Operative midwifery / by J.M. Munro Kerr.

Contributors

Munro Kerr, J. M. 1868-1956.
University of Glasgow. Library

Publication/Creation

London : Baillière, Tindall and Cox, 1908.

Persistent URL

https://wellcomecollection.org/works/ds9w9xmw

Provider

University of Glasgow

License and attribution

This material has been provided by This material has been provided by The University of Glasgow Library. The original may be consulted at The University of Glasgow Library. where the originals may be consulted. Conditions of use: it is possible this item is protected by copyright and/or related rights. You are free to use this item in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s).

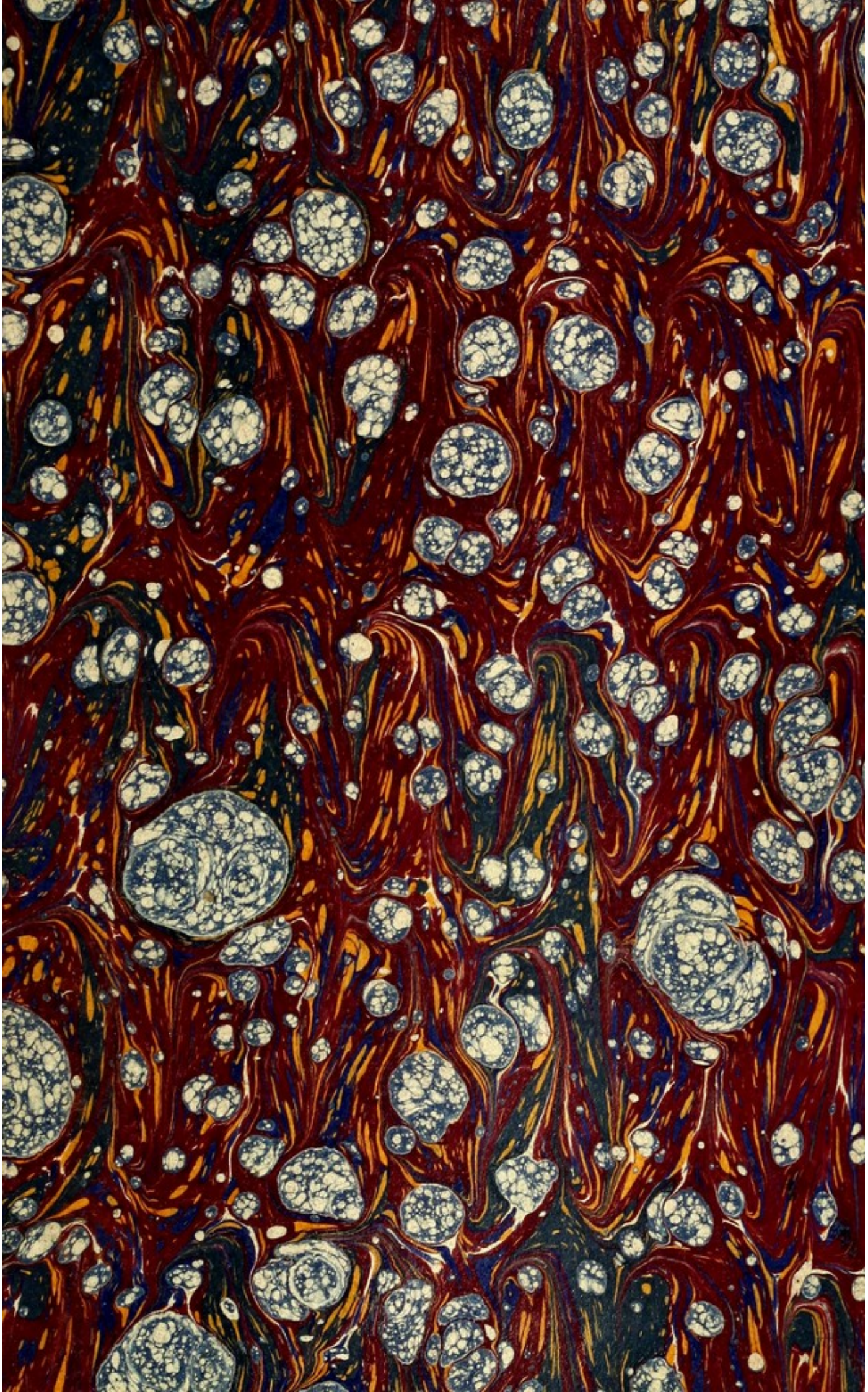
wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

STORE

Glasgow
University Library

* 345 - 1909
STORE
gf25 - y . 214



Digitized by the Internet Archive
in 2015

https://archive.org/details/b21460668

OPERATIVE MIDWIFERY

OPERATIVE MIDWIFERY

BY

J. M. MUNRO KERR, M.B., C.M., GLAS.

FELLOW OF THE FACULTY OF PHYSICIANS AND SURGEONS, GLASGOW

OBSTETRIC PHYSICIAN, GLASGOW MATERNITY HOSPITAL; GYNÆCOLOGIST, WESTERN INFIRMARY; PRESIDENT OF THE GLASGOW OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY; LATE ASSISTANT TO THE REGIUS PROFESSOR OF MIDWIFERY, GLASGOW UNIVERSITY

WITH 294 ILLUSTRATIONS IN THE TEXT

LONDON
BAILLIÈRE, TINDALL AND COX
8, HENRIETTA STREET, COVENT GARDEN
1908

[*All rights reserved*]

28

TO THE MEMORY OF

ROBERT BARNES, M.D., F.R.C.P.

PREFACE

MANY years have elapsed since a treatise devoted entirely to Operative Midwifery has appeared in the English language.

In venturing to consider the subject in these pages, I have constantly had before me two standard works. I refer to Barnes' 'Lectures on Obstetric Operations' and Herman's 'Difficult Labour,' the former a classic in obstetric literature, the latter a most valuable companion at the bedside.

As will be seen, I have followed very much the same lines as Barnes, whose 'lectures' have always appeared to me nearly perfect. Much, however, has happened since the publication of the last edition in 1886. At that time antisepsis and asepsis in midwifery were only beginning to be discussed; abdominal palpation for the diagnosis of presentations and positions of the fœtus was practised by only a few; the revival of symphysiotomy had newly begun; the modern operation of Cæsarean section had been described by Sänger only a year or two previously; while operations upon the pregnant or parturient woman for abdominal and pelvic tumours were had recourse to only in the most desperate circumstances. Indeed, the changes that have taken place have their parallel only in the revival that followed the scientific teaching of Ambroise Paré.

In considering the various pathological conditions causing dystocia and the methods of dealing with them, I have tried, as far as possible, to indicate what is becoming more apparent every day, that the art of midwifery can no longer be considered a subdivision of medicine, but must be regarded as a branch of surgery requiring a thorough knowledge of surgical principles.

I trust it shall be found that due credit has been given to those who have specially advanced the art of obstetrics in recent years. The names of many who have thus distinguished themselves in this and other countries are mentioned throughout the text, but it is impossible to avoid overlooking some, and to them I offer my apologies.

For actual assistance rendered, I desire to thank especially Dr. J. W. Ballantyne, of Edinburgh, for kindly contributing the chapter on dystocia caused by double monsters; Dr. Riddell, of the Glasgow Royal Infirmary, for his note on pelvic radiography; and Dr. Dickie, my assistant at the Western Infirmary, for revising and correcting the proofs and rendering me much assistance in other ways. I am also indebted to my colleagues, Drs. Jardine and Russell; Dr. W. L. Reid, Dr. Teacher, Dr. Lindsay, Dr. Dunlop, and Dr. James Scott, of Glasgow; Dr. Adam of Hamilton, Dr. Hewetson of Birmingham, Dr. Lloyd Roberts and Dr. Donald of Manchester, Dr. Haultain of Edinburgh; Dr. Cullingworth, Dr. Herman, Dr. Spencer, and Mr. Bland-Sutton, of London; Professors Bumm and Nagel of Berlin, Professor Bar of Paris, and Professor Edgar of Philadelphia, for permitting me to use illustrations and statements which have appeared in their published works. I must also thank the publishers of the *Journal of Obstetrics and Gynæcology of the British Empire*, the *Practitioner*, and the *American Year-Book*, for the loan of several valuable illustrations, and Messrs. Arnold and Sons, and Gardner and Son, for the blocks of the instruments here illustrated.

Such of the illustrations of the pathological specimens as have not been lent me are, for the most part, from photographs and drawings of specimens in the Hunterian Museum, Glasgow University, in the Pathological Institute of the Western Infirmary, and in my own collection. The photographs of the different stages in the various operations were taken under my direction in the Glasgow Maternity Hospital. All the original drawings are by Mr. A. K. Maxwell, of Glasgow, to whom I am grateful for the trouble he has taken.

I must also thank the publishers for the courtesy with which at all times they have met my wishes.

J. M. MUNRO KERR.

7, Claremont Gardens, Glasgow.
August, 1908.

CONTENTS

CHAPTER		PAGE
I.	CONSIDERATION OF DYSTOCIA IN GENERAL—CLASSIFICATION OF DYSTOCIA	1
II.	DYSTOCIA THE RESULT OF FAULTS IN THE FORCES: UNDUE STRENGTH OF THE FORCES—PRECIPITATE LABOUR—INEFFICIENCY OF THE FORCES	5
III.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS: ATTITUDE, POSITION, AND PRESENTATION—ABDOMINAL PALPATION—VAGINAL EXAMINATION—AUSCULTATION—OTHER METHODS OF EXAMINATION	15
IV.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): ABNORMAL ATTITUDE AND POSITION OF THE HEAD—PROLAPSE OF LIMBS ASSOCIATED WITH PRESENTATIONS OF THE HEAD	26
V.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): BREECH PRESENTATIONS	50
VI.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): TRANSVERSE OR OBLIQUE PRESENTATIONS	85
VII.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): MALFORMATION OF FŒTUS	96
VIII.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): PRESENCE OF MORE THAN ONE FŒTUS	112
IX.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): DOUBLE MONSTERS, BY J. W. BALLANTYNE, M.D., F.R.S. EDIN., ETC.	121
X.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*): CORD—PLACENTA—MEMBRANES	131
XI.	DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL: DEFORMITIES OF THE BONY CANAL—CLASSIFICATION OF THESE DEFORMITIES AND CONSIDERATION OF THE DIFFERENT VARIETIES	152

CHAPTER PAGE

XII. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): DIAGNOSIS, PROGNOSIS, AND TREATMENT OF PELVIC DEFORMITIES, MORE ESPECIALLY OF THE VARIETIES OF RACHITIC MALFORMATION - - 176

XIII. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): ABNORMALITIES IN THE SOFT PARTS—CERVIX—VAGINA—PERINEUM - - 199

XIV. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): CARCINOMA OF CERVIX - 212

XV. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): TUMOURS OF OVARY - 221

XVI. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): MYOMA OF UTERUS - 234

XVII. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): TUMOURS OF BLADDER AND RECTUM - - - - - - - 256

XVIII. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): SUPPURATIVE CONDITIONS IN PELVIS AND ABDOMEN - - - - 260

XIX. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): ALTERATION IN THE AXIS OF THE CANAL—DISPLACEMENTS BACKWARD, FORWARD, DOWNWARD—DISPLACEMENTS THE RESULT OF VAGINAL AND ABDOMINAL FIXATION OF THE UTERUS - - 265

XX. DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*): MALFORMATIONS OF UTERUS AND VAGINA - - - - - 294

XXI. PREPARATIONS FOR OPERATION: PREPARATION OF OPERATING-ROOM, INSTRUMENTS, AND APPLIANCES—OPERATOR'S HANDS —PATIENT—ANÆSTHESIA - - - - - 303

XXII. VERSION - - - - - - - 316

XXIII. FORCEPS - - - - - - - 333

XXIV. FORCEPS (*continued*): FORCEPS IN CONTRACTED PELVIS - 363

XXV. SYMPHYSIOTOMY, PUBIOTOMY, OR HEBOTOMY - - 374

XXVI. CÆSAREAN SECTION - - - - - - 402

XXVII. INDUCTION OF PREMATURE LABOUR—INDUCTION OF ABORTION 432

XXVIII. ACCOUCHEMENT FORCÉ, INCLUDING VAGINAL CÆSAREAN SECTION - - - - - - - 454

XXIX. OPERATIONS INVOLVING DESTRUCTION OF THE CHILD: CRANIOTOMY — DECAPITATION — EVISCERATION — SPONDYLOTOMY—CLEIDOTOMY - - - - - 477

CHAPTER		PAGE
XXX.	MANUAL REMOVAL OF PLACENTA AND MEMBRANES	507
XXXI.	ABORTION—HYDATIDIFORM MOLE	516
XXXII.	ECTOPIC PREGNANCY—PELVIC HÆMATOCELE—PREGNANCY IN RUDIMENTARY HORN (CORNUAL PREGNANCY)	536
XXXIII.	PLACENTA PRÆVIA—ACCIDENTAL HÆMORRHAGE	577
XXXIV.	POST-PARTUM HÆMORRHAGE	608
XXXV.	ACCIDENTS TO MOTHER: LACERATION OF UTERUS, VAGINA, PERINEUM, SYMPHYSIS PUBIS	617
XXXVI.	ACCIDENTS TO MOTHER (*continued*): INVERSION OF UTERUS—PULMONARY EMBOLISM—SUBCUTANEOUS EMPHYSEMA	657
XXXVII.	ACCIDENTS TO CHILD — INJURIES TO BONES, MUSCLES, NERVES, ETC.; ASPHYXIA NEONATORUM	668
	APPENDIX	689
	INDEX	692

OPERATIVE MIDWIFERY

CHAPTER I

CONSIDERATION OF DYSTOCIA IN GENERAL—CLASSIFICATION OF DYSTOCIA

When all the most distinguished writers of obstetric treatises in the past have failed to give an absolutely satisfactory definition of dystocia, it may be fairly assumed that the task is impossible. That this should be so is not to be wondered at when the other condition of normal labour or eutocia can only be described by cumbersome details of its phenomena. Fortunately, a definition is not essential to an understanding of dystocia. One is not long in obstetric practice until one forms an idea of the condition; indeed, it might prevent a full appreciation of the fact that Nature in parturition, although generally following a certain course, refuses to be trammelled by hard-and-fast rules. It is important for the accoucheur to remember this, and to appreciate within what limits she may be allowed a free hand. The mistake is too often made of forgetting this and of interfering with Nature, when, with a little patience, it would have been unnecessary.

But if it is of great importance that the accoucheur should appreciate the natural variations of parturition, it is equally important that he should recognize when Nature is at fault and requires assistance, and that he should do this as early as possible. He must never presume that a parturition is normal. He must not be content until he has satisfied himself that it is not abnormal. This attitude must be assumed in every labour. Again and again one sees how failure to do this results in complications being overlooked until they cannot be remedied, and the child's, and even, occasionally, the mother's, life is sacrificed or greatly endangered.

Another matter which the accoucheur should ever bear in mind is the limitations of the different operative procedures. Repeatedly in the last few years cases have been admitted to the Glasgow

Maternity Hospital where the medical attendant has failed absolutely to appreciate this. Most of these cases have been examples of contracted pelvis or impacted shoulder presentation. It would appear as if the accoucheur considered it a disgrace not to be able to accomplish delivery by forceps or by version, and so he has recourse to unjustifiable force. As I shall point out in the following pages, the employment of unjustifiable force is always wrong; it may often be followed by no trouble—indeed, it may even appear to be quite successful—but in hundreds of cases it results in more or less serious consequences, and it is absolutely unscientific. It almost invariably means that the operation is unsuitable or is being badly performed. I cannot deny that occasionally one is compelled to exert a degree of force which is justifiable owing to exceptional circumstances. These circumstances, however, will be referred to in their proper places. Here I would only remark that when an undue amount of force in the extraction of the child is employed it should only be exerted in the interests of the child. If the child is dead or dying, delivery should be completed by diminishing the bulk of the child by embryulcia. It is quite profitless to drag a dead child out of the parturient canal with difficulty, when by performing craniotomy one could extract it with great ease. In a difficult labour, therefore, the accoucheur must carefully observe the condition of the child. He must never sacrifice it, if, with safety to the mother, he can save it, but he must effect the delivery in the easiest manner should it succumb.

Naturally, the relative claims of mother and child frequently require to be considered in cases of dystocia, and nothing taxes so much the judgment of the accoucheur as giving each its proper place, for their interests are often antagonistic. Let me illustrate this by two simple examples. In placenta prævia by rapidly dilating the cervix and extracting the child a large proportion of children will be saved, but by doing so one submits the mother to very great danger; on the other hand, by bringing down a foot, one does the safest thing for the mother, but not the best for the child. Again, take a case of contracted pelvis where labour has been allowed to proceed to an advanced stage and many vaginal examinations have been made. If the child is still alive, Cæsarean section will almost certainly result in its life being saved, but the danger of sepsis to the mother will be enormous, while if craniotomy is performed the child will be sacrificed, but the mother probably rescued. Only experience and a quiet consideration of all the circumstances will teach the obstetrician how to act. No hard-and-fast rules can be laid down, and different obstetricians, of equal ability, knowledge, and experience, may act differently under the same circumstances. The obstetrician must ever avoid taking

up an extreme position and becoming a partisan for or against any particular treatment. Progress in obstetrics has been much retarded in all ages by those who have unfortunately adopted such an attitude. When one finds equally distinguished obstetricians holding absolutely different views, it is almost certain that the right is with none. Personally, I know of no recognized obstetric operation which has not its place and may not be practised with advantage under certain conditions, and I consider that obstetrics has been greatly advanced by the revival of symphysiotomy, by the introduction of Bossi's metal dilator, and by vaginal Cæsarean section.

There are three factors which influence labour—the *forces*, the *child*, and the *passage*—and no attitude towards dystocia could be sounder than attempting to estimate in every case how far each of these factors is disturbed. This is often difficult, especially in the minor forms of dystocia, for sometimes more than one, and indeed all three, are at fault. The obstetrician, however, must carefully consider all, and relegate to each its proper place. The easiest explanation of a delay or difficulty is to blame the forces—the factor which is most indefinite and most difficult to exactly estimate. For this very reason, therefore, and because it is the least serious, the accoucheur should not rest satisfied with attributing the trouble to it until he has made certain that neither of the other two factors is disturbed. This matter will be more fully considered in the next chapter.

But labour may be further disturbed by accidents to the parturient, such as rupture of the uterus; by hæmorrhage, such as that which is associated with placenta prævia; by displacements of the uterus, such as retroversion, all of which, and many other complications considered in these pages, the accoucheur must be alert to appreciate and deal with. Frequently he has to do this with all celerity under conditions not too favourable and with very inadequate assistance. Appreciating this fully, I have tried, in considering all complications, not only to describe the ideal treatment of the particular condition, but also, when such a treatment is impossible, to indicate the best course to follow under the circumstances.

There remains, however, another group of cases where the factors of labour may or may not be disturbed, but where operative interference becomes necessary in the interests of the mother or child, because the mother's or child's vitality shows signs of progressive weakness.

In the case of the mother, where actual disease such as valvular disease of the heart, phthisis, hyperemesis, etc., are not present, it will be found almost without exception that one or more of the factors of labour is disturbed. In this connexion it must be remembered that women bear labour very differently, and that consequently, with some

it will be necessary to interfere earlier than with others. Generally speaking, the cardiac condition, as indicated by the pulse, is a fair guide. To have the full benefit of this guide, however, one must know beforehand the ordinary rate and character of the pulse, for I have found it by no means uncommon to get a pulse-rate of 90 or 100 quite early in labour—indeed, even during the later weeks of pregnancy. A steadily rising pulse-rate is of most value, and must always be looked upon as a danger signal. The same applies to a steadily rising temperature and increasing restlessness.

I have only referred to the early indications for interference, and have not mentioned tetanic contraction of the uterus, tenderness over the lower uterine segment, and the appearance of Bandl's ring. Without doubt, these also are indications for immediate delivery. As we shall see, when rupture of the uterus is being considered, they are symptoms of the very greatest seriousness. But they should never be allowed to develop; the uterus should be emptied long before they make their appearance.

As regards the child, a steady slowing of the fœtal heart, especially when the rate decreases to about 100, always points to the child's life being in danger. At such a time one finds the cardiac sounds much affected by the uterine contractions. At all times they are very much slower during the contractions, but if the child's vitality is undisturbed they immediately return to the ordinary rate as the contractions pass off. When they return slowly, and especially when they are irregular, there is no time to lose if the child is to be saved.

The escape of meconium in all presentations other than the breech is another danger signal on the side of the child. No doubt small quantities of meconium are frequently discharged into the amnionic cavity even during pregnancy, but its free escape during labour, unless the child's cardiac condition is absolutely satisfactory, calls for speedy delivery.

Very strong and irregular fœtal movements also frequently precede the death of the fœtus during labour. With the mother very restless and suffering from the pains of labour, however, such a symptom is seldom of much practical value. We must depend, therefore, almost entirely upon the condition of the fœtal heart. If the labour is at all protracted, the accoucheur must auscultate the fœtal heart frequently; he must note its rate and character, and how it is affected by the uterine contractions.

CHAPTER II

DYSTOCIA THE RESULT OF FAULTS IN THE FORCES

Undue Strength of the Forces—Precipitate Labour—Inefficiency of the Forces.

If the question were asked, What is the commonest cause of minor dystocia and delay in labour? without doubt the answer would at once be given—Faults in the expulsive forces. But, while such an answer is quite correct, all who have had much experience of obstetric practice must admit, that very frequently such an explanation is given too readily and without sufficient consideration. It is so simple and vague that one is tempted to be satisfied with it, whenever the cause of the dystocia is not strikingly apparent. I have frequently found the real cause some little departure from the normal in the pelvic cavity or in the position or attitude of the child, so much so that I think it a good rule to attribute delay and difficulty in labour only to faults in the forces, when one has absolutely satisfied oneself that the fault is not in the passage or passenger.

In approaching this subject of the forces as a factor of dystocia, one is arrested at the very outset, by the fact that there is no standard for, or means of, estimating the forces. With dystocia associated with the passage and passenger, we shall see that it is quite otherwise, for by investigation and careful consideration the degree of difficulty may be fairly correctly surmised.

I have said that there is no means of estimating the forces. By that, I mean, there is no practical method of doing so beyond the simple expedient of applying a hand over the abdomen and estimating the frequency, duration, and effect of the uterine contractions. One cannot measure the forces, and say that one has a force of so many millimetres of mercury too little or too much.

There have been many attempts to measure the forces of labour. Duncan and Poppel, for example, estimated the resistance of the membranes to a bursting force. Others attempted to measure them by attaching a dynamometer to the forceps, and so estimating

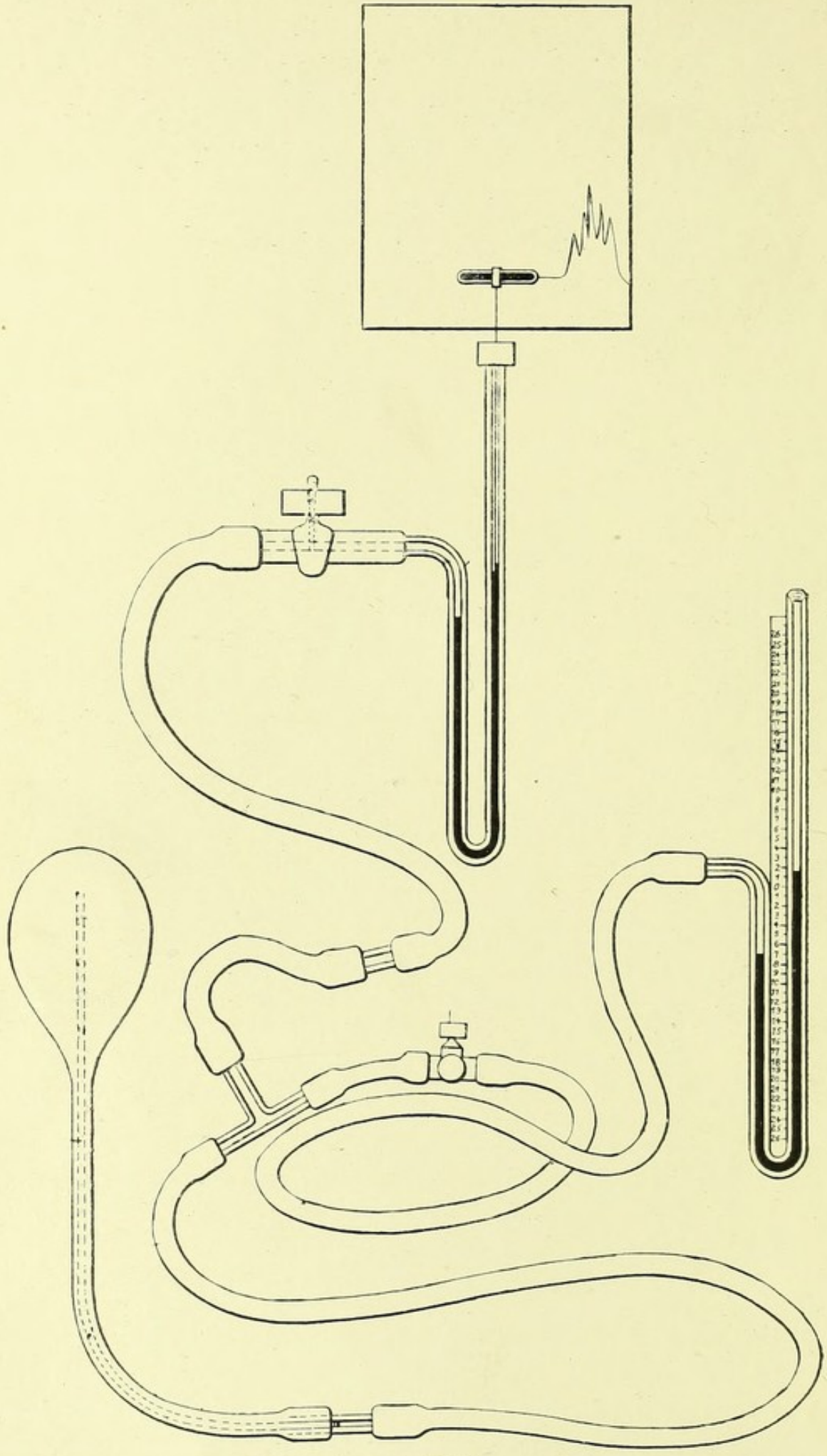


Fig. 1.—Schatz's Tokodynamometer.

the amount of force required to extract the child. It is, however, unnecessary to discuss results obtained by such methods, for it is at once apparent that no exactness could possibly be obtained by such devices.

The earliest and most scientifically constructed instrument for calculating the uterine force is the tokodynamometer of Schatz (Fig. 1), described some forty years ago.[1] By means of it, and its modifications, many interesting observations and tracings have been made by different observers, showing the features of normal and abnormal uterine contractions. In recent years Schäffer[2] has given this subject special consideration, and by means of his instrument has also made many tracings. Schäffer's instrument (Fig. 2) has the advantage of being more easily applied, although, of course, one cannot

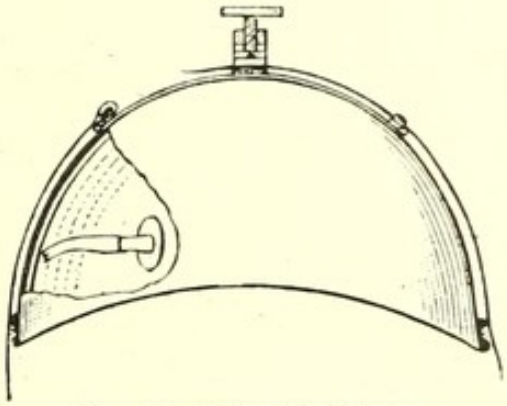


Fig. 2.—Schäffer's Pelotte.

estimate the uterine contractions so accurately with it, as with Schatz's and similar instruments. Schäffer states that in the interval of the contractions the pressure is 5 millimetres of mercury, and during the contractions it varies from 80 to 220 millimetres. He also considers that the power of the uterine contractions and auxiliary forces is about equal. But although such instruments and investigations are of decided scientific interest (Fig. 3), they are, at present, of no practical value. In practice one can only estimate the efficiency of the forces of labour by the progress made.

The expulsive forces may be abnormal in two ways: they may be unusually strong or they may be unusually feeble and ineffective. Although excessively strong uterine contractions and the resulting condition of *precipitate labour* does not, properly speaking, come under the head of dystocia, it is a subject, regarding which, it is permissible to say a word. The first striking feature of precipitate labour as one encounters it in practice, is the fact that it is peculiar to certain individuals. This is due not only to the strength of the uterine

[1] *Archiv f. Gyn.*, Bds. iii. and xxvii.

[2] 'Experimentelle Untersuchungen über Wehenthätigkeit,' Berlin, 1896.

contractions, but also, and even in greater part, to the slight resistance offered by the soft parts of the parturient canal. Very frequently such patients state that they have had only 'one or two pains,' which shows that the process of dilatation, usually accompanied by much suffering, occasionally does not set up nervous phenomena termed 'pain.'

The ordinary dangers of precipitate labour are familiar to every one, rupture of the perineum, post-partum hæmorrhage, injuries to the child. In addition, there has occasionally followed a subcutaneous emphysema, and still more rarely fracture of the sternum. Both these complications are considered in Chapter XXXVI. Walthard[1] points out that emphysema is very rare in precipitate labour. Certainly, the two cases I have had experience of followed labours

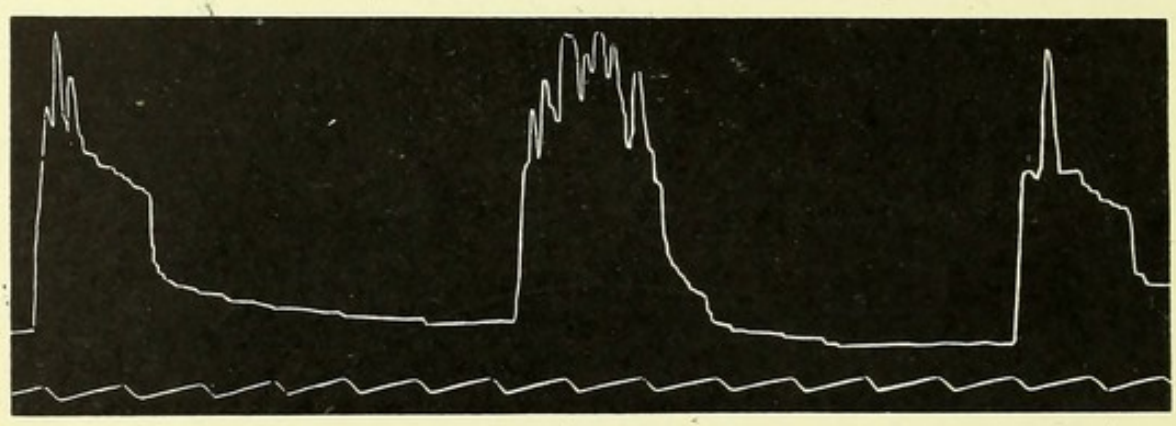


Fig. 3.—Uterine Contractions registered by Schäffer's Instrument.

in which the bearing-down efforts were prolonged and of unusual severity.

We are more concerned here, however, with the other condition, in which the expulsive forces are feeble and ineffective. As the expulsive forces consist of two component parts, the uterine contractions and the auxiliary forces, it is natural to expect that labour may be protracted sometimes by one, sometimes by the other, and occasionally by both being at fault.

Uterine contractions, to be effective, should possess three characteristics. They should occur at regular but not too long intervals, they should be strong, and they should be sustained. As labour advances these features should become more decided. Sometimes all three are at fault, but the most frequent cause of delay is the weakening and cessation of the contractions just when they should continue.

Uterine inertia may be primary or secondary. Primary uterine inertia is due to the inherent weakness of the uterine muscle or to errors in its innervation. It may also be the result of some reflex

[1] Winckel's 'Handbuch,' 1905, Bd. ii., Teil iii., p. 2094.

irritation inhibiting the action of the muscular contractions. Secondary uterine inertia, on the other hand, results from the muscle becoming tired and worn out. Primary uterine inertia may be easy of explanation, as in cases where the uterus is known to be diseased from chronic metritis, or tumours; is overdistended by an excessive quantity of liquor amnii or more than one fœtus; or has its contractions inhibited by some reflex irritation, such as retention of urine, premature rupture of membranes, etc. In very many cases it is extremely difficult to account for the inertia, and in such errors in development and innervation are vaguely spoken about. Although, however, one cannot always give a reason for the inertia, one can at least say that it is not necessarily found in cases of general debility. Nor is it a characteristic of individuals of feeble muscular development; indeed, it has been my experience to find it more commonly in the strong and athletic than in those of poor muscular physique. It is often a feature of labour in young primiparæ, and is not infrequently seen in old primiparæ, probably as the result of increased resistance in the soft parts. In the cases of decided uterine malformation which have been under my care it has not been a striking feature, although others have observed it in such cases.

With secondary uterine inertia it is quite different. Here, one has to deal with forces which up to a certain point were acting quite satisfactorily, but which for some reason gave out. If there has been a prolonged labour, and especially if there has been some abnormality in passage or fœtus, one can readily understand this, for muscle cannot go on contracting indefinitely, it becomes exhausted. The time at which the uterine muscle becomes fatigued varies in different individuals; sometimes it occurs early, sometimes late. Many speak vaguely of defective innervation in such cases, and claim that this results from congestion of the lower part of the uterus and cervix. Certainly it is not uncommon in cases of premature rupture of the membranes, and generally contracted pelves, in both of which the presenting head presses unduly on the lower part of the uterus.

In the second stage of labour, when the expulsive forces are feeble, the uterus is often blamed, when, as a matter of fact, the fault is more in the auxiliary forces. One repeatedly sees regular, strong, and even frequent uterine contractions cease when they should continue. In such cases it will invariably be found that the auxiliary forces, the abdominal and other muscles concerned, are at fault. It is not uncommon in very stout individuals and in those with pendulous abdomens, and feeble or widely separated recti. Again, it is very common in nervous and excitable women, and in those who bear pain badly or feel pain acutely. But the expulsive forces are some-

times inhibited by such simple conditions as overdistension of bladder or rectum, and one frequently sees strong bearing-down efforts follow the emptying of these viscera. It must not be forgotten, however, that a considerable amount of the strength of the auxiliary forces and the uterine contractions in the second stage is reflexly set up by the mechanical stimulus of the presenting part upon the pelvic floor. Feebleness of the forces is therefore not infrequently the result of non-descent of the presenting part. Every one is familiar with the effect which the introduction of the hand or a blade of the forceps has on the forces. Such treatment is seldom employed in the present day, although it was a common practice in ancient times.

The recognition of uterine inertia is not difficult, provided one makes it a rule always to exclude the possibility of other pathological conditions being the cause, and only concluding that the forces are at fault when there is nothing else to account for the protraction of the labour. If this precaution is not taken mistakes will constantly be made.

The operator, when it is a question of uterine inertia, should note the frequency and duration of the uterine contractions. Unfortunately, there is no standard for comparison. Every individual is a law unto herself, and sometimes, even the character of the parturition, varies in different labours in the same individual. As labour progresses there should be an increase in the frequency, severity, and duration of the uterine contractions, and there should be a steady descent of the fœtus. Frequently the uterine activity ceases for a time, and it will be found advantageous to encourage this by the administration of a full dose of opium or morphia. After such a lapse the uterus resumes its activity, and labour progresses rapidly.

As regards the treatment of inertia of the uterus there is little to be said, and, unfortunately, not a great deal to be done.

As protraction of the first stage of labour causes no concern, it will be found best not to interfere beyond removing any condition which may be reflexly inhibiting the uterine activity. Thus, it is important to keep the bladder and bowels empty, and to remove any irregular uterine contractions—the so-called ' false pains '—by small doses of opium or morphia. Often a change in position is useful, and usually in this stage the most progress is made when the parturient keeps moving about.

Many stimulants to uterine contraction have been suggested. Amongst them may be mentioned irritation of the breasts, massage of the uterus, electricity, hot vaginal douching, separation of the membranes, rupture of the membranes, dilatation of the cervix by means of the hand or metal dilators, and the administration of various drugs having a special effect upon uterine activity. Of great

antiquity are the two first methods, and certainly both, but especially the second, at fixed intervals, bring about uterine contractions. It is very questionable, however, if they advance labour to any great extent. From electricity little better results are obtained. The safest manner in which it can be employed is to apply one pole over the uterus and the other over the dorsal vertebræ. The introduction of an electrode into the vagina is undesirable. Some favour the continuous and others the faradic current, but only a few electrical enthusiasts consider the treatment of any practical service.

The various devices of irritating the uterus by stimulating the cervix are sometimes of value. Hot vaginal douchings, especially if there is any undue resistance in the soft parts, are often of decided benefit. Separation of the membranes from the lower portion of the uterus, the injection of glycerine, and manual or mechanical dilatation of the cervix, need hardly come into consideration here, for, properly speaking, they are methods of inducing labour. They will be considered, therefore, when that subject is under discussion.

As regards the drugs which have been recommended and employed for the purpose of stimulating uterine contractions, ergot and quinine are the most important. Some others, such as pilocarpin and ipecacuanha, have a similar effect, but only the two first mentioned are now used. Of these the more important is ergot, in the form of the liquid extract, or ergotin. Ergot given in full doses produces uterine contractions of a tetanic nature. Every one knows this from clinical experience, and Schatz many years ago demonstrated it by means of his tokodynamometer. By one and all, therefore, it is condemned. That matter was settled long ago once and for all.

The administration of ergot in small doses is another matter. Satisfactory results have been obtained by Schatz, Schäffer, and the late Moore Madden. In spite of the experience of these observers, however, it is generally condemned.

Several writers have reported favourably of quinine sulphate, given in two or three doses of from 2 to 4 grains. Larger doses do not seem to give any better results. It is claimed that the uterine contractions produced by the drug do not present the unfavourable features which follow the administration of ergot. Personally, I have been disappointed with the results.

All the methods of treatment which have been considered may be employed in both stages of labour. When, however, the second stage has been reached, other manœuvres may be tried, for then the auxiliary forces have likewise to be stimulated. Amongst the devices to stimulate the latter may be mentioned mechanical irritation of the vagina and perineum by the colpeurynter or the hand. The

latter of these is never employed at the present day. As regards the colpeurynter, however, it is frequently employed, especially on the Continent. Bürger[1] refers to it favourably. The only form of mechanical stimulation extensively employed is massage of the uterus at regular intervals. I have never seen it do much good.

Encouraging the patient to bear down, and removing any reflex condition which may be inhibiting the action of the forces, has often a very beneficial effect. Especially is this seen in cases where the parturient is very nervous and excitable, and complains greatly of the pain of the uterine contractions. Thus, it will be found that inhalations of small quantities of chloroform are of great service. It is surprising how such treatment is often followed by strong expulsive efforts. But in other cases, when the symptoms mentioned are not present, chloroform has no effect, and sometimes even retards the progress of labour.

Before leaving the subject of uterine inertia, an important question must be considered—viz., how far does inertia justify one in having recourse to artificial delivery? As regards this matter there are two distinct opinions. There are those who maintain that inertia *per se* is never a sufficient indication, and that one must wait until the maternal pulse and temperature is disturbed, or until the fœtal heart shows signs of being injuriously affected. On the other hand, there are those who recommend interference before these symptoms manifest themselves. They try to anticipate the symptoms.

What are the facts of the case? The effect of uterine inertia is to prolong labour, which in itself adds materially to the discomfort of the parturient. If it is only the first stage that is affected, nothing further results; neither the mother nor the child is endangered except when the membranes rupture prematurely, and even in such cases there is a tendency to exaggerate the danger. As regards the second stage, the real trouble in private practice is that unusual delay is an inconvenience to the patient and those in attendance. The risk of infection in such cases is increased, largely because vaginal examinations are made at short intervals, with the object of ascertaining if any progress is being made. The dangers to the child and the soft parts of the parturient canal are not so great as is generally imagined. On theoretical grounds, therefore, non-interference is clearly the right attitude. It is an attitude which is logical, and serves as a good working rule for one's guidance, and I have every sympathy with those who adopt it. Still, in spite of that, I follow in practice those who consider that prolongation of the second stage to several hours is sufficient reason for operative interference in cases in which

[1] *Archiv f. Gyn.*, Bd. lxxvii., Heft iii., p. 546.

there is no disproportion between fœtus and maternal pelvis. My position is quite illogical—but my answer is, the human body is not a machine, and one cannot treat it as such. The temperature and pulse may be very considerably disturbed during labour, and even before labour commences, or they may respond slowly to the irritation of labour. As regards the child, my experience is, that if one waits until the fœtus shows signs of circulatory disturbances, it will, when delivered, be more asphyxiated than was expected.

I hope there is no misunderstanding regarding my attitude, or a belief that I favour early interference. Early interference in the second stage, unless there is some decided indication for it, in mother or child, cannot be too strongly condemned. Without doubt, it is responsible for many of the minor ailments which follow parturition, as it certainly is the cause of vaginal and perineal lacerations, which might have been avoided by allowing the pelvic floor to become gradually distended by the presenting part.

Besides uterine inertia, or the extreme condition of atony referred to, it sometimes happens that the uterine contractions are irregular in character. We meet with this in two forms—general tetanic contraction of the uterus, and spasmodic local contraction.

Tetanic contraction of the uterus (tetanus uteri) is a condition seen in certain cases of extreme dystocia, when the uterus has been long trying to overcome the obstruction to the birth of the child. Thus, one sees it in marked degrees of pelvic deformity and in impacted transverse presentations. One also encounters it when ergot has been freely administered. Such a condition is to be distinguished from the ordinary form of retraction of the uterus found after the membranes have ruptured, by the fact that it is associated with great pain and discomfort, and a uterus uniformly convex and tender to pressure.

This complication is one of extreme gravity, and as a matter of fact, is usually the result of mismanagement. A uterus should not be allowed to get into a condition of tetanus. When this occurs, the first thing to do is to moderate the contractions by inhalations of chloroform and a hypodermic injection of morphia. By such means the tetanic contractions can always be removed, except when the condition has followed the administration of ergot.

After the tetanic contractions have been relieved, delivery should be completed in the safest manner possible, and here it may be remarked that, as the child will almost certainly be dead or dying, too much consideration need not be given it. Having extracted the child in such cases, one must always be prepared for post-partum hæmorrhage, and post-partum hæmorrhage of a very troublesome

character. If there is any suspicion of rupture of the uterus, it must be carefully examined.

Localized contractions of the uterus, the other form of irregular contraction, are of interest both in pregnancy and labour. They are specially liable to occur in the three regions where the circular muscular fibres are pronounced—viz., the orifices, the os internum and externum, and the openings of the Fallopian tubes. In pregnancy such contractions about the Fallopian tubes have frequently led to errors in diagnosis, for on bimanual palpation the irregular swelling closely resembles an interstitial myoma or an extra-uterine pregnancy. Bar[1] has more than once referred to these irregular contractions, and I have witnessed the occurrence on several occasions.

During labour such localized spasmodic contractions often cause considerable discomfort, and when they occur about the retraction ring (strictura uteri), or about the external os (trismus uteri, spasmodic rigidity of the cervix), they may actually interfere with the birth of the child.

Spasmodic contraction of the retraction ring usually follows a protracted labour in which the passage or passenger is at fault. The retraction ring may sometimes be so applied to the child as to arrest its expulsion, when the presentation is by the breech or by the head, while in the third stage retention of the placenta is a common sequela. These, like other varieties of irregular uterine contractions, are relieved by chloroform, opium or morphia.

[1] *Bulletin de la Soc. d'Obstét. de Paris*, February 16, 1905.

CHAPTER III

DYSTOCIA THE RESULT OF FAULTS IN THE FŒTUS

Attitude, Position, and Presentation—Abdominal Palpation—Vaginal Examination — Auscultation — Other Methods of Examination.

Amongst the commonest causes of dystocia attributable to the fœtus are alterations in its attitude, position, and presentation.

Each of these terms has its particular significance. *Attitude* is the relationship of the different parts of the child to one another. *Presentation* is the relationship of the long axis of the child to the long axis of the uterus. *Position* is the relationship which a particular part of the child bears to a particular part of the pelvic wall. Thus, we consider the child in the normal attitude when it lies flexed with its chin against the sternum and its upper and lower limbs folded across the upper and lower parts of its trunk; in the normal presentation when it lies longitudinally with its head lowermost; and in the normal position when the long axis of its head lies in the right oblique diameter of the pelvis with the occiput anterior (Fig. 4).

Abdominal Palpation.—To make out differences in attitude, position, and presentation is not always easy, and is especially difficult if one depends entirely on the older method of vaginal examination. Indeed, by such an examination, nothing can be made out so long as the os is undilated and the presenting part is high in the pelvis. Labour has to be in progress before anything can be affirmed regarding the presenting part.

With the newer method of examination by abdominal palpation it is quite otherwise, for during pregnancy and early in labour, the presentation and position of the child can generally be defined without much difficulty. But abdominal examination possesses another advantage over the vaginal. It renders repeated vaginal examinations less necessary, and diminishes the risks of infection. Indeed, it is in great part because of this that it has come into such favour.

The two obstetricians whose names are especially connected with the perfecting of this method are Pinard in France and Leopold in Germany. The most valuable monograph in the English language is

Fig. 4.—From a Dissection of a Uterus at Term. The Woman died of Eclampsia. (Photograph by Dr. James Scott.)

one by McLennan,[1] of Glasgow, who has considered the subject most exhaustively and given a complete literature.

To practise abdominal palpation with a view to making out the exact position and presentation of the fœtus it is necessary to place

[1] 'Abdominal Manipulations in Pregnancy.' London, 1902.

the patient to be examined on her back with the head slightly raised. The bladder must be emptied shortly before the examination, and the woman must be perfectly comfortable and breathe quite freely.

The accoucheur, after heating his hands in warm water, should place them on the patient's abdomen. At first the pressure should be gentle, but it may be increased gradually. It is of great importance to avoid, as far as possible, setting up uterine contractions and spasms in the abdominal muscles. It will tend to relaxation of the abdominal wall if the patient's attention is diverted, and when moving the hands from one place to another if they are slid over the surface, not lifted and suddenly planted down again. It should be

Fig. 5.—Palpation of the Fœtal Part situated at the Pelvic Brim.

remembered, also, that it is not the tips of the fingers which are to be used, but their whole palmar surface, and that while one hand is making out what is beneath it, the other steadies the distended organ.

The parts of the child which require to be located are the head, breech, limbs, and back.

The first manœuvre or 'grip,' which has for its object the location of the fœtal parts situated over the brim, is carried out by passing the two hands down along the sides of the uterus towards the brim of the pelvis. To do this the accoucheur should stand or sit at the right side of the patient (Fig. 5). In most cases the head will be

found at the brim, and will be recognized as a large, hard, globular mass. The beginner must make sure that it is really the presenting head and not the pelvic brim he feels. The pelvic brim should therefore be defined, and then the fingers slipped over it on to the presenting part, when a depression will be found between the brim and the head. If the head has descended low into the pelvis, and especially if the uterus is very tense, it may be difficult to feel the head, and the mistake may be made of thinking that there is no part of the child engaging. It will often be found that the head can be grasped better by making what is termed the 'Pawlik grip.' To carry this out the examiner should face the patient and grasp the

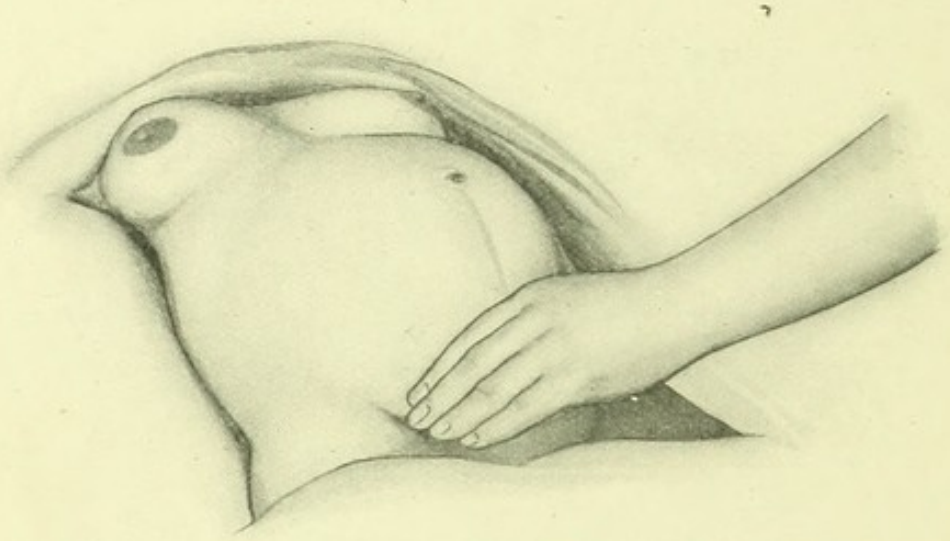


Fig. 6.—'Pawlik Grip.'

presenting part between the thumb and fingers of one hand, while steadying the child with the other (Fig. 6).

Having made out the presenting part, and supposing it to be the head, while still facing the patient, the hands should be slid up to either side of the fundus (Fig. 7), where usually the breech is situated. This part is felt to be bulkier, but less globular, and to have a depression between two prominences.

The sides of the distended uterus are next examined (Fig. 8). They will be found occupied, the one by the trunk and the other by the limbs. On the side towards which the trunk is directed, there is greater resistance, and the trunk is recognized as a long, smooth mass, curving round and running into the head and breech. A break in continuity can usually be recognized between trunk and head, and, unless the head is fixed at the brim,

there is considerable mobility between it and the trunk. At the pelvic extremity the back runs right into the breech without any break in continuity, and there is no mobility between the breech and the rest of the trunk.

On the other side of the abdomen, and often more posterior, are the limbs. Here the resistance is very much less, and different members can be felt, sometimes at rest, but often gliding underneath the hand or being pushed up by more violent movements of the fœtus.

From this brief description abdominal palpation seems very simple, but it is not always so. If the abdominal walls are thick or rigid, and if the uterus is very tense or irritable, contracting at the slightest

Fig. 7.—Palpation of the Fœtal Part situated at the Fundus.

touch, it may be extremely difficult, and sometimes impossible, to make out the fœtal parts. Also, if the fœtus is very small and the liquor amnii excessive, little can be felt. Still, with practice, it is surprising how much can be made out even when the conditions are by no means favourable.

After the accoucheur has had some experience in abdominal palpation, he will find that he can go a step further, and actually diagnose the position and attitude of the presenting head or breech. To some extent this may be done by the beginner from the position of the back and limbs, although in head presentation this does not permit of great exactness. The head must be fixed at the brim before one can pronounce definitely regarding its position. If one looks at the illustration (Fig. 9), it will be observed that in vertex positions, the

occipital end of the head being lowermost, the fingers can be sunk deeper into the pelvis on that side, or, to put it differently, the side on which the fingers sink deepest is the side to which the occiput is directed. In face and brow presentations, as we shall see, it is quite otherwise. With them the occiput is higher, and is felt unusually prominent. These and other points, however, will be considered in connexion with the different positions and presentations. Similarly, the appreciation of the relative size of the fœtal head and maternal pelvis, so important a guide to treatment, and the appreciation of the presence of more than one fœtus, will be considered when these subjects are under discussion.

Vaginal Examination.—Until recent years the accoucheur made his diagnosis of the position, presentation, etc., of the fœtus entirely

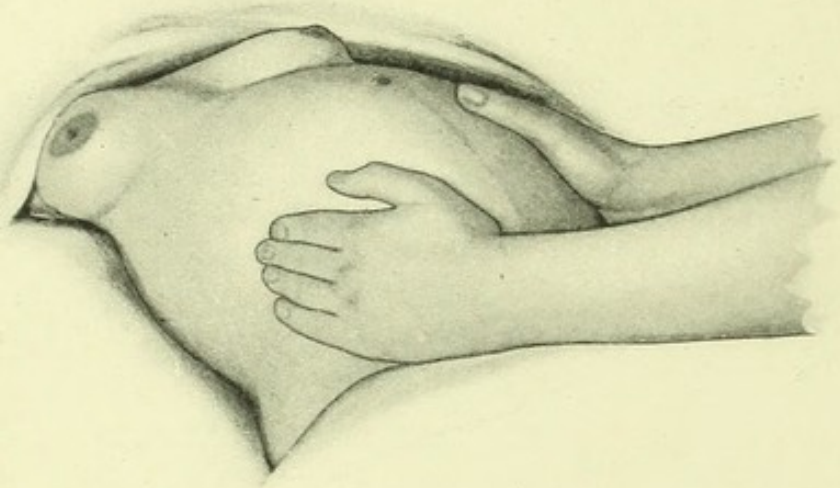


Fig. 8.—Palpation of the Fœtal Part situated at the Sides of the Uterus.

by a digital examination *per vaginam*. If one looks at the obstetric text-books of a comparatively few years ago, one finds this method of examination the only one seriously discussed, while even at the present moment a large majority of practitioners still employ it almost exclusively.

The perfecting of abdominal palpation, but, above all, the demonstration that every vaginal examination is a distinct danger to the parturient, has led the more enlightened and thoughtful to limit vaginal examinations as far as possible. Some enthusiasts would dispense with the latter altogether; but it is perfectly evident that such an extreme position is untenable, for there are many conditions, both maternal and fœtal, which can only be appreciated by vaginal examination. Amongst these may be mentioned small tumours in the pelvis, rigidity of the cervix, and, indeed, not infrequently, many

slighter abnormal attitudes and positions of the fœtus. Prolapse of the cord is another condition which can only be early appreciated by vaginal examination. True, the fœtal heart sounds will tell one when the child is in danger, but in cases of prolapse of the cord if one were to wait until the child showed symptoms of cardiac embarrassment there would be little chance of saving it. An early diagnosis of the condition is only possible by vaginal examination.

Having said so much in favour of vaginal examination, it must be

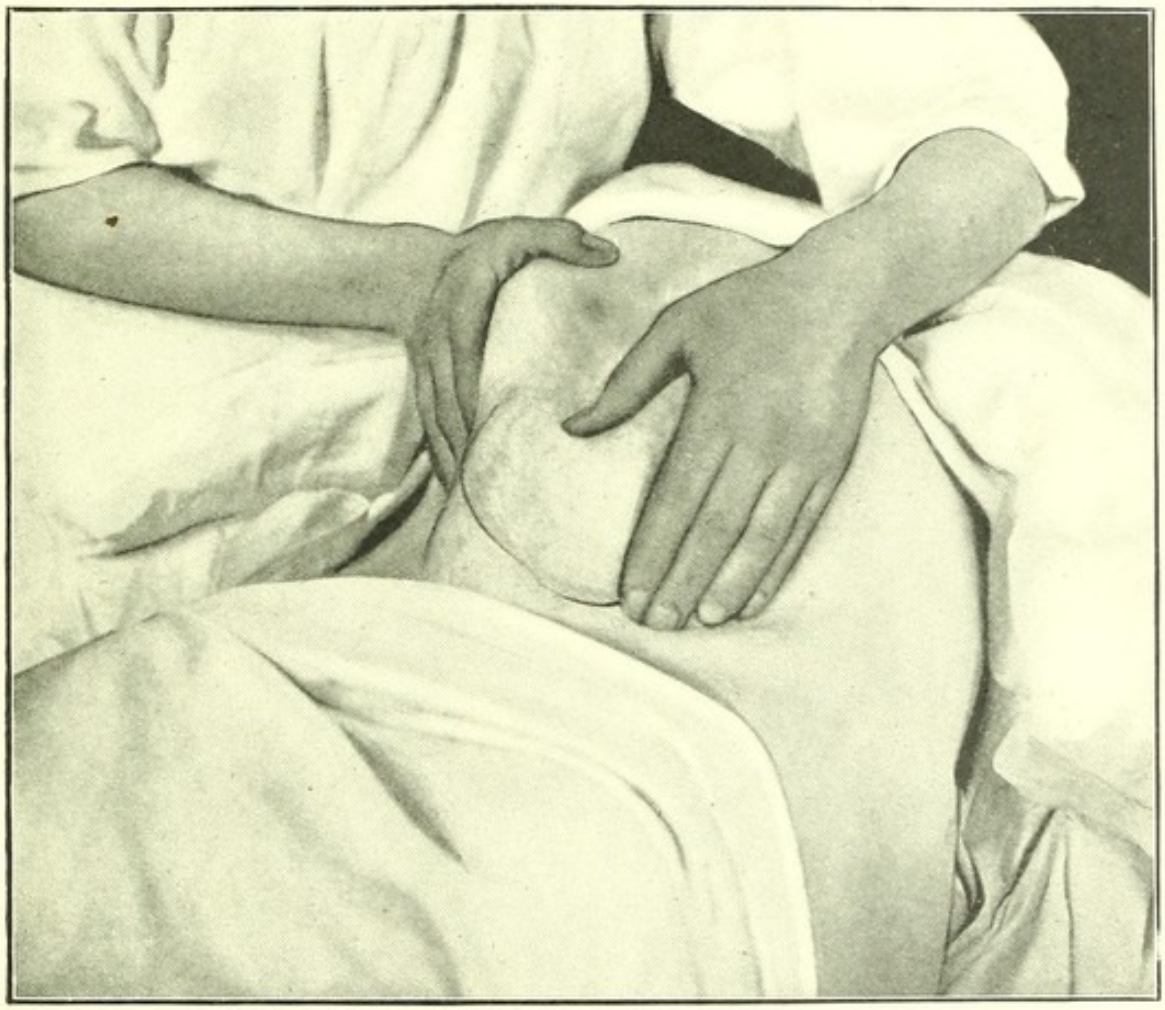


FIG. 9.—The Occiput is located by the Hand—in this Particular Case the Left—sinking deeper into the Pelvis upon the Side towards which it is directed.

clearly understood that the number of examinations should be as few as possible. Usually only two are necessary, one early in labour and the other after the membranes have ruptured. Again let me say that every vaginal examination during labour distinctly increases the risks of sepsis. One cannot get away from that fact; it has been proved beyond all question. I have no intention, however, of discussing at this stage the question of septic infection and how to prevent it. That matter is fully considered in Chapter XXI.

Prior to making a vaginal examination, it is always desirable, when possible, that the woman's bladder and rectum should be well emptied. The appearance of the abdomen when the bladder is overdistended is shown in the illustration (Fig. 10).

The accoucheur's hand and the patient's vulva are thoroughly cleansed. In order to lessen still further the risks of infection, the fingers of one hand should hold apart the labia, so as to permit of one or two fingers of the other hand being introduced without any friction against the external genitals. The vulva should be fully exposed in making the examination.

The position which the patient should assume is a matter entirely

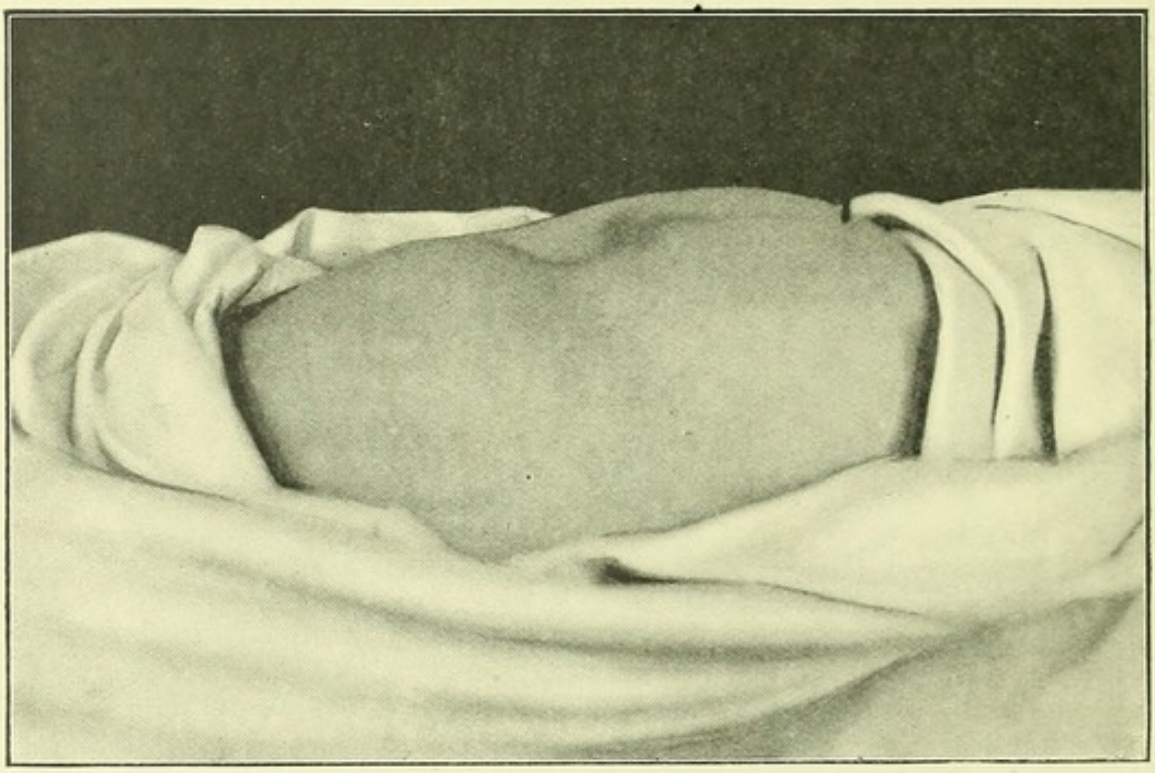


Fig. 10.—An Overdistended Bladder in a Parturient at Term.

of choice. We, in this country, favour the left lateral, but obstetricians in other countries generally prefer the dorsal. Whenever a thorough bimanual examination of the pelvis early in pregnancy is required, the dorsal is usually better, although I have occasionally found in stout women that the pelvic contents may be more exactly felt in a position midway between the dorsal and lateral.

If the vaginal examination is being made for the first time upon the parturient, the general formation of the bony pelvis and the condition of the soft parts should be investigated. It is most desirable in the case of a primipara and of a multipara, who has had any difficulty in her previous labours, that this examination should be made some few weeks before term, for now and again some abnormality will be dis-

covered which, if recognized for the first time during labour, might be difficult to treat. Personally, I examine vaginally every primipara about the thirty-sixth week. At the same time I determine the presentation and position of the child by abdominal palpation.

Having formed an opinion of the pelvis, the soft parts of the parturient canal, and the consistency of the cervix and the degree of its dilatation, the particular presentation is determined. The various landmarks of the fœtal skull — the sutures, fontanelles, bony and other prominences—are familiar to all. I must admit that occasionally I have not been able to come to a diagnosis regarding the position, from them alone; especially has this been so when there has been any defective ossification of the cranial bones, and the head has been situated high in the pelvis. In cases of doubt, therefore, and especially prior to any operative interference, I always feel for the ear. This landmark is not much employed at the present day, but the older obstetricians—Baudelocque, Smellie, and others—often made use of it, and I have found it of great service. The features of the different presentations are referred to elsewhere.

In addition to determining the size, position, and presentation of the fœtal head, the examining finger should always be swept round to make sure that there is no prolapsed loop of cord or other abnormal condition.

Auscultation.—In the few remarks which are called for in connexion with the examination by auscultation I shall confine myself entirely to the fœtal heart sounds. It is well known that other sounds may be heard with the stethoscope—the uterine souffle, the funic souffle, movement of the child, muscular susurrus, gas in the uterus, bruit of placental separation. None of them, however, is of any real practical importance.

The careful and repeated auscultation of the fœtal heart during labour, and especially when the second stage is protracted, cannot be too strongly commended. The child seldom dies quickly. Death occurs gradually, and so, as a rule, one has opportunities to interfere and save the child. Almost the only occasions upon which the child dies quickly during labour are where the cord becomes prolapsed and continuously pressed upon—say when the membranes rupture before full dilatation of the os.

One knows that the child's life is being endangered by the heart sounds becoming slower. Sometimes for a little they become faster, but before long, if the fœtal heart is embarrassed, the sounds become slower and slower, and then intermittent, irregular, and still slower. Whenever they number less than 100 the child's life is decidedly in danger, and the sooner it is extracted the better. It is often difficult

to count the fœtal heart if it is registering 140 to 160, but when it comes down to 100 to 110 it is an easy matter. The only possible mistake is to confuse it with the maternal pulse. In a protracted labour the fœtal heart should be carefully noted every half-hour during the second stage.

But there is valuable information to be gained from the heart sounds regarding other conditions. The diagnosis of the presence of more than one fœtus is confirmed by hearing fœtal heart sounds of

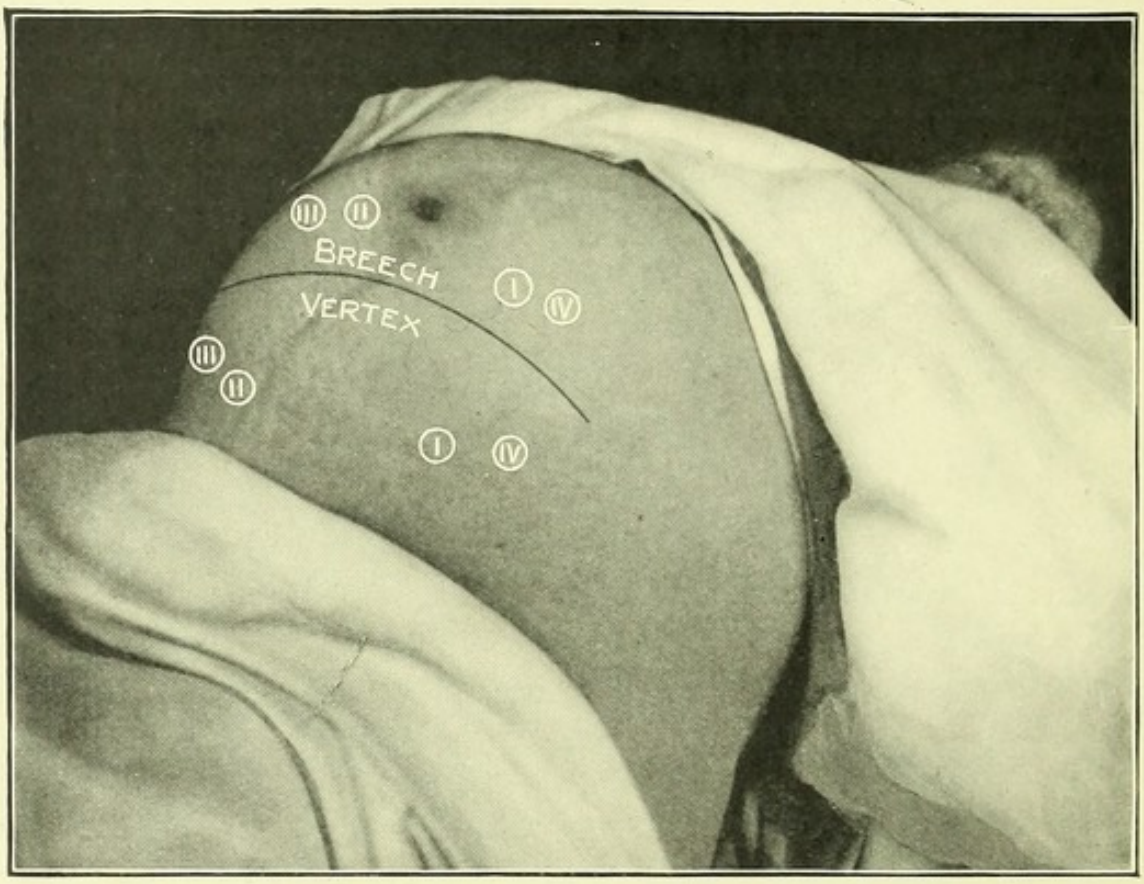


FIG. 11.—Areas of Maximum Intensity of the Fœtal Heart Sounds in Pelvic and Vertex Positions.
The line marks the uppermost limit for head presentations and the lowermost for breech.

different rhythms. This, however, is considered in the chapter on Plural Pregnancy (Chapter VIII.).

The fœtal heart sounds are also of value in the diagnosis of the various presentations. The illustration (Fig. 11) shows the area of greatest intensity for the different presentations. It may generally be concluded that in all presentations except the face the sounds are heard best wherever the back of the child is situated. In face presentations, however, the sounds may be best heard over the thorax, and occasionally the fœtal heart has been felt through the uterine wall in this presentation.

A rectal examination is rarely if ever called for in obstetric practice. With backward displacement of the gravid uterus and certain tumours complicating pregnancy, it is conceivable that it might be of service. For example, where a myoma happened to be on the anterior uterine wall, and prevented palpation or auscultation of the fœtus, as was my experience some time ago (Fig. 123), a rectal examination might permit one feeling the fœtal parts. Indeed, in a case of this kind Rosthorn made use of this method of examination with advantage.

CHAPTER IV

DYSTOCIA THE RESULT OF FAULTS IN THE FŒTUS *(continued)*

Abnormal Attitude and Position of the Head—Prolapse of Limbs associated with Presentations of the Head.

Abnormal Presentations of the Vertex.

Occipito-Posterior Positions of the Vertex.—The presentations of the vertex associated with dystocia are, with few exceptions, those in which the occiput is directed backwards (Fig. 12). It is of very frequent occurrence. I have found it in fully 20 per cent. of my private cases.

As regards its etiology, nothing very definite is known. Theoretically, the malrotation is more liable to occur if the pelvis is relatively large or the fœtal head relatively small—in other words, if the head is still extended when it reaches the pelvic floor. There is distinct support for this explanation in the fact that, according to most writers, the average size of the fœtal head in children born with the occiput posterior is somewhat below the normal. Von Weiss,[1] for example, found this so in 41 per cent.

The recurrence of the presentation in succeeding labours has been frequently remarked upon, and recently a case came under my notice where it was repeated at three successive parturitions.

The malposition being so common, it is of great importance that one should be able to recognize it. Early in labour this is only possible by abdominal palpation, but after the head has sunk into the pelvis and the os is well dilated, vaginal examination reveals the anterior fontanelle within easy reach and towards the front of the pelvis.

When palpating the abdomen, and after satisfying oneself that the presentation is a head, two things should always lead one to suspect an occipito-posterior position: ease in palpating the limbs in front, and the presence of the back on the right side of the abdomen.

[1] Volkmann's *Samml. Klin. Vorträge*, No. 60, 1892.

Sometimes it is impossible to palpate the back, as only the edge of the trunk is within reach ; in other cases, however, the back is more to the front, and can therefore be readily felt. If conditions are very favourable for abdominal palpation, one is sometimes able to feel the point of the chin, as in this position the head enters the pelvis less flexed. I must admit, however, that I have seldom been able to make out this feature, owing to the tenseness of the lower part of the uterus. The other feature, less resistance on the side to which the occiput is directed, is readily appreciated.

Auscultation may sometimes be of assistance in the diagnosis, for

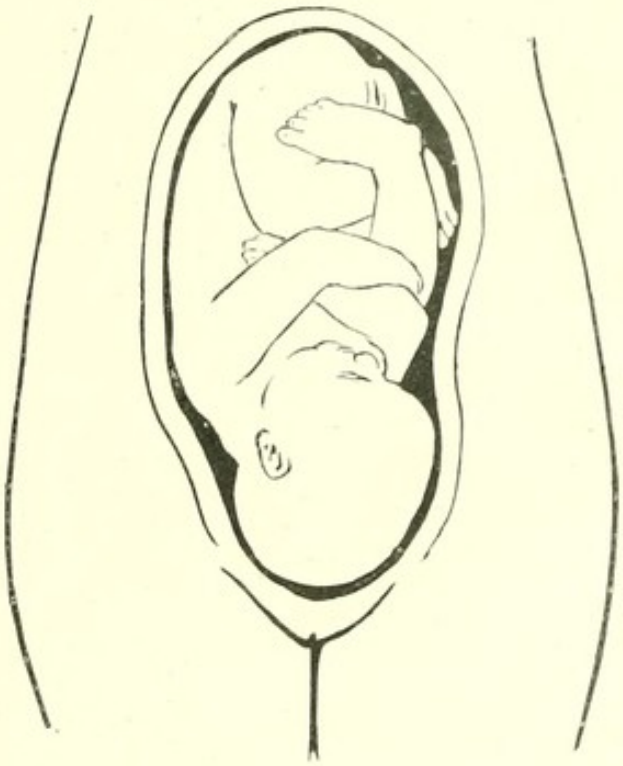


Fig. 12.—Occipito-Posterior Position of Vertex (3rd Vertex).

the heart sounds are usually heard with difficulty round towards the flank to which the back of the child is directed, although sometimes they are best heard up towards the fundus.

By vaginal examination the striking characteristic of occipito-posterior positions is the ease with which the anterior fontanelle is felt, owing to the fact that the head is not nearly so flexed as in the ordinary position of the vertex.

A later chance of recognizing the position, and one which should never be missed, is given when difficulty is experienced in extracting the head at the outlet, for unless there is deformity of the pelvic outlet, one never finds any difficulty in delivering with forceps a child lying low down with its occiput anterior. But, as if purposely arranged to arrest attention, yet another opportunity is afforded when traction

is made with forceps. Not only is there difficulty in getting the head out, but a peculiar appearance of the perineum is noticeable. The vulvar orifice gapes unusually, and the perineum begins to tear before the head has distended it.

In fully 93 per cent. of the occipito-posterior positions which have been under my care forward rotation of the occiput has occurred; in the other 7 per cent., where the occiput remained posterior, the progress of the labour has usually been completely arrested or uterine inertia has become established. Many French and German observers have found persistent occipito-posterior positions less frequent than my figures indicate, a very general figure given being 3 or 4 per cent. The lowest figure is Botkowskaia's[1]—1·4 per cent.

The dangers to mother and child in persistent occipito-posterior positions are decidedly greater than in the ordinary vertex position. Especially does this apply to the child, which, not infrequently, is born dead or injured; indeed, such accidents occur five times as often in occipito-posterior as in occipito-anterior positions.

Lacerations to vagina and perineum being so common, the risks to the mother of infection are quite appreciably increased; indeed, the maternal mortality is usually stated to be about 1 to 1·5 per cent. Croom[2] has called attention to the occurrence of peculiar deep longitudinal lacerations high in the vagina.

Treatment.—It is recommended in occipito-posterior cases, recognized early in labour or during pregnancy, that the patient be placed in the knee-elbow position or on the side to which the occiput is directed, and that, with the aid of manual manipulations, the child's back be dragged or pushed round to the front. Although I have not been successful on the few occasions upon which I have tried such manipulations, without doubt they have occasionally proved successful in the hands of others.

For cases further advanced in labour, with the head fixed in the pelvis, it is well not to interfere, seeing that so few fail to take a favourable rotation forward. This will often necessitate the medical attendant allowing the second stage to continue many hours, and it is because he does not care to do this that he meets with so many cases of a persistent posterior position.

When the occiput remains persistently posterior in spite of a long time given it for rotation, one has the choice of four methods of treatment: (1) Leaving the case to Nature, and still hoping for spontaneous delivery; (2) manual rotation and extraction with forceps; (3) forceps rotation and extraction; (4) forceps extraction, the occiput remaining posterior.

[1] *Thèse de Paris*, 1897.

[2] Ed. Obst. Trans., vol. vi.

Spontaneous delivery of a persistent occipito-posterior presentation may occur in one of two ways. The head, either in the region of the anterior fontanelle or of the forehead, is pressed against the symphysis pubis, while the occiput is driven over the perineum. Stumph[1] refers to them as favourable and unfavourable forms respectively. The

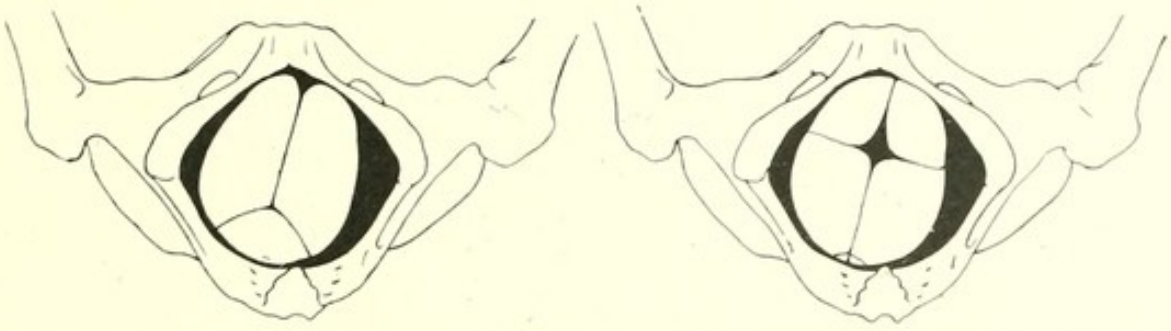


Fig. 13.—Favourable and Unfavourable Mechanism of Birth in Persistent Occipito-Posterior Positions of Vertex. (Stumph.)

illustrations (Fig. 13) explain themselves. The accompanying outline drawing (Fig. 14) of the fœtal head shows the manner in which the head is moulded. But the practical point is: does this spontaneous delivery of the head in a persistent occipito-posterior position often occur? In my experience it is very uncommon. I am prepared, however, to admit that this may in part be due to the fact that I interfere earlier than Continental operators. I have, however, in con-

Fig. 14.—Outline of Head Moulding in Persistent Occipito-Posterior Position. (Spiegelberg.)

sequence, a lower fœtal mortality, for while the figures of those who are advocates of extreme expectancy show a mortality of 10 to 12 per cent., mine work out at 4 to 5 per cent.

To bring about forward rotation of the occiput by manual interference, many devices have been recommended. Thus, with the object of favouring flexion, it has been suggested to press up the forehead during a pain, pushing it at the same time towards the hollow of the

[1] Winckel's 'Handbuch,' 1904, Bd. i., Heft ii., p. 1078.

sacrum. Again, but directing attention to the other end of the foetal head, pulling down the occiput with the fingers, the vectis, or one blade of the straight forceps, has been advocated.

Smellie recommended a method which, in recent years, was revived by Tarnier. One or two fingers are passed into the vagina and

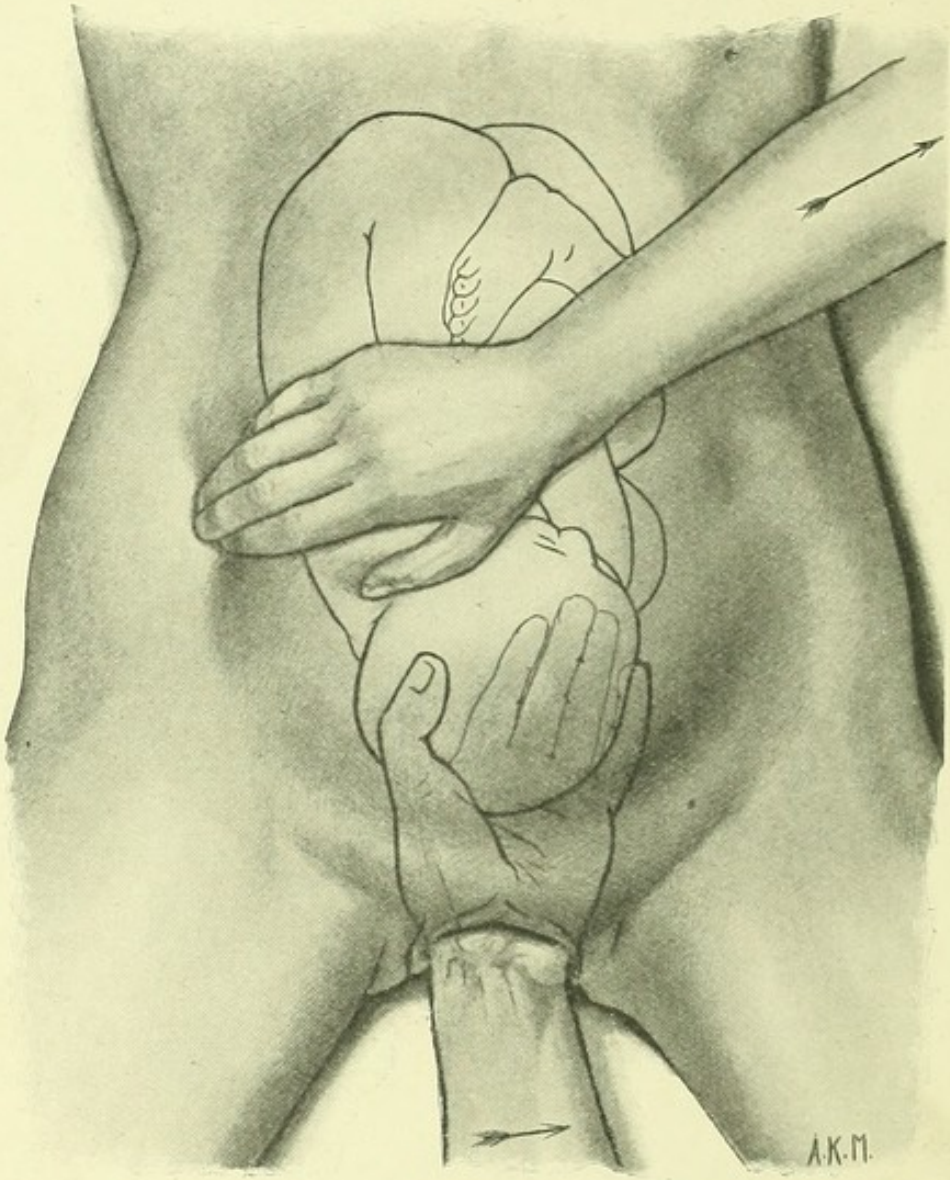


Fig. 15.—Correction of an Occipito-Posterior Position of Vertex.
The internal hand rotates the occiput forwards, while the external drags round the shoulder ; the arrows indicate the direction of these manœuvres.

laid along the side of the child's head, and during the uterine contractions the head is pressed upon and rotated in the direction desired.

Doubtless these manipulations have sometimes been successful, but, although I have tried them all, I have but rarely found them so. The only manœuvre I have found of real service is rotating the head

by means of the hand passed into the vagina. The head is grasped between the fingers and thumb (Fig. 15), but before trying to bring about rotation the head must be flexed and raised out of the pelvis. The manœuvre will only succeed, however, if the other hand, applied to the abdomen from the outside, brings the anterior shoulder forward. Although the fœtal head can stand very nearly a half turn, the manual rotation of the head alone is attended with not a little risk to the child. Besides, if the shoulder is not brought forward, the head at once springs back into its old position. It is well, after having rotated the head and trunk, to apply forceps and extract the child. The manœuvre is best carried out, I have found, with the patient lying upon her side. Taking my private and hospital cases I have found this manœuvre succeed in 70 per cent., and sometimes even after attempts had been made to deliver the child with forceps.

Opinions regarding the value of manual rotation vary. Speaking generally, the English school may be said to favour it, as may be seen from the writings of such modern authors as Herman,[1] Jardine,[2] and Eden.[3] Stumph, already quoted, gives it great praise, and such is the attitude of many German writers. A few French operators, following Tarnier's lead, approve of rotation, but many refer to it as being unnecessary. Amongst American accoucheurs, it is coming to be looked upon with greater favour.

It may happen sometimes that if one fails to bring about rotation in the manner described, the latter may be effected by passing one's hand into the uterus beyond the head and rotating the trunk by directly pulling on the anterior shoulder of the fœtus. Quite recently I was called in consultation to a case in which two medical friends had been making fruitless attempts to deliver with forceps. Upon making a vaginal examination, I discovered that the child was of considerable size, and that the head, although in the cavity, was placed with the occiput posterior. Under deep anæsthesia I tried to rotate the head and body as described, but failed. I then passed my hand over the side of the child's head, seized hold of the anterior shoulder, and without much difficulty pushed it round. I then delivered the child, which weighed 9 pounds, with forceps. It was only slightly asphyxiated, although a good deal bruised about the head. Lamond Lackie[4] has recorded a case similarly treated.

Some interesting cases are described by Von Weiss[5] where, after

[1] 'Difficult Labour,' revised edition, 1900, p. 13.
[2] 'Clinical Obstetrics,' 2nd edition, 1905, p. 277.
[3] 'A Manual of Midwifery,' 1906, p. 223.
[4] *Ed. Med. Journ.*, January, 1907.
[5] *Op. cit.*, p. 614.

pushing up the forehead, the child was delivered by expression. It is quite possible that this primitive method is employed too seldom nowadays, and so it is interesting to read of these cases described by Von Weiss.

Rotating the head by means of forceps, either straight or curved, a method so strongly advocated by Tarnier, Edgar of New York,[1] and a few others, I have seldom tried, although occasionally, when extracting the child as an occipito-posterior, I have seen rotation occur with-

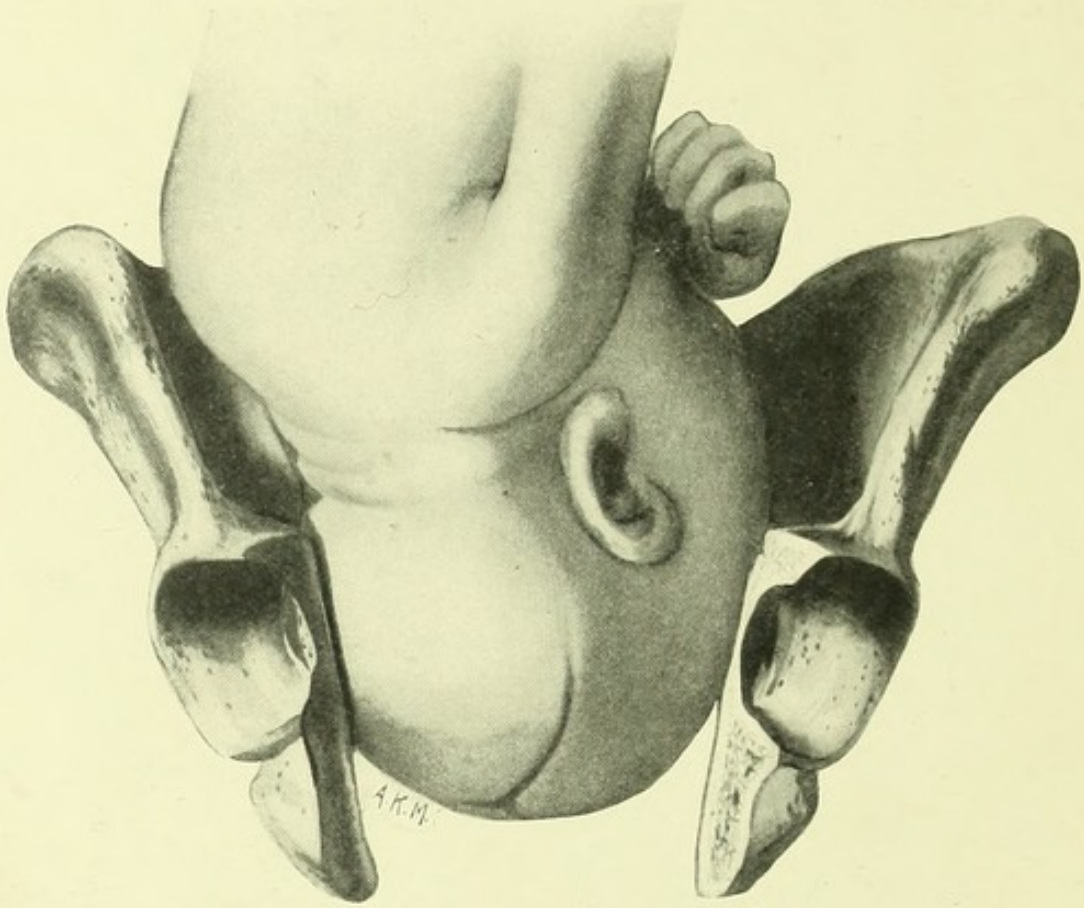


Fig. 16.—Posterior Fontanelle Presentation.

out any attempts being made to bring it about. As, however, we have not studied forceps delivery, I will postpone until later the consideration of the employment of the instrument in occipito-posterior positions.

Anterior Fontanelle Presentation.—This presentation indicates a diminished amount of flexion. One meets with it most commonly in occipito-posterior presentations, which have just been considered, and in flat pelvis when the head engages in the transverse diameter of the brim with both fontanelles about the same level.

But there is another condition in which the presentation is encountered—occipito-anterior presentations—where, owing to the

[1] 'Practice of Obstetrics,' 1903, p. 583.

smallness of the head or roominess of the pelvis, the head becomes partly extended. As can be readily understood, if that happens a larger diameter of the head is thrown across the pelvis—indeed, the presentation approaches a brow, and the progress of the labour becomes retarded in consequence. In a case I saw some time ago this was strikingly illustrated, and I was compelled, after the second stage had been allowed to go on for fully three hours without progress, to apply forceps. Even then considerable traction was required to bring away the child, although the pelvis was quite normal, because the head was too small to permit of the forceps getting a firm hold and so maintaining flexion. When the child was born it weighed only 5 pounds.

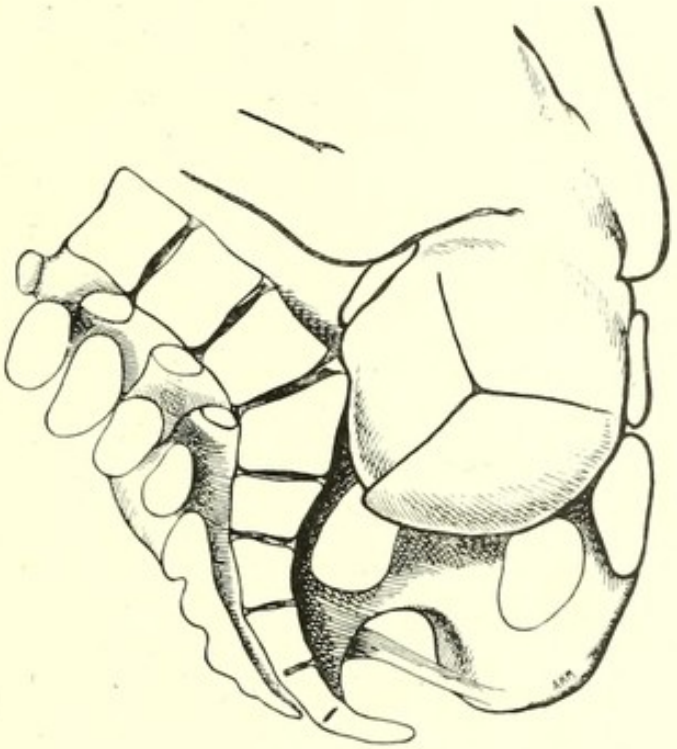


FIG. 17.—Anterior Parietal Presentation. (After Bumm.)

Posterior Fontanelle Presentation.—This presentation (Fig. 16) indicates greatly increased flexion, and is brought about by increased general obstruction to the passage of the head. Thus, one meets with it in generally contracted pelvis and when the head is very large. The labour is always delayed, and frequently instrumental. The difficulties of delivery are referred to under the various operations.

Anterior and Posterior Parietal Presentations.—It will be remembered that the head at the brim not infrequently assumes a lateral or biparietal obliquity, and comes to be directed towards one or other shoulder. As a result of this the sagittal suture, instead of running across the middle of the pelvis, comes to be situated sometimes nearer the symphysis, sometimes nearer the promontory. Occasionally the obliquity becomes extremely marked, and then one

speaks of an anterior or posterior 'parietal presentation' (Figs. 17 and 18), according as one or other of the parietal bones occupies the pelvic brim. Formerly such presentations were termed sometimes 'ear presentations.'

Prior to rupture of the membranes these presentations may alternate, but after rupture, as the head becomes fixed, one or other persists.

Marked examples of the malpositions are rarely encountered when the pelvis is of normal size, although, with a pendulous abdomen, before the head is fixed, an anterior parietal presentation often exists if the parturient is standing or lying on her side and the abdominal

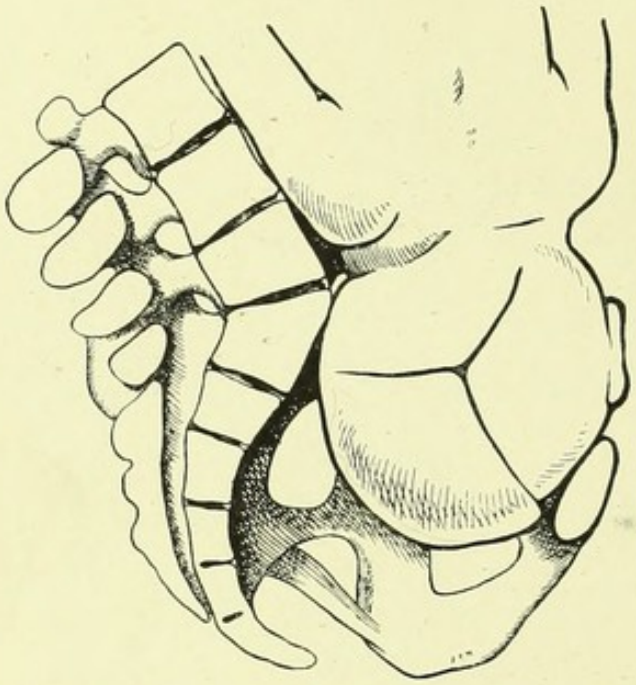


Fig. 18.—Posterior Parietal Presentation. (After Bumm.)

wall is not supported. The condition therefore is pre-eminently a feature of flat pelvis, and the mechanism of birth is referred to in connection with that subject.

The variety of obliquity influences greatly the birth, a posterior parietal presentation being much less favourable than an anterior. This is especially seen if delivery with forceps is attempted. With the anterior parietal presentation traction brings the posterior parietal round the sacral promontory, while with the posterior parietal presentation the anterior parietal is pulled against the symphysis. I have found the anterior parietal presentation more common than the posterior in the slighter degrees of pelvic deformity, and the reverse to be the case where the malformation was very decided.

Engagement of the Head in the Transverse Diameter of the Pelvis.—Early in labour one frequently finds the head in this position,

even when the pelvis is of normal capacity. Usually, however, it changes into the oblique before labour has advanced very far. A persistent transverse position is the rule, however, in flat pelvis.

Occasionally, even although the pelvis is normal, one meets with a persistent transverse position if the head is very small, and more than once I have seen the exit of the head arrested (Fig. 19) owing to this abnormal position. It is, as a rule, easily rectified by the hands or by forceps.

Engagement of the Head in the Conjugate Diameter of the Brim.—I have had no experience of engagement of the head in the conjugate diameter, as a cause of dystocia. McKerron[1] in this country has referred to it. In his cases, however, there was general contraction

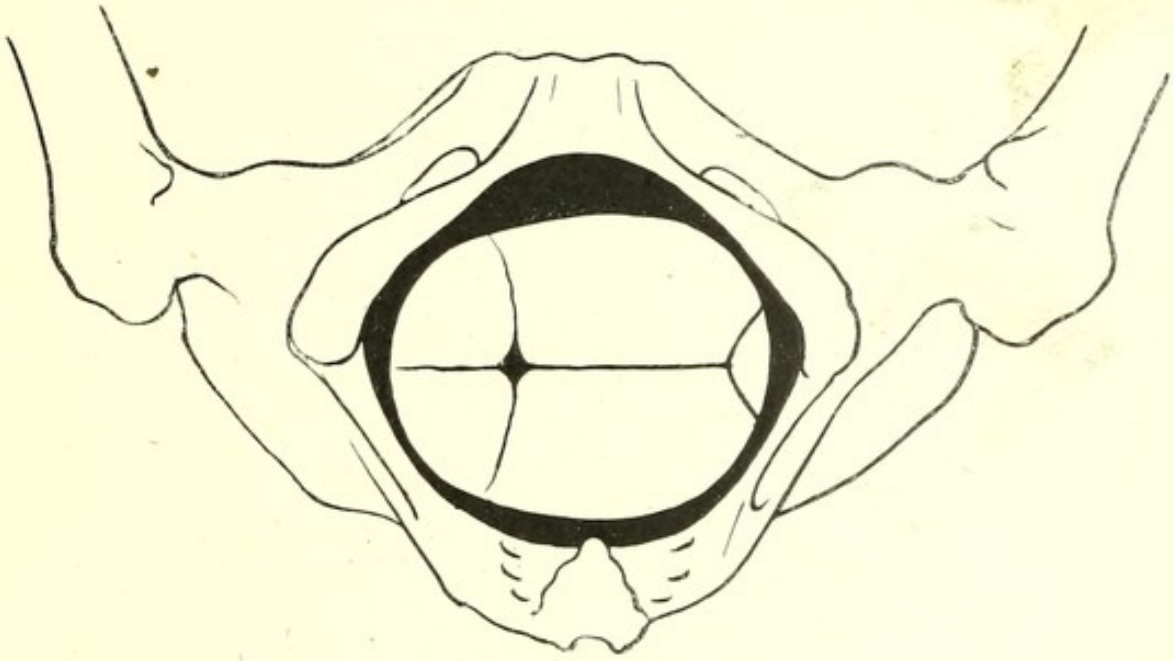


FIG. 19.—Transverse Position of Vertex at Outlet.

of the pelvis, and that appears to have been the real cause of the arrestment of the head at the brim. McKerron states that by rotating the head into the oblique diameter he was able to grasp it with forceps and deliver easily.

PRESENTATIONS OF THE FACE.

Facial presentations (Fig. 20) one is in the habit of looking upon as presentations of the vertex where, from some cause, such as contracted pelvis, obliquity of the uterus, dolichocephalic shape of head, tumours of the neck, etc., the head, instead of remaining flexed, becomes extended. This change of attitude in the head occurs, as a rule, at the commencement of labour, and the presentation resulting is often spoken of as secondary presentation of the face, to distinguish

[1] Lond. Obst. Trans., vol. xli., p. 142.

it from the primary, which may exist for some time before labour. Specially interesting are the cases described by Croom,[1] Ahlfeld,[2] and others, in which the presentation has varied before labour, being sometimes vertex and sometimes face.

The diagnosis of a facial presentation is not always easy. By careful palpation one searches for and locates the head, the back, the limbs, and the breech, just as in positions of the vertex. But while in vertex presentations this, as a rule, is a simple matter, in presentations of the face considerable difficulty may be experienced, owing to the fact that the abdominal and uterine walls are often more resistant.

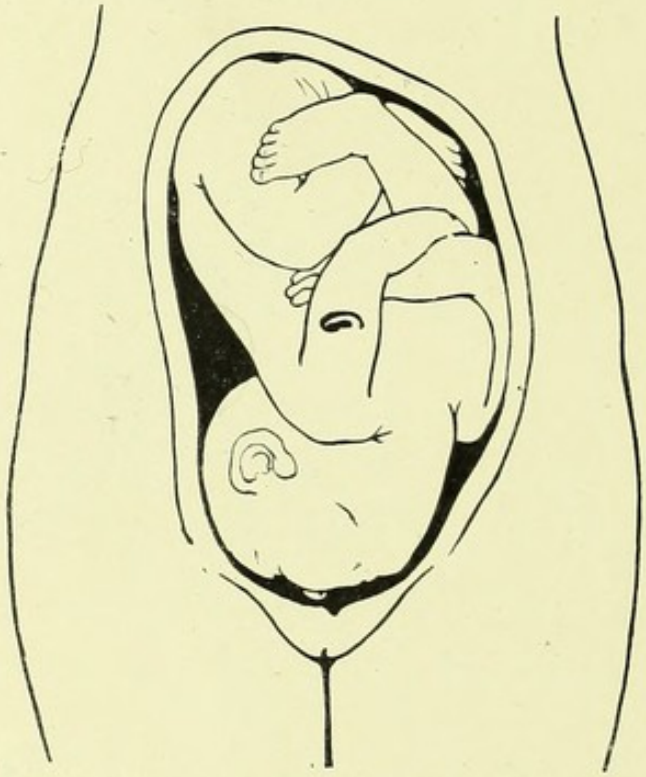


Fig. 20.—Third Position of the Face.

In vertex presentations we saw that the back and occiput formed a curved surface with only a slight depression at the neck; in facial presentations, on the other hand, there is a marked depression between the back and the neck, and in conditions favourable for diagnosis, as where the child is lying dorso-anterior, this depression can be readily distinguished. Not infrequently, however, the child lies with its dorsum posterior (Fig. 20), when it is difficult to reach the depression mentioned. Some have referred to the inferior border of the chin forming a horseshoe-like rim, which dips into the cavity (McLennan), and I quite agree that this sometimes may be felt, but it is only when the conditions are very favourable for palpation, as the chin may easily be mistaken for the prominence of the occiput and the extended neck

[1] 'Clinical Papers,' 1901. [2] 'Lehrbuch der Geburtshülfe,' 1898, p. 387.

for the flexed back. This leads me to say that palpating the back in face cases is always difficult, because it runs more down the middle of the uterus, and is, consequently, out of reach.

As regards the fœtal heart sounds, one often hears them best high up over the chest of the child, and especially when the latter is towards the front. Indeed, in such cases, if the uterine and abdominal walls are especially thin, the cardiac impulse has been felt occasionally.

If a vaginal examination is hurriedly made, the face may be mistaken for the vertex, but the presentation most frequently confused with a face is a breech. Early in labour, with the os only slightly dilated and the presenting part high up, I must admit there is a considerable difficulty in distinguishing the two. Indeed, it is often impossible to say, from vaginal examination alone, which of them one has to deal with. This, further, illustrates the great importance of palpation.

If the presenting face is within reach, it will be found that it does not so completely fill the pelvis as the vertex. It is less hard, and its outline is less smooth and uniform. The bony prominences of the orbital ridges, the malar bones, the chin, the ridge of the nose, and the alveolar processes, can be felt, and the eyes and mouth can be distinguished. But although, in theory, these different parts may help one to a diagnosis of the presentation, in practice the one landmark that should be relied on is the alveolar processes. If one trusts to other landmarks one will certainly be led astray.

Facial presentations occur about once in 200 labours. In the Glasgow Maternity Hospital in the last ten years we have found facial presentations in the proportion of 1 in 200. Pinard and Lepage, for the Clinique Baudelocque, found them in the proportion of 1 in 323.

It is not so easy to decide the relative frequency of the different positions, but most authorities agree with Naegele that mento-posterior positions are more common than mento-anterior.

For both mother and child the prognosis is less favourable than with vertex positions. The mother's life is placed in greater danger, because of the increased liability to lacerations and bruises of the soft parts, because of there being more vaginal examinations and manipulations, and, above all, because the conditions which caused the mal-attitude often still further delay and complicate the labour. If delivery is spontaneous, however, there is no additional risk.

As regards the child, the labour being generally delayed, the face, especially on one side, becomes much swollen, sometimes, indeed, to an alarming extent. Then, again, vaginal examinations, carelessly or excitedly made, may result in injuries to the mouth, nose, and especially the eyes, while, as the result of the great extension of the

head (Fig. 21), injuries to the soft parts of the neck occasionally occur, especially if forceps is employed.

In 69 cases of face presentation in the Clinique Baudelocque from 1890 to 1900 there were no maternal deaths; in 52 the temperature was normal throughout, in 17 it was slightly raised; 62 women were spontaneously delivered; in 1 the face was converted into a head presentation; in 4 primiparæ 2 were delivered by forceps and 2 by symphysiotomy; in 1 multipara perforation (dead child); in 1 multipara forceps (with fracture of the child's skull). Palotai,[1] for Kczmàrszky's Clinique, Budapest, analysing 103 cases, gives the following figures: In 50 to 60 per cent. the fœtus had originally lain in the first position; duration of labour averaged fifty-two minutes more than in head presentations; operative measures were required in only 4·85 per cent. of cases; maternal mortality, 0 per cent.; fœtal mortality, 8·16 per cent. The author therefore believes that face

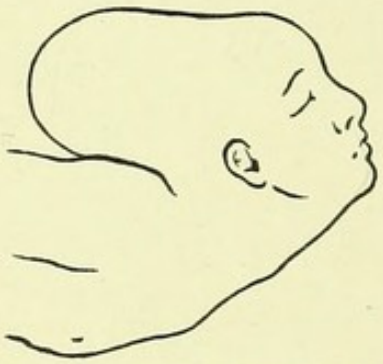


Fig. 21.—Outline of Attitude and Moulding of Head in Face Presentations. (Spiegelberg.)

presentations should be treated expectantly. Our results at the Glasgow Maternity Hospital have been very much worse, for our maternal mortality has been 3 per cent. and our fœtal 25 per cent. This, in great part, is due to early interference, which is undoubtedly a mistake, but also to the fact that so many cases are admitted to the hospital after attempts at delivery have been made outside.

Treatment. — This presentation being less favourable to the mother and child than that of the vertex, the first question to be considered is whether or not one should convert it into the latter. Before taking up that important question, however, a word about another line of treatment that has been advocated by some—viz., the performance of version and bringing down the feet. Personally, I do not favour this in uncomplicated face presentations, because the fœtal mortality is greater when the head comes last. Only if there is some

[1] *Gynækologia*, 1902, No. 1, Ref. *Journ. Obst. and Gyn. Brit. Empire*, vol. iv. p. 313.

condition such as pelvic deformity, placenta prævia, prolapse of cord, or some danger threatening the mother, calling for immediate delivery, would I have recourse to version.

The first to describe clearly manipulations for the conversion of face presentations was Baudelocque.[1] There are two methods to which Baudelocque's name is attached, and they are generally referred to as I. and II. In Method I. that great obstetrician recommended the pushing up of the face with the fingers in the vagina, while the other hand from the outside pressed down the occiput. In Method II. he recommended the passing of the hand into the uterus and the pulling down of the occiput. Now, anyone who has tried either of these methods will have found that, while a face can often be changed into a vertex, the old presentation usually returns whenever the hands are removed. This is chiefly because the lordosis associated with a facial presentation remains, not being removed by the alteration in the attitude of the head. The results from Baudelocque's manipulations have therefore been disappointing.

Some thirty-five years ago Schatz[2] made a most important contribution to the subject by describing certain manipulations directed to altering the lordosis, and which were carried out externally. To carry out Schatz's manipulations, the operator faces the patient, and having palpated out the anterior shoulder and the breech, he raises the shoulder and back of the child. He then applies three fingers of the hand, that is raising the shoulder, against the chest, while with the other hand he pushes the breech in the opposite direction. With the hand over the breech, he then presses the child downwards. As can be imagined, considerable manipulative dexterity, mobility of the fœtus *in utero*, and relaxation of the abdominal walls, are necessary before one can even hope to carry out the treatment successfully. Personally, I have always failed, and the experience of accoucheurs in this and other countries has been equally or nearly as unfavourable.

It was very soon seen that a combination of the methods of Baudelocque and Schatz would be more efficacious than either, and so several operators suggested this. Thorn[3] probably deserves the greatest credit for perfecting the combined method of internal and external manipulations now favoured (Fig. 22). For the internal manipulations, Thorn favours Baudelocque I.—that is, pressing the face, then the forehead, upwards. Baudelocque II.—the pulling down of the occiput with the hand or fingers introduced into the uterus—may also be employed; but Thorn does not consider this so safe. The

[1] Heath's translation, 1790, vol. ii., p. 229. [2] *Archiv f. Gyn.*, Bd. v.
[3] *Zeit. f. Geb. u. Gyn.*, Bd. xiii., 1886, and Bd. xxxi., Heft i., p. 1, 1898.

external hand of the operator presses against the protruding chest in the direction indicated in the illustration. An assistant, when available, then drags the breech over in the opposite direction.

The internal manœuvres may be varied slightly. For example,

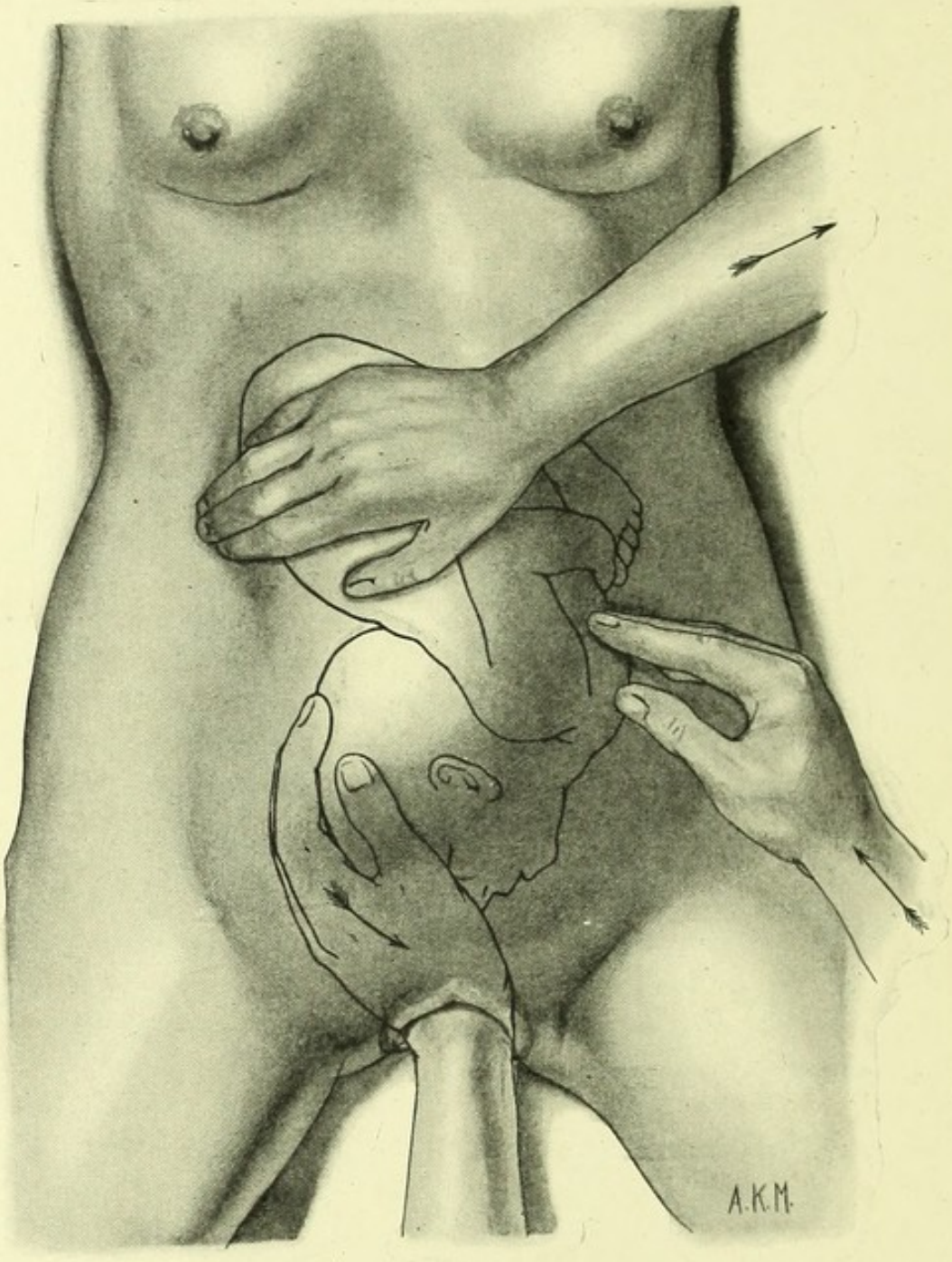


Fig. 22.—Thorn's Method for converting a Face into a Vertex Position.
The arrows indicate the directions of pressure and traction.

the head may be grasped antero-posteriorly by the thumb and fingers, as Opitz recommends, but one need not detail all the trifling variations which have been suggested. To employ, however, the internal hand for correcting the lordosis by passing it into the uterus and

pressing upon the chest is undesirable and sometimes dangerous. Besides, it is usually unsuccessful, for, if it is necessary, the uterus is too firmly applied to the surface of the child. If an assistant is not available for dragging over the breech, the breech may fall over itself by placing the patient upon the opposite side to which it is directed. In the Glasgow Maternity Hospital for the last ten years the proportion of cases in which a conversion has been successful works out at about 65 per cent. For the Berlin University 'Frauenklinik' Olshausen states that from the years 1886 to 1900 they had 114 cases, with 79 successes—70 per cent.[1] Weiss[2] and Thorn[3] give their successes as 50 per cent. and 75 per cent. respectively.

Having corrected the mal-attitude of head and body, the fœtal head should be pushed firmly down into the pelvis, and a pad and binder applied, or immediate delivery effected with forceps.

For the employment of the manœuvres described, it is of the greatest importance that *the patient should be deeply anæsthetized, the cervix well dilated, the uterine walls not applied too closely to the surface of the child, and the head not too firmly impacted in the pelvis.* Consequently, they must be carried out, as a rule, comparatively early in labour, although occasionally I have seen them successful even when labour was far advanced. When attempts are made late in labour, the head must be dislodged from the pelvis, and that usually, by pushing the child back into the uterus, stimulates the uterus to contract firmly, and prevents the external manœuvres from being carried out. Besides, the head at this stage is much moulded, and so does not readily adapt itself to a new position in the pelvis.

Judgment regarding the different methods of treatment in face presentations must be based on the fœtal mortality, for the maternal mortality in hospital practice and in the hands of careful obstetricians has been reduced to a minimum.

Failure to convert a face into a vertex presentation is of little moment, for very good results are obtained—in fact, some say better results—when one leaves the labour to Nature.

It is entirely the attitude of the partisan for Thorn and others to explain away the good results obtained by purely expectant treatment, such as those given by Böer and Zeller—120 cases with only six fœtal deaths, a mortality of only 5 per cent.—and those recorded by Von Weiss,[4] with a fœtal mortality of 7·6 per cent. The best results, after correction, are those of Opitz for Olshausen's Klinik—8·9 per cent. mortality.

[1] 'Lehrbuch der Geburtshülfe,' Olshausen and Veit, 5th edition, 1902, p. 210.

[2] *Volkmann's Klin. Vorträge*, No. 74, 1893.

[3] *Ibid.*, No. 339, 1902.

[4] *Op. cit.*, p. 58.

As far as can be judged at present, equally good results are obtained by judicious expectancy. It appears to me, therefore, that the routine practice of correcting face presentations is not called for. I am quite prepared to admit that it is often successful, especially when Thorn's method is employed, but some experience and practice is required before the requisite amount of manual dexterity is obtained. In the meantime, therefore, I would advise the general practitioner

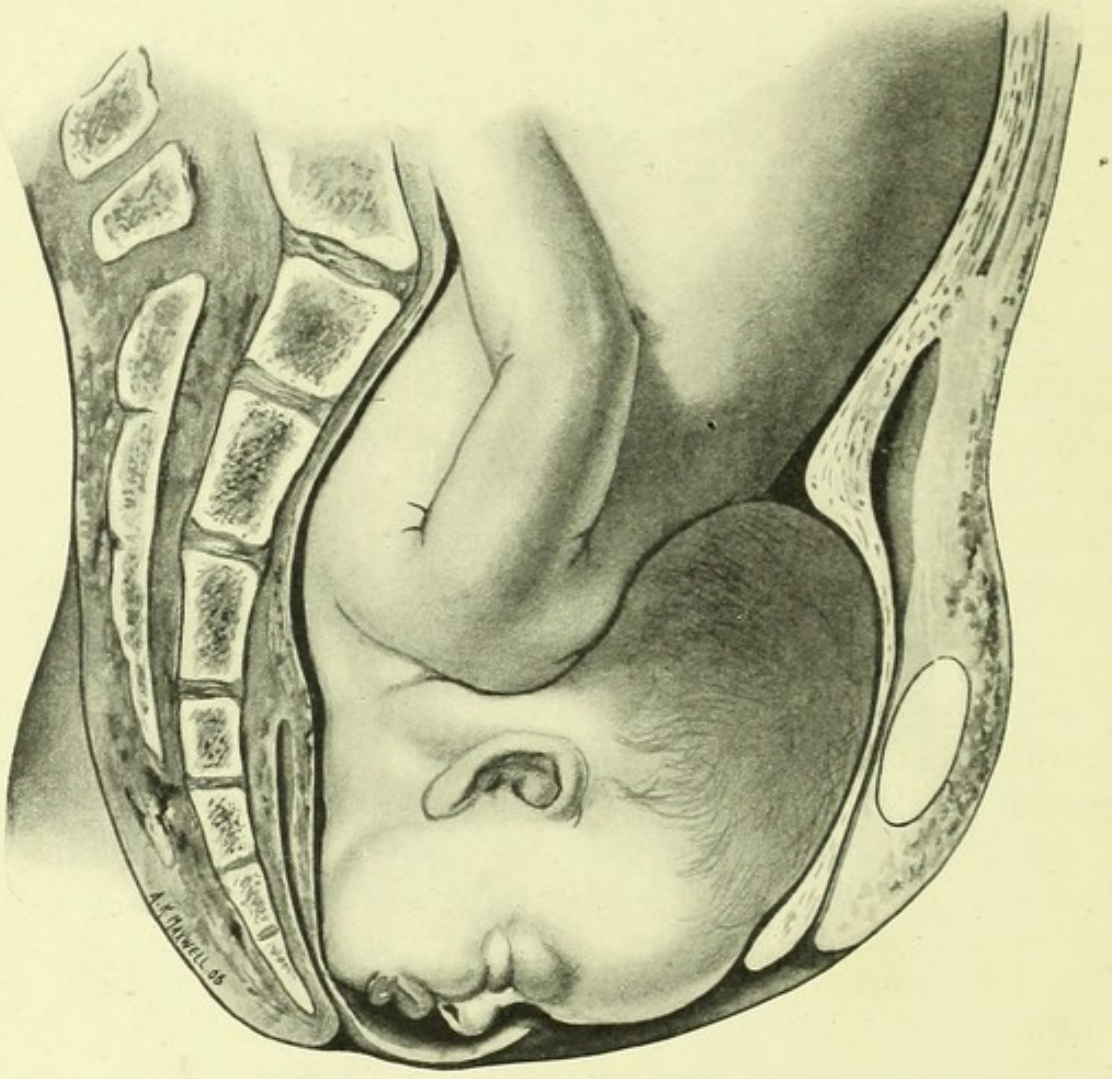


Fig. 23.—Persistent Mento-Posterior Position of Face.

to leave face presentations alone. If, however, he is anxious to try the method described, and he can choose his time, he will get the best results by operating when the os uteri is about three-quarters dilated, and when, in introducing his hand into the uterus, he requires to rupture the membranes.

But there is another matter which must be considered. What is to be done with those cases which one treats expectantly or fails to convert, and in which the chin remains directed posteriorly (Fig. 23)?

In such cases it has been possible occasionally to dislodge the head and convert the presentation into a vertex, or, by manipulations, similar to those described for occipito-posterior positions of the vertex, to bring the chin to the front. With a face firmly impacted in the pelvis, those manœuvres have, as a rule, failed. It is usually taught that there is then nothing left but to perforate, but we have had one or two cases where, with axis traction forceps and by simply exerting traction, rotation of the chin has occurred. Lewers[1] a few years ago gave an interesting description of two such cases, and others have been recorded at odd times. A valuable communication on the subject is a recent one by Reed,[2] where seventy-five recorded cases, beginning with one by Smellie, are analysed. It is very interesting, for the results have not been nearly so bad as is generally indicated in text-books. Here are some of Reed's conclusions:

'*Rotation.*—Manual succeeds, 4 (Volland, 1); fails, 9 (Volland, 4); forceps succeeds, 25 (33 per cent.); fails, 16 (21 per cent.).

'*Manual Flexion.*—Fails, 5 cases (Thorn, 1); succeeds, 12 (16 per cent.). Vectis succeeded in 2 of the 3 cases tried. Version tried in vain in 4 cases.

'*Delivery.* — Unrotated, 17; spontaneous after correction, 10. Forceps succeeded, 28 (37 per cent.); failed, 3; axis traction. Forceps succeeded, 3; failed, 0; craniotomy, 14.

'*Mortality.*—Mother: Live, 61; die, 8; not stated, 6. Babies: Live, 39; die, 30; not stated, 6.'

It is evident, therefore, that attempts at rotation, and even attempts at delivery, with forceps are quite justifiable, and frequently successful even in the most hopeless cases of mento-posterior positions of the face.

Brow Presentations.

I must now say a word or two about the most unfavourable of all head presentations—viz., the brow (Fig. 24), the attitude between vertex and face. Fortunately, this unfavourable attitude is very rare, for it occurs only in about 1 in 2,000 cases.

As regards etiology, the position may be looked upon as a variety of face presentation, for the same factors influence the occurrence in both. When one has said that, however, the resemblance ceases. A brow is an infinitely more unfavourable presentation than a face.

The diagnosis of the presentation is rarely made until the os is sufficiently dilated to permit one feeling such landmarks as the anterior fontanelle, and especially the supra-orbital ridges. True, if

[1] Lond. Obst. Trans., 1899, vol. xli., p. 280.

[2] *Amer. Journ. Obst.*, 1905, vol. li., p. 615.

conditions are very favourable, one may make out by abdominal palpation the chin and the head less flexed than usual, but the deep depression between the occiput and the back, which can often be appreciated in face presentations, is not so marked. Even vaginal examination may leave one in doubt if the membranes have been long ruptured and a caput succedaneum has formed. Besides, the head is often high in the pelvis, for it engages in the occipito-mental diameter, the longest cranial diameter, and so finds great difficulty in entering the pelvis. Should there be any doubt about the presentation, the patient should be anæsthetized and a thorough examination made.

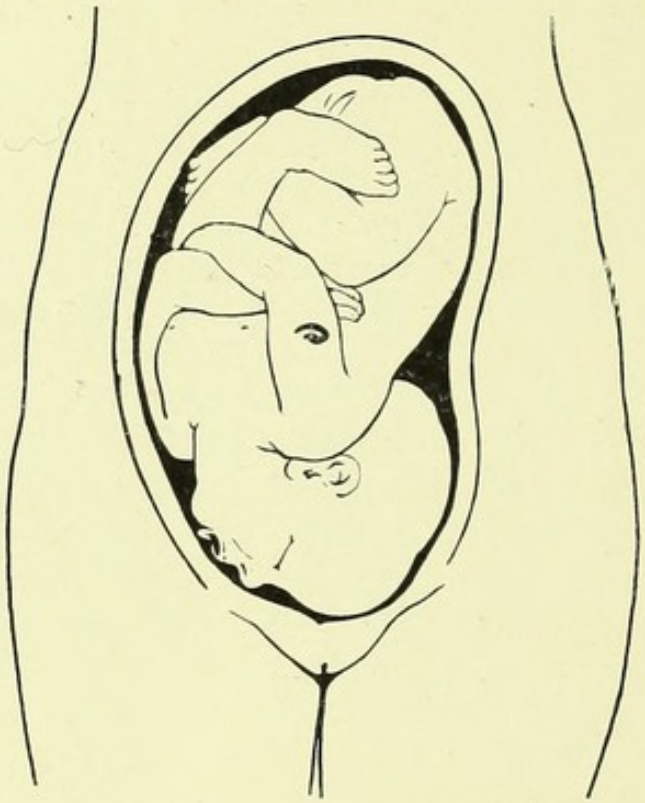


Fig. 24.—Brow Presentation.

In certain cases one may be deceived as regards the extent to which the head has descended, for the caput and elongated forehead may give the impression that the head is lower than it really is.

Spontaneous delivery in brow presentations rarely occurs, except when the child is below and the pelvis above the normal. When it does occur, the face in the region of the base of the nose is fixed against the pubes, and the anterior fontanelle and rest of the head sweep over the perineum. If the chin remains posterior, spontaneous delivery is impossible. The moulding of the head is shown in the illustration (Fig. 25).

As already stated, the prognosis for both mother and child is by no means good, although, since rectification has become more general, the results for both have greatly improved. All manner of injuries

to the mother are liable to occur, and Von Franqué states that rupture of the uterus occurs in 3 per cent. of cases. In one brow presentation brought into the Maternity Hospital the uterus was ruptured. Tears of the perineum, fistulæ in bowel and bladder, have frequently resulted. The long duration of the labour, and the injuries to the brain and soft parts about the face, especially if the child is dragged through with forceps, account for the high fœtal mortality.

Brow presentations, therefore, cannot be treated expectantly, which many still consider the right course to pursue with face presentations. Nor should they be treated with forceps and the child dragged through the pelvis, for such a procedure is attended with great risk to both the child and the mother.

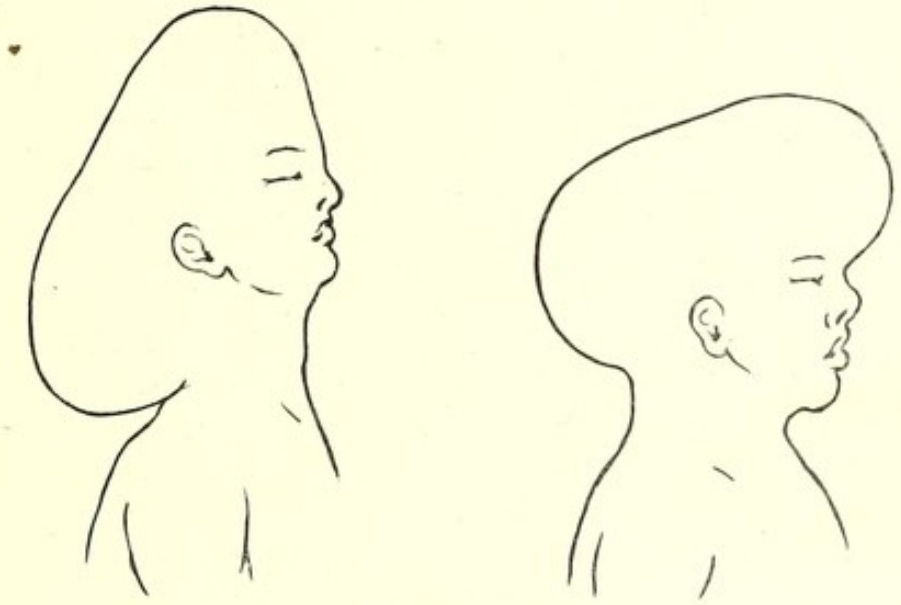


FIG. 25.—Two Forms of Moulding which the Head may undergo in Brow Presentations. (Spiegelberg.)

Version or rectification of the position are the only alternative treatments. Personally, I favour version when the presentation is recognized early, for, although the fœtal mortality is smaller after rectification, there is probably 20 to 30 per cent. in which rectification fails, and this, should it happen, is a very serious matter in brow presentations.

When labour has advanced and version is consequently unsuitable, rectification after the manner of Thorn, already described in connexion with face presentations, should be practised.

A year or two ago a woman, whose child presented by the brow, was admitted to the Glasgow Maternity Hospital advanced in labour. Several fruitless attempts at delivery with forceps had been made before she was sent to the hospital. My assistant rectified the mal-attitude, and without much difficulty delivered a living child weighing 12 pounds.

We have had three other such cases in recent years, and all have been successful. As regards the cases delivered by forceps, in one the child was alive, in the other it was dead.

The recent results from rectification have been very satisfactory. V. Franqué[1] for 342 collected cases gives the following:

Version	57	cases—	33·3	per cent.	dead	children.
Forceps	77	,,	27	,,	,,	
Alteration into a face ...	14	,,	14	,,	,,	
,, ,, vertex ...	43	,,	7	,,	,,	

When an alteration into a face or vertex fails, and the conditions are unfavourable for version, it has been recommended that symphysiotomy should be performed. Wallich, for the Clinique Baudelocque, for several such cases gives a maternal mortality of 5 per cent. and a fœtal of 28 per cent. I should be loath, however, to subject a woman to such a serious operation as symphysiotomy unless the child's condition was very satisfactory, and this will rarely be the case after several fruitless attempts at delivery. As a last resort, craniotomy is the only treatment.

Prolapse of Limbs associated with Presentation of the Head.

Prolapse of an arm is a common occurrence in oblique presentations. With head presentations (Fig. 26), however, it is very rare, as it happens only about once in 400 cases.

Naturally, any condition which hinders the engagement of the head predisposes to the accident. Thus, contracted pelvis, pelvic tumours, hydramnios, and sudden rupture of the membranes, are the most common causes on the side of the mother; while prematurity, maceration, and abnormal positions of the head, such as those of the face, brow, and occipito-posterior positions of the vertex, may be mentioned in connection with the fœtus.

The arm, of course, prolapses much more readily than the foot, and generally it is the anterior arm. Some extraordinary cases have been recorded where both arms and legs have presented. Broom[2] has related a very interesting one where the head and two feet became arrested at the brim. Von Zumph describes one where there was prolapse of both feet and arms and the cord in a facial presentation. Hall[3] describes a very complicated condition where the head was impacted between the legs of the child, and many odd and interesting cases are to be found scattered throughout the literature relative to the subject.

[1] Winckel's 'Handbuch,' Bd. ii., Teil iii., 1905, p. 1582.

[2] *Lancet*, 1890, p. 1298. [3] *Archiv f. Gyn.*, Bd. lxiii., 1901.

When the foot or feet come down, the child is invariably premature or macerated, and the uterus is firmly retracted over the child's trunk.

I have only once experienced difficulty in diagnosing the condition—

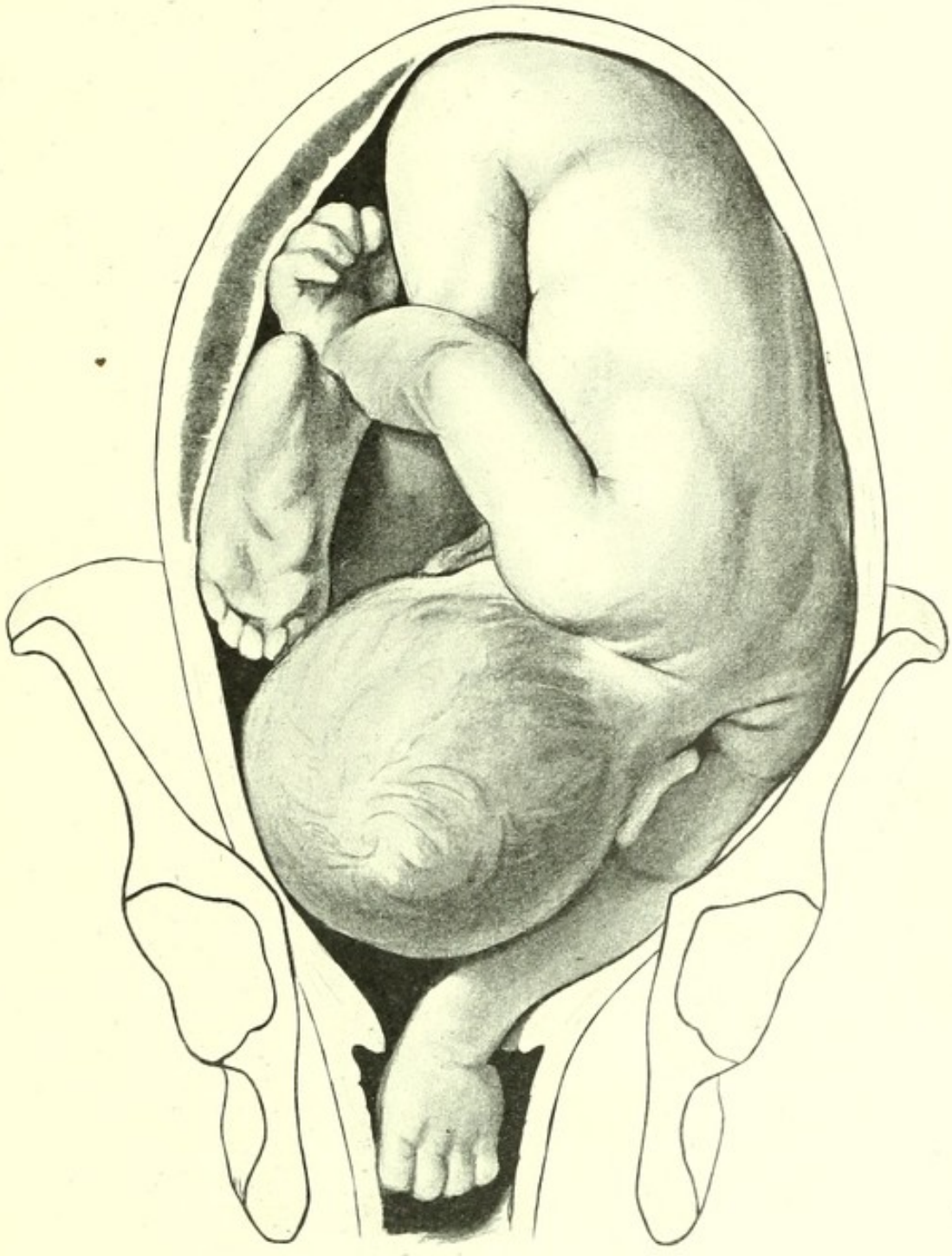


Fig. 26.—Prolapse of Arm in Vertex Presentations. (Bumm.)

when a foot came down beside the head and the tips of the toes felt exactly like the prolapsed cord.

A careful examination under an anæsthetic should always be made in doubtful cases, when it will invariably clear matters up.

Upon two occasions I have found the hand preventing the child's

head engaging at the brim, but the arm was easily displaced, and the head immediately entered and descended.

Naturally, considerable difficulty may be experienced in delivering the child if the prolapsed limb is not recognized, especially if the pelvis is deformed, and that accounts for the fact that not infrequently the mother and child have been seriously injured. The fœtal mortality, however, is also increased by the fact that the children are often premature and badly nourished.

In simple prolapse of the arm the latter can invariably be pushed up, and that should always be the treatment followed. To look upon the condition as an oblique presentation and perform version is a

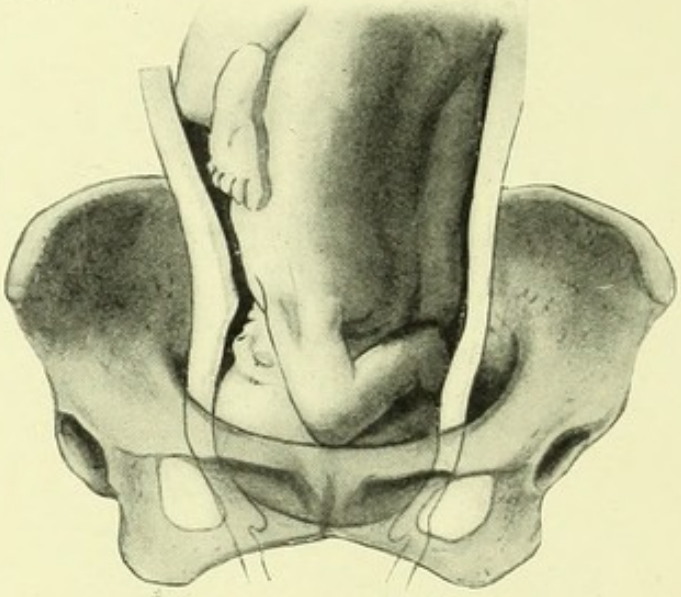


Fig. 27.—Dorsal Displacement of the Arm.

mistake. When a foot comes down, however, especially if the uterus is very firmly retracted over the child, there may sometimes be not a little difficulty in pushing the limb up. Here again version is a mistake, and it is usually very difficult. The course to pursue is to deeply anæsthetize the patient and push up the leg.

A peculiar but very rare displacement of the arm is the dorsal displacement (Fig. 27), which was first described by Sir J. Y. Simpson to the Edinburgh Obstetrical Society in 1850.[1] Since then many cases have been recorded. Sir A. R. Simpson in 1879[2] reviewed those recorded to date. Barbour[3] in 1887 recorded a case in which, after the birth of the head, in spite of extreme traction, the child could not be delivered. Finally, an arm was pulled down, and then it was discovered that the other was behind the occiput. It,

[1] 'Collected Works,' vol. i., p. 381.

[2] Trans. Ed. Obst. Soc., Session 1878-1879, vol. v., p. 97.

[3] *Edin. Med. Journ.*, September, 1887, p. 216.

too, was delivered with difficulty, and during the process was fractured. The latest recorded case is one by Wells.[1]

In these cases the head is prevented from descending, as in A. R. Simpson's case, or the difficulty may only occur after the head has been delivered. Apparently the arm catches upon the retraction ring, although it may sometimes be on the pelvic brim.

Naturally, the condition is easily overlooked. It should, however, be suspected if there is difficulty in delivering the head or shoulders when the pelvis is of normal capacity, the fœtus of normal size and in the ordinary position. By passing the hand up beyond the presenting part, the bent arm is felt.

Replacement often succeeds, but is sometimes accomplished with great difficulty, so much so that version is recommended by several writers. With deep anæsthesia in the Sims position, however, I should imagine that reposition of the arm could usually be accomplished.

[1] *Lancet*, January 19, 1907, p. 165.

CHAPTER V

DYSTOCIA THE RESULT OF FAULTS IN THE FŒTUS *(continued)*

Breech Presentations.

It sometimes happens that the breech is arrested in its passage through the maternal pelvis, and the progress of labour becomes retarded in consequence. When this occurs it usually takes place at the pelvic floor; occasionally it may happen at the brim.

An actual failure of the breech to engage is only encountered in primiparæ, when there is distinct disproportion between the maternal canal and the lower part of the trunk of the child. On the maternal side may be mentioned such conditions as deformity of the bony pelvis, and tumours of the uterus or surrounding structures; while on the fœtal side the most important are unusual size of the child's pelvis, and tumours of its pelvis and abdomen.

The maternal abnormalities referred to are not difficult of recognition—at least, pelvic deformity, if at all pronounced, should not be overlooked. Tumours, ovarian or uterine, however, are sometimes more obscure, especially if they are of medium size, for bimanual palpation of them is not always possible, owing to the presence of the distended uterus. Recently I had personal experience of this in a case of an ovarian cyst which was only distinguishable when the child's head was pushed out of the pelvis.

With fœtal abnormalities, such as a sacral tumour or enormous distension of the fœtal abdomen, the diagnosis is always difficult. They can often only be appreciated by a process of exclusion and by introducing the whole hand into the uterus.

Besides the conditions referred to, the engagement of the presenting part may be interfered with by alterations in the axis of the canal, such as are produced by a pendulous abdomen, or as a result of the operation of vaginal or abdominal fixation of the uterus.

But in addition to such abnormalities in mother or fœtus, it is frequently necessary to bring down one or both feet for dangers threatening the life of the mother or child. In this connexion, on the mother's side,

such conditions as placenta prævia, severe eclampsia, phthisis pulmonalis, or cardiac disease, and on the child's prolapse of the cord, and a steady diminution in the fœtal heart beats, may be mentioned.

Again, in medium degrees of contracted pelvis, when there is no necessity for Cæsarean section, most authorities advise the bringing down of a leg, and I do also, provided it is impossible to perform bipolar cephalic version and bring the head to present. The latter proceeding I favour, because, if it prove successful, one is able to estimate the relative size of fœtal head and maternal pelvis; besides, as I shall explain when discussing the relative merits of version and forceps in moderate degrees of contracted pelvis, forceps is infinitely preferable, as it is attended with a much smaller fœtal mortality.

The Breech situated at the Brim.

Although it is comparatively easy to bring down a foot when the breech is arrested at the brim, and is indicated under certain circumstances, it must not be forgotten that the risks to the mother and child are decidedly increased, especially if forcible extraction of the child follows. Traction, therefore, should only be exerted and delivery completed if there is distinct danger to the mother in delay, for if the breech is forcibly drawn upon, not only do the arms become extended, but the cervix, being insufficiently dilated, grasps the after-coming head with a force impossible to overcome, unless deep incisions are made in the cervix. In other conditions, such as placenta prævia, contracted pelvis, or large child, the case should be left to Nature until the whole breech is born. By so doing the maternal mortality will be reduced to a minimum, and the fœtal mortality will be kept at the lowest possible figure.

The Manner in which the Foot is to be brought down.—Before commencing this subject, one naturally asks the question, Is it ever an advantage to bring down both feet? The only circumstance, in my experience, under which it has appeared to have been an advantage, was when rapid emptying of the uterus was deemed necessary. Often it is not easy to get hold of both feet, especially if the legs are stretched out along the sides of the child's trunk. Besides, it increases the fœtal mortality, although, when rapid delivery for the sake of the mother is the first consideration, the life of the child is of only secondary consequence.

The bringing down of a foot is seldom a difficult manœuvre; but occasionally, and especially if the membranes have ruptured early and the breech is fixed, it may give rise to a good deal of trouble. Until

comparatively recent years the recommendation was to seize both legs, or whichever one presented; but now the advice of all writers, without exception, is to bring down the one directed anteriorly. In this country we are largely indebted to Barnes for having clearly pointed

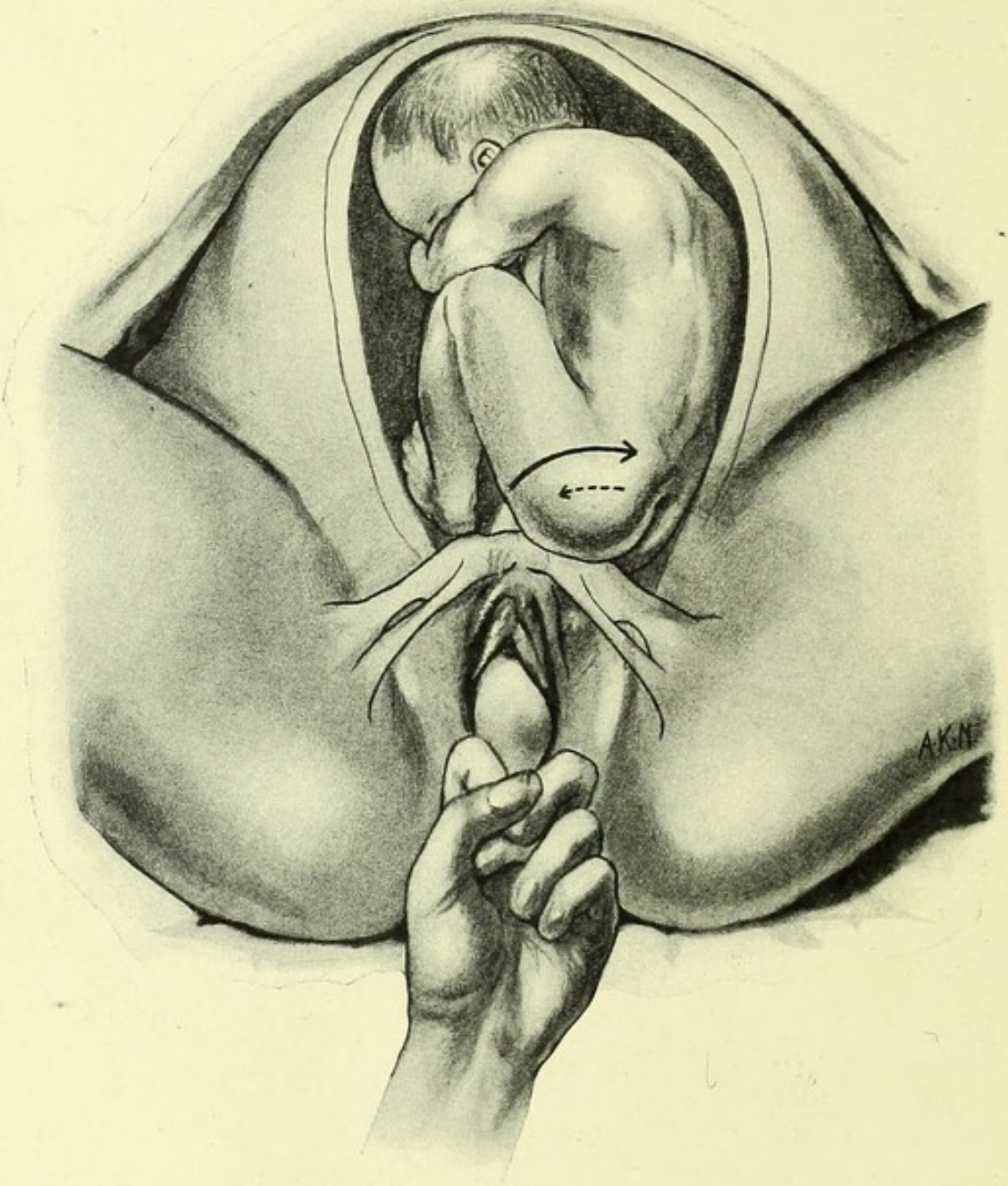


FIG. 28.—The posterior leg has been brought down, with the result that the anterior buttock catches upon the symphysis pubis. The arrows indicate the rotations of the trunk which result when traction is made on the leg.

out the advantage of such a procedure. By looking at the illustration (Fig. 28), it will be at once apparent why the anterior is better than the posterior. With the posterior leg down, the anterior buttock catches on the symphysis pubis, and the descent of the fœtal pelvis is

arrested. Even if traction is made on the limb matters are only made worse, for it is impossible to get the line of traction in the axis of the pelvis. But it is not always easy to get hold of the anterior leg, and it is especially difficult if the abdomen is pendulous, if the liquor amnii has drained away, or if the pelvis is contracted. Besides, the legs are often crossed, and confusion in consequence arises.

Be the cause what it may, how is the unfavourable position to be overcome? To push the limb back and seize the other is usually impracticable, even if it were worthy of consideration, while the bringing down of the other limb is not always possible. One is compelled in these cases, therefore, to make the best of matters. Now, if such a case is left to Nature, it will be seen that the posterior thigh comes to the front and becomes anterior by rotation. In doing this, however, it is apparent that the trunk may take either a long or a short rotation (Fig. 28—the arrows indicate the two varieties). Most modern writers seem agreed that the long rotation is the more general. Here is the opinion of two who have given the subject special consideration. Farabœuf and Varnier[1] write: 'La rotation abandonnée à la spontanéité se fait toujours par le chemin le plus long'; while Nagel[2] says: 'Die Drehung des Rumpfes um seine Längsachse geschieht desshalb auf dem langeren Wege,' etc.

As a rule, however, if the posterior leg is pulled upon, the fœtal pelvis takes the long rotation in a dorso-anterior and the short in a dorso-posterior position. Occasionally a short rotation occurs even in dorso-anterior positions, according to Farabœuf; but that is the exception, and certainly I have rarely seen it happen. Rotation may be greatly helped by the hand grasping the buttock between the thumb and finger, and encouraging the particular rotation the breech is tending to take.

In carrying out the manipulation of bringing down a foot, the hand, with the fingers brought together in the form of a cone, is carefully insinuated into the uterus, through vulva, vagina, and cervix. I need not say that this must be done after the patient's genitalia and the operator's hands have been thoroughly cleansed. No hard-and-fast rule can be laid down as regards the hand to be employed and the position of the patient, for matters of that kind must be left to the judgment and experience of the operator. This only I would say, that the prospective obstetrician should train himself to be ambidextrous. Personally, I prefer, when bringing down a foot, to have the patient upon her back, and I employ the hand which, introduced into the uterus, will most readily and most comfortably

[1] 'Introduction des Accouchements,' 1904, p. 155.

[2] 'Operative Geburtshülfe,' 1902, p. 42.

reach the limbs. Consequently, if the limbs are towards the mother's right side, I employ my left hand, and if they are to her left side, my right.

Many, especially in this country, prefer the patient in the left

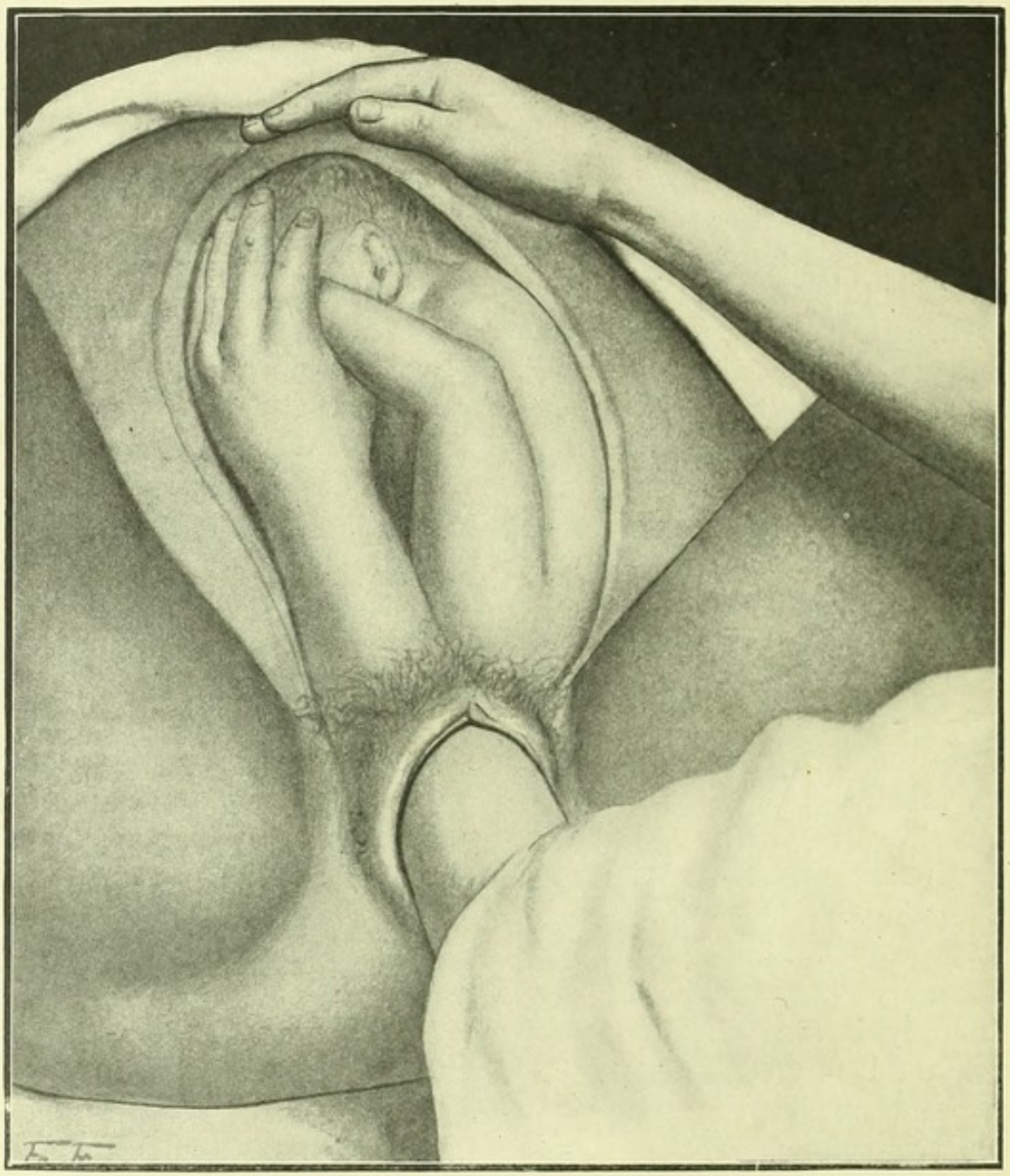


FIG. 29.—The operator has passed his hand along the ventral aspect of the child, and is seizing the anterior leg. (Nagel.)

lateral position, and, as I shall show, this is sometimes a distinct advantage. If such a position is employed, it will usually be found that the left hand is most suitable when the limbs are to the back, and the right when they are directed to the front of the mother. The cases in which it is a distinct advantage to have the patient

in the left lateral position, and even to raise the pelvis with a pillow, are those difficult cases where the fœtal pelvis is fixed in the maternal canal, the waters have drained away, and there is little room in the uterus for carrying out any manipulations. Under such circumstances the lateral position allows the force of gravity to come into play, and

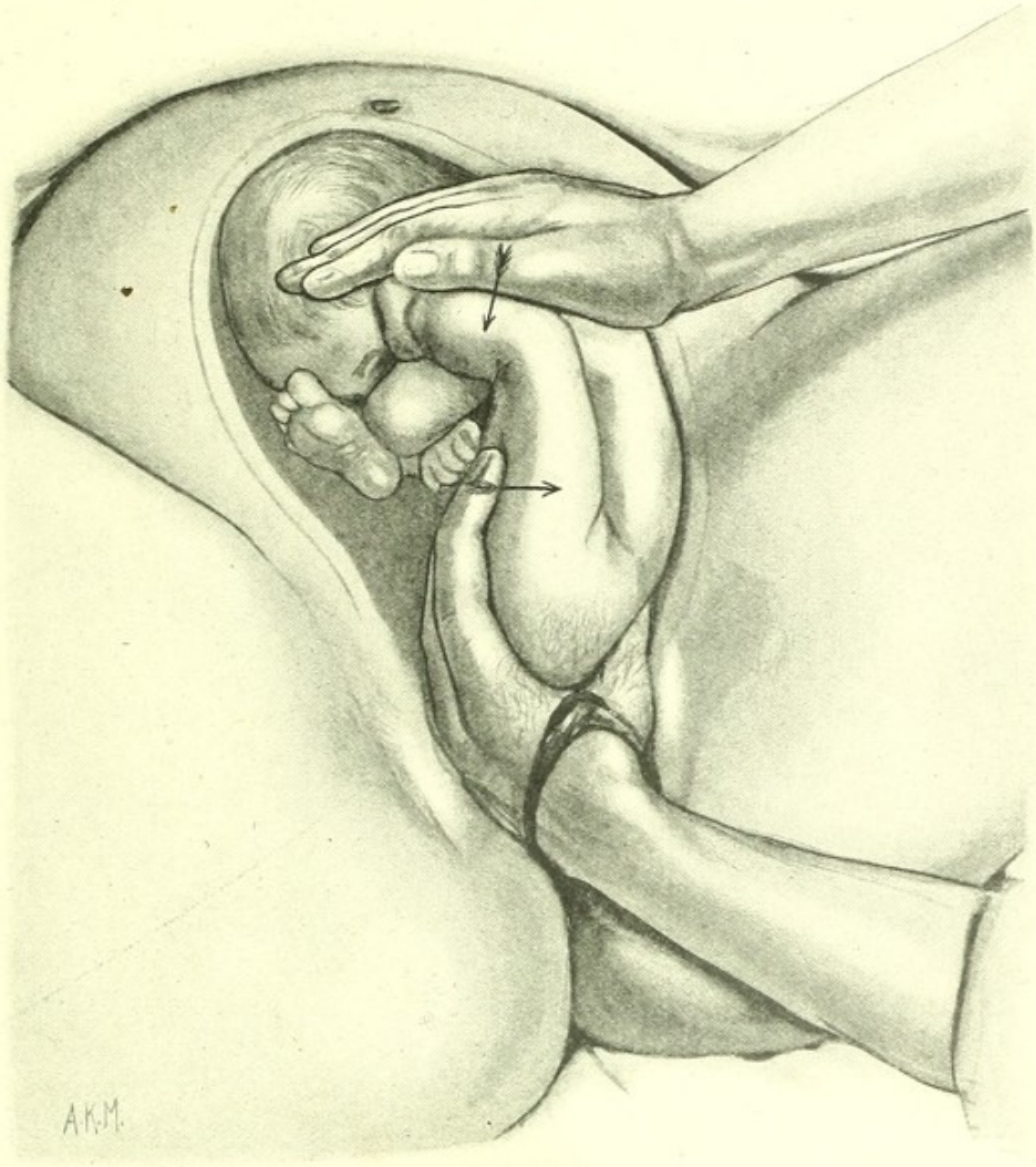


Fig. 30.—Pinard's Manœuvre for bringing the Foot within Reach.

so favours the dislodgment of the fœtal pelvis, especially if in addition the patient is deeply anæsthetized.

Probably all operators—at least all English operators of any experience—have appreciated the advantage of the left lateral position in those conditions described where there is great difficulty in dislodging the fœtal pelvis. Barnes speaks highly of it, Nagel does the

same, while the older obstetricians in the days before anæsthetics often made use of the position, or even the genu-pectoral position; see, for example, the recommendation of Smellie.[1]

Having introduced the hand into the uterus, it is to be passed along the ventral aspect of the child, over the thigh and lower part of the leg to the foot (Fig. 29), which is to be grasped between the fingers. If the legs are bent upon themselves, the foot is encountered almost whenever the hand is introduced; but if the legs are extended along the trunk, the hand will require to be passed almost to the fundus before the foot can be seized. The manipulations must only be carried out in the intervals between the uterine contractions. During the pains the hand must lie passive against the child's body.

Pinard has suggested a manœuvre—no doubt employed from time immemorial, for one sees it hinted at in the writings of the old obstetricians—for bringing the foot more readily within reach. As seen from the illustration (Fig. 30), the fore and middle fingers are applied over the thigh and press the latter against the trunk, with the result that the foot is brought lower, and can be more readily seized; at the same time the external hand presses down the trunk. It is seldom of use, however, when the uterus is firmly applied to the child's body or the legs extended. Usually the lower leg can be readily bent on the thigh, but when one comes to draw down the thigh the knee catches on the uterine wall. In such cases the breech must be dislodged and pushed up, while the trunk is pulled over by the external hand applied over the fundus; indeed, for a moment the presentation is actually made oblique.

The hand which is inside the uterus, and which, as I have already stated, is only moved during the intervals between the contractions, should, when possible, observe the character of the fœtal pulse, for the condition of the fœtal pulse naturally influences one in the further treatment of a case. The operator, however, must not be surprised by a very decidedly intermittent and rapid pulse after any disturbance of the child, for this is the rule; but it is only temporary, it soon quiets down after the manipulations cease, provided the condition of the child is satisfactory.

Extraction of the Child by Traction on the Leg.—Having considered the indications for, and the methods of bringing down a foot, and the advantage of bringing down the anterior one, we must proceed to the manner of extracting the child. Before doing so, I would once again warn my readers against such a proceeding with the os undilated, unless the indications are most pressing. It is no

[1] Smellie's 'Midwifery,' McClintock, vol. i., p. 317.

exaggeration to say that the risks to the mother are doubled, and those to the child trebled or quadrupled, by such a step. It is sometimes necessary, however, although almost the only indications are dangers threatening the life of the mother, when it is imperative that the uterus should be evacuated as quickly as possible. It might be thought that danger threatening the life of the child would also be a reason, but, as

Fig. 31.—The Manner of grasping the Foot.

a matter of fact, in practice, that is only the case if the os is fully dilated. No fœtus, showing cardiac embarrassment, could be extracted alive unless the parturient canal was, at the commencement of the operation, sufficiently dilated to allow of the child passing, or unless the operator was prepared to make deep incisions in the cervix.

The foot is to be grasped in the manner shown (Fig. 31), and if traction is made upon both feet they are best held with one finger between, to prevent them chafing. The attachment of a fillet is seldom necessary. The line of traction should be well back, so as to be exerted as nearly as possible in the axis of the brim. Once the knee is

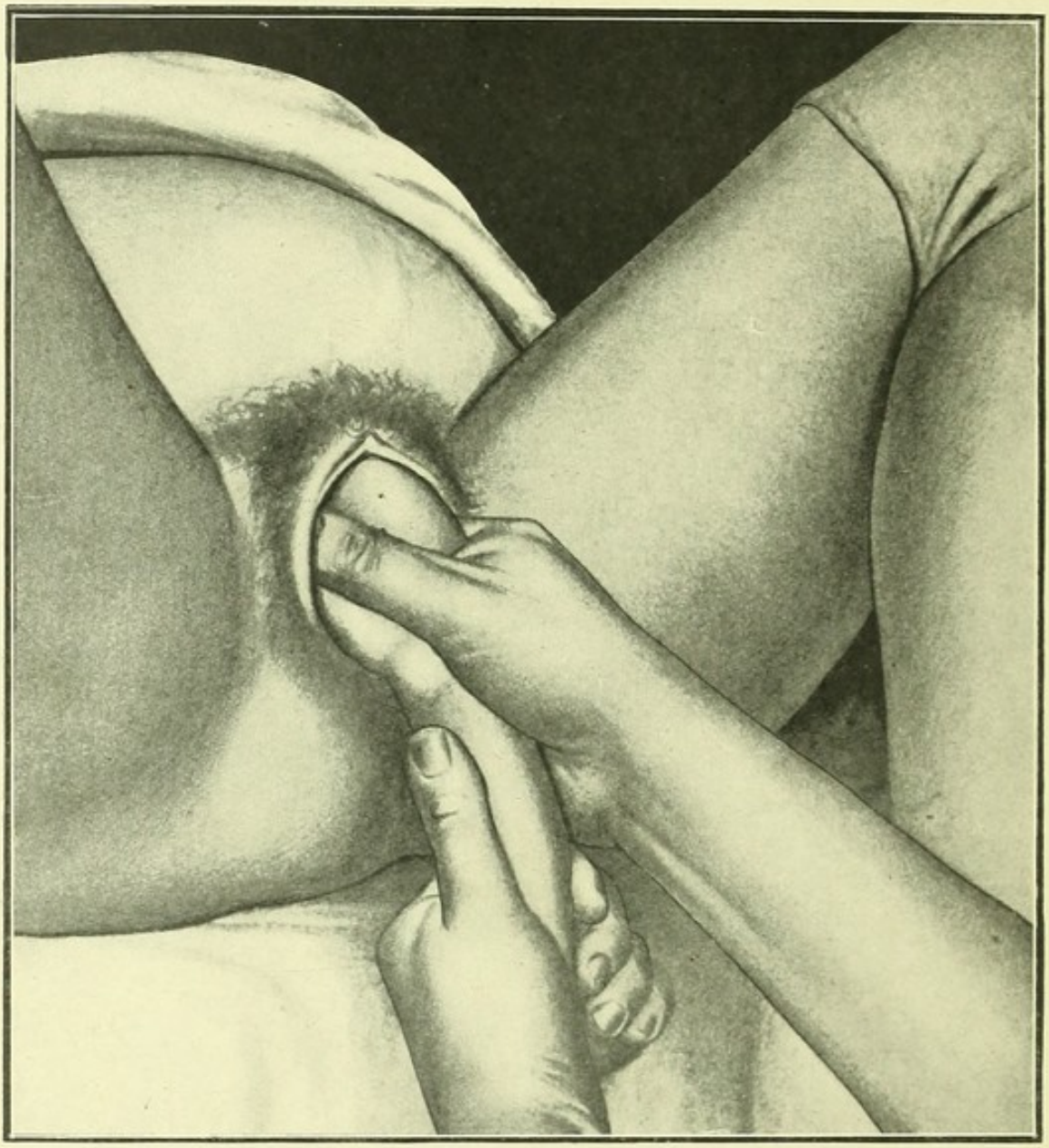


FIG. 32.—The Manner of grasping the Leg when Traction is being made upon it. (Nagel.)

born, the operator's hand should be passed over the thigh so that the latter rests in his fingers, while his thumb is applied over its dorsal aspect (Fig. 32). When the posterior buttock distends the pelvic floor, the leg on which the traction is being made should be pulled upwards. If need be a finger may be passed into the fold of the other thigh, so that a little more traction can be exerted (Fig. 33). There should,

Roughly speaking, once the child is born as far as the umbilicus it will not survive if longer than eight minutes is taken for its extraction. Of course, in many cases, as we have seen, where the delivery is hastened, the child's life hardly comes into consideration, as the operation is performed in the mother's interests.

In forcibly extracting a child by the feet the difficulty in bringing down the arms and head is frequently increased by the fact that the

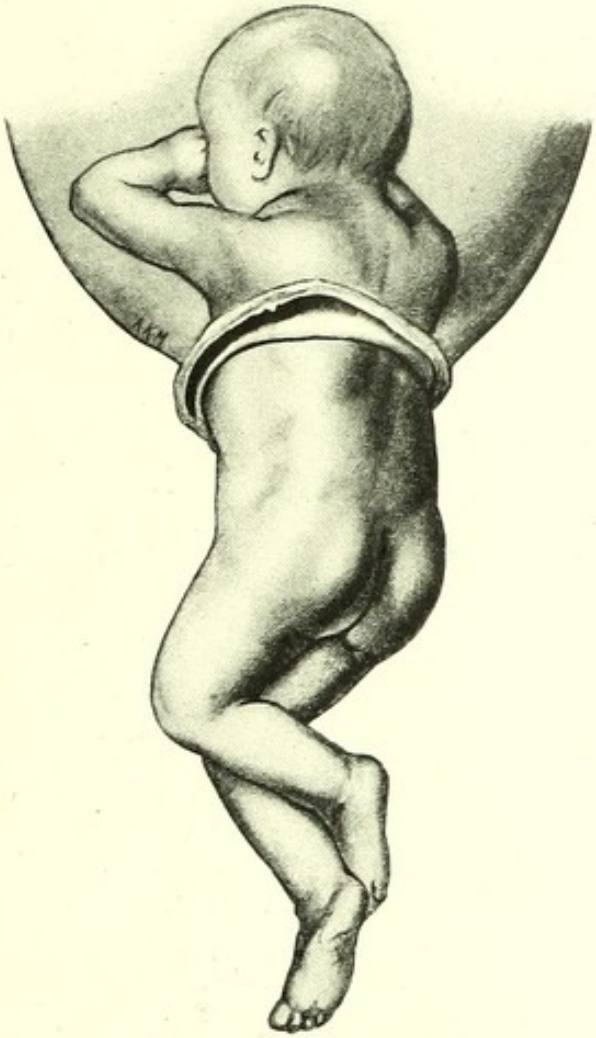


Fig. 35.—Showing the Upper Part of the Trunk caught by a Cervix not fully dilated. (After Budin and Tarnier.)

cervix, not being completely dilated, firmly grasps the body underneath the arms (Fig. 35). In such a condition, with a large child, unless one is prepared, to forcibly dilate and tear the cervix, or to make deep incisions into it, there is little chance of delivering a living child, and the hope of doing so should be abandoned.

The necessity for bringing down the arms, prior to extracting the head, has only been universally taught and practised since Baudelocque's time. Prior to that date some recommended leaving the arms

alone, as Deventer; others bringing down one, as Paré. Mauriceau, however, recommended bringing down both, while Smellie advised bringing down the arm only if the pelvis was small and the child large.

In disengaging the arms it is always an advantage to first bring down the one which is directed posteriorly, for there is more room for carrying out the manipulations in the hollow of the sacrum.

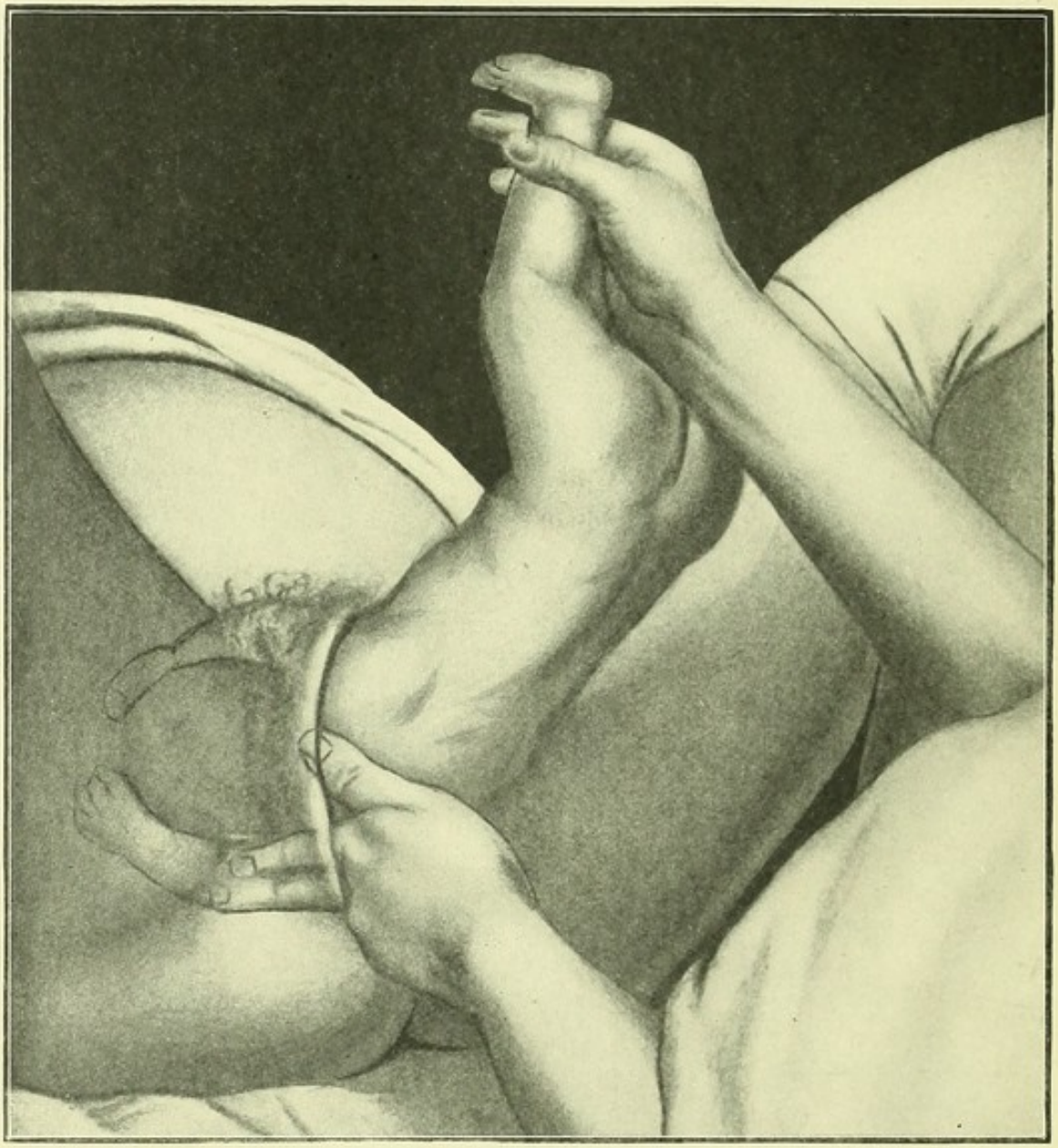


Fig. 36.—Bringing down the Posterior Arm. (Nagel.)

In order to bring the arm well within reach, the child should be pulled up towards the abdomen of the mother and a little to one or other side—if the back is to the right, to the left; if the back is to the left, to the right (Fig. 36). With a heavy child this is rather irksome, and so may be delegated to an assistant. The operator, however, usually finds it a distinct advantage to perform the manœuvre himself.

A mistake which is very commonly made, and one which renders the disengagement of the arms much more difficult, is pulling the

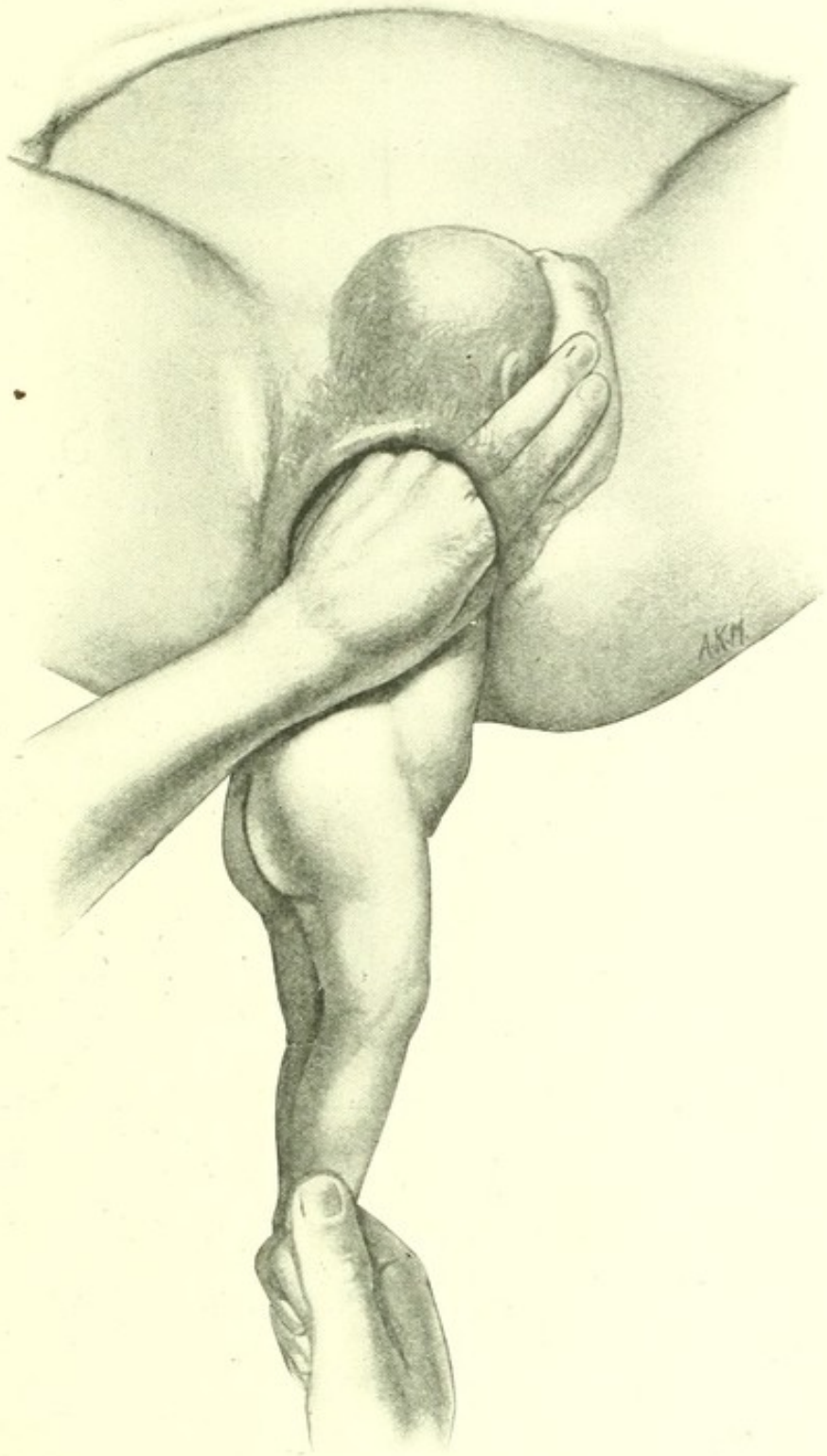


FIG. 37.—Bringing down the Anterior Arm without rotating the Trunk.

trunk of the child too far down, for it has the effect of impacting the head and arms in the pelvis. Generally speaking, when one feels the

lower angle of the anterior scapula just about the level of the lower margin of the symphysis pubis, one should proceed to bring down the arms. Indeed, in contracted pelvis, and with a very large child, it will sometimes be advantageous to do so earlier.

The hand to be employed is the one which can be passed most conveniently along the back of the child, so that while one hand is pulling the child forward the other is insinuated into the vagina and carried up the spinal column. If the child's arm is within easy reach, two fingers inserted into the vagina and the thumb over the child's back (Fig. 36) is sufficient, but at other times the whole hand must be inserted. Having come to the shoulders, two fingers should be carried, or rather laid, along the upper arm as far as the bend of the elbow, and the arm pulled or pushed down over the child's face. One must never try to bring the arm down by simply getting one or two fingers beyond the shoulder and pulling on the humerus, for that will almost certainly result in its fracture. If the arm cannot be reached, the trunk should be disengaged a little by pushing it up, and the whole hand, except the thumb, should be passed along the upper arm.

Having brought down the posterior arm, one has the choice of bringing down the other, keeping it anterior or rotating the trunk until it becomes posterior. The former manœuvre, most favoured by the French, is often quite possible, and, if so, should be adopted. It is carried out by pulling the child in a backward direction (Fig. 37) and passing the fingers over the shoulder on to the arm, as has just been described in connexion with the posterior arm.

But it is sometimes impossible to bring down the anterior arm in that way. In such cases the trunk should be rotated, and the arm which was anterior carried round until it comes to be posterior. Some operators, indeed, make a practice of always employing this latter method. But rotation, although usually carried out quite easily, is not altogether free from risk, for if the chin is low and catches, the head is arrested, and torsion of the neck, beyond the point of safety, follows. When carrying out rotation, therefore, the trunk, grasped by the two hands with the thumbs placed over the back and the fingers round the body (Fig. 38), should be pushed up, and the head and remaining arm dislodged from the pelvis; then, alternately rotating and pushing up the trunk, the latter is gradually brought round to the position which renders the arm accessible from the hollow of the sacrum.

Rotation, however, may be made in the direction of either the black or the dotted arrow. If one makes it in the direction of the dotted arrow, the anterior arm comes posterior, and the head remains to be extracted occiput anterior, the best position for extracting the after-coming head.

It seems, therefore, the most natural course, and, as a matter of fact, is the one generally recommended. It has, however, sometimes a distinct disadvantage, for in the process of rotation, the arm, becoming arrested by the friction against the uterine wall, comes to take up a position more or less behind the occiput. It has always seemed to me, therefore, better to follow the direction of the black arrow.

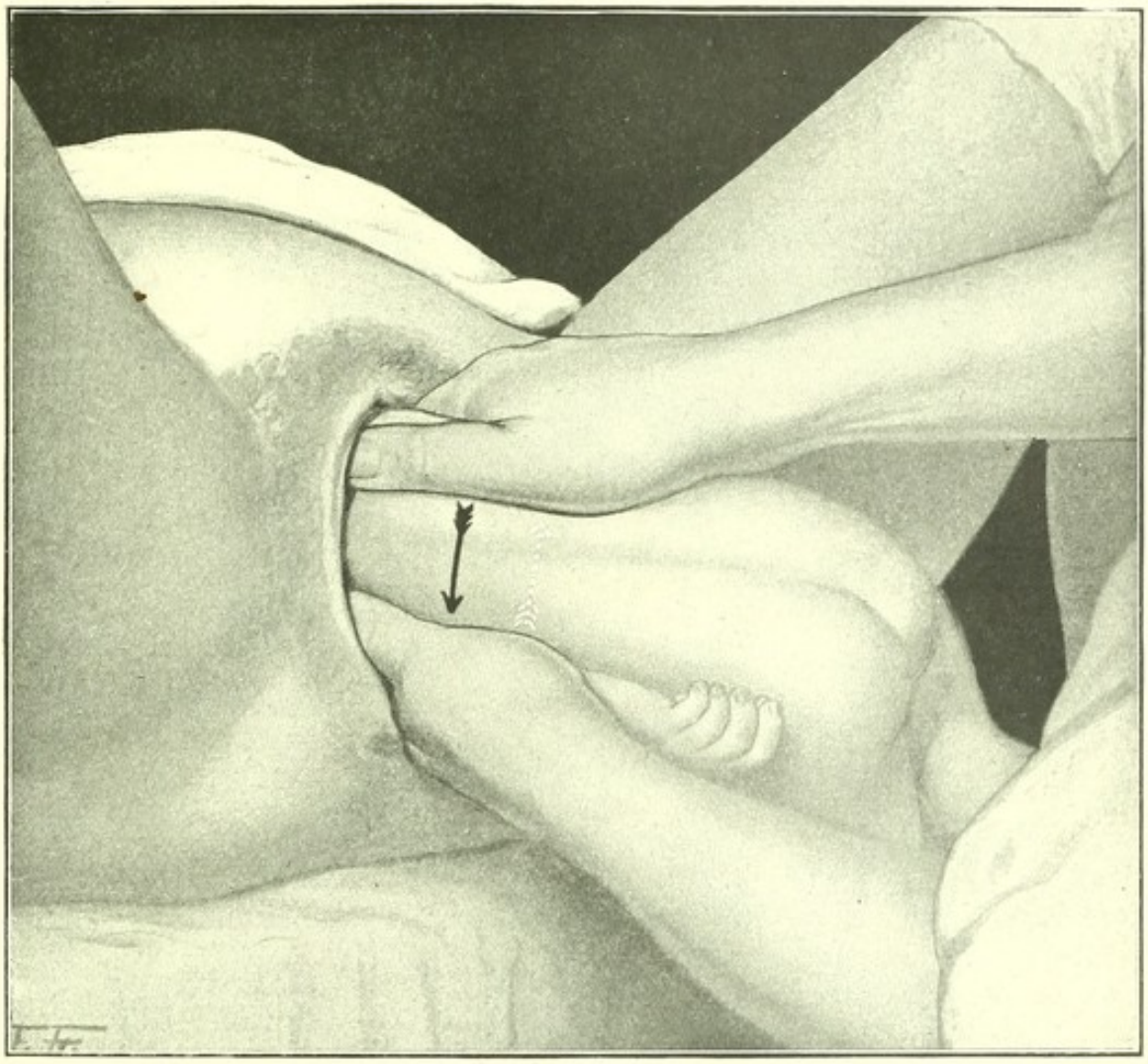


FIG. 38.—Bringing down the Second Arm. (Nagel.)

The posterior arm having been brought down, the operator is rotating the trunk so as to bring the anterior arm into the hollow of the sacrum, where it can be easily reached. The dark arrow is the right direction of rotation.

In the particular position under consideration, the rotation must not be stopped when the shoulder reaches the right sacro-iliac synchondrosis, otherwise, although the arm could be brought down, one would have to deal with an occipito-posterior position of the after-coming head. Rotation, therefore, must be continued still further, and the shoulder be carried to the other sacro-iliac synchondrosis before the arm is brought down, for by so doing one will obtain what is desired, an occipito-anterior position of the head. But this long

rotation will be found of great advantage in another respect. All the time the arm tends to come more over the face, and the last stage of rotation aids this more than all the rest, for the arm catches on the projecting spinal column and becomes very accessible. Having placed the arm posterior, it is brought down as already described.

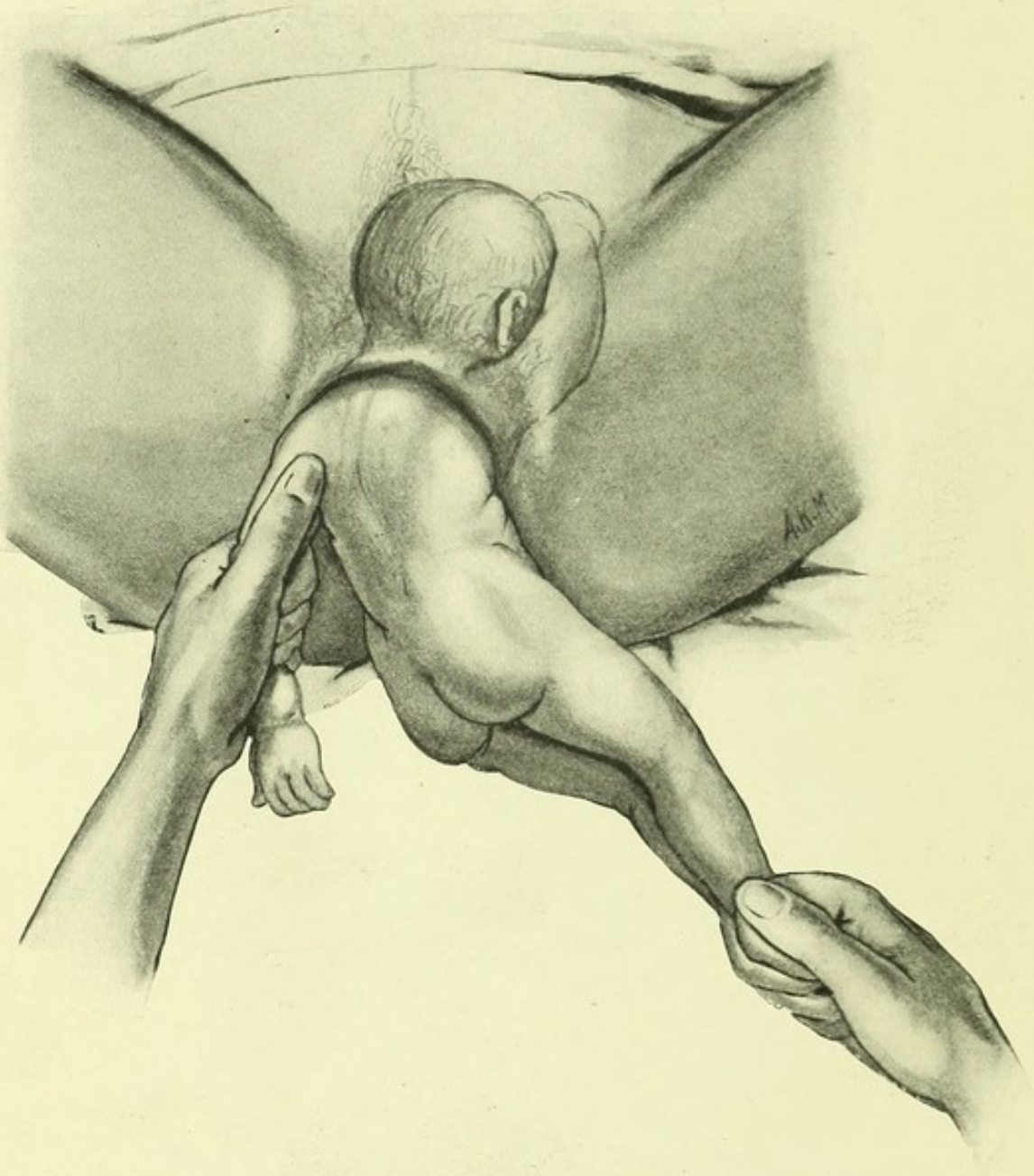


Fig. 39.—Rotation of the Trunk by pulling or pushing the Trunk with the Arm already brought down—a Manœuvre not recommended.

Rotation may be aided by seizing the arm which is already down, and dragging or pushing the trunk by means of it (Fig. 39), but such a manœuvre is not advisable, and the manipulations already described are the best.

It sometimes happens, owing to the large size of the child or the narrowness of the bony canal, that there is extreme difficulty in bringing down the arms. In such cases, under anæsthesia, the trunk

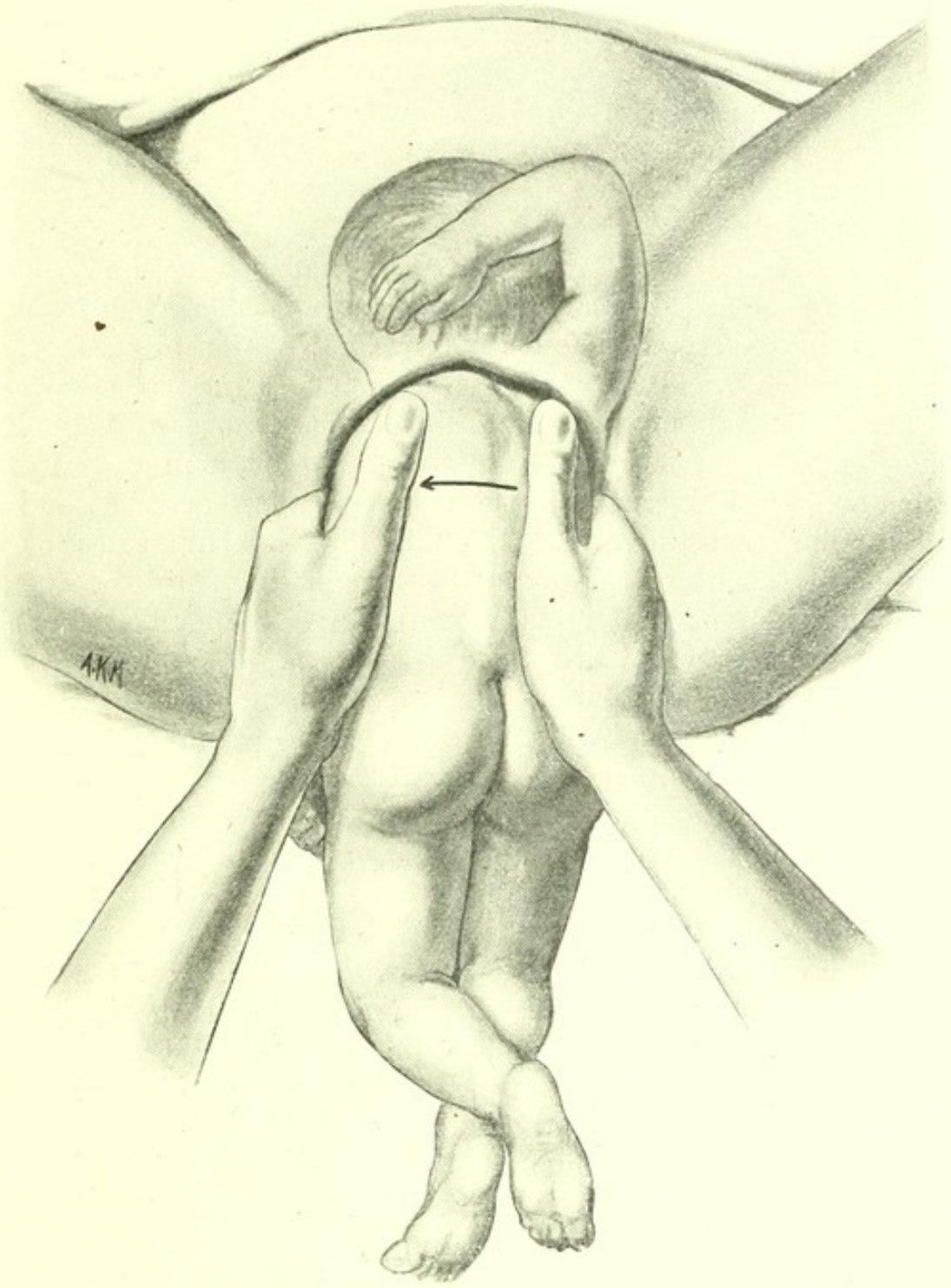


FIG. 40.—Dorsal Displacement of the Arm, and the Manner in which the Trunk should be rotated in Order to bring the Arm into the Hollow of the Sacrum, and so within Easy Reach.

of the child should be pushed well up, the hand passed along the ventral aspect of the child, and the anterior arm brought down. If such extreme difficulty is anticipated, it is well to do as Küstner has

suggested, and bring down an arm immediately after the navel appears.

When, after many and futile attempts, the arms cannot be brought down, a hook must be used. I have only had to do this with a dead child where the maternal passage was deformed and the child was of extreme size. If recourse is had to a hook, it should be passed along the dorsal aspect of the child, over the elbow, and the arm pulled upon—it is invariably fractured. I have sometimes required to use a sharp hook for such cases.

Occasionally it has even been necessary to perforate the head before bringing the arm down.

Sometimes one of the arms gets displaced behind the occiput—'dorsal' or 'nuchal' displacement of the arm. It has even happened that both have become so displaced—a malposition often extremely difficult to rectify. It is a matter of simplicity in the case where, one arm being already down, the other is discovered behind the neck (Fig. 40), for a simple rotation of the body in the direction of the arrow will result in the arm becoming arrested and the head slipping past the arm. Should, however, both arms be still alongside of the head, they must be brought down by the operator passing his whole hand into the uterus after the trunk of the child has been pushed up and disengaged, or they must be brought within reach by rotation. If rotation is chosen, it is at once evident that, as the trunk is rotated and the one displaced arm corrected, the malposition of the other is aggravated. The trunk is therefore rotated—the direction here does not matter—and the posterior arm, which is more easily reached, disengaged; then the child is rotated back again to allow of the other arm being brought down.

In cases where the child's abdomen is forward at the stage when the arms have to be disengaged—a condition which need never occur if one favours rotation of the back forward as the breech is being born—some obstetricians recommend pulling the child backwards and passing the hand up along its ventral aspect, and disengaging the arms from that side; while others favour approaching the arms from the dorsal aspect. It is impossible to detail all the little manœuvres which have been suggested. Fritsch's, however, seems good. It consists in passing one hand over the front of the child's shoulders, and then pulling its trunk upwards with the other, the arms being thus dislodged by the movement of the trunk rather than by any direct manipulation on the arms.

Extraction of the Head.

Having delivered the arms, the operator now proceeds to the extraction of the head. Should he have already lost much time in bringing down the arms, it is of the greatest importance, if the child is to be born alive, that he extract the head quickly. But while that is fully appreciated by every one, it is often forgotten that many children are lost, not so much by delay as by undue and misdirected traction on the trunk, causing fracture and dislocation of the upper part of the spinal column. It is a matter of extreme difficulty to give the relative proportion of cases lost by delay and those lost by injury to the spinal column, but I feel convinced that a much larger number of cases are lost by the latter than is generally supposed. So impressed am I with this that it has become my practice in the last few years always to deliver the after-coming head with forceps (Fig. 41), if moderate traction and suprapubic pressure, in the manner to be described, fail to effect the delivery. Consequently, I always have forceps ready at hand in a breech presentation, or when I have brought down a foot; not that I often employ the instrument, for that is seldom necessary, but I prefer to have it ready in case it should be required. Since I have had recourse to forceps in all cases of the least difficulty, my results have been infinitely better.

This, it may be said, is a very prominent position for forceps to occupy in the treatment of the after-coming head, and many, I know, will not agree with me, especially those who follow Continental teaching. Most English obstetricians of experience will side with me, however, for the treatment has always been in favour in this country, since our great Smellie recommended it. Barnes[1] wrote of it: 'It is to be preferred to manual traction, because it avoids pulling upon the cervical articulations'; and again (p. 57): 'But if there be any delay, the forceps will be safer for the child. The forceps, then, is the more scientific instrument.' Herman[2] says: 'This is the best way of delivering it (the head) when help is needed.'

Obstetricians of other countries, taken as a whole, are either lukewarm or directly opposed to the employment of forceps. Zweifel[3] for example, admits that the instrument is easy of application, but is opposed to its employment because it takes time, and because the results of forceps delivery are bad, and he quotes the statistics of Sickel.[4] But no time is lost if the forceps are ready to hand, as I have recommended they should be; and it is not to the point to quote statistics of cases in which forceps were only had recourse to after

[1] 'Obstetric Operations,' p. 171.

[2] 'Difficult Labour,' p. 52. [3] 'Lehrbuch der Geburtshülfe,' 1892, p. 705.

[4] Schmidt's 'Jahrbucher,' Bd. lxxxviii., p. 112.

many futile attempts at manual extraction. How can one expect good results with forceps in such cases? Williams[1] takes up a more pronouncedly antagonistic attitude, and writes: 'As a matter of fact, it is never necessary to resort to the forceps under such conditions.'

There are indications, however, in quite recent years that the employment of forceps for the delivery of the after-coming head is

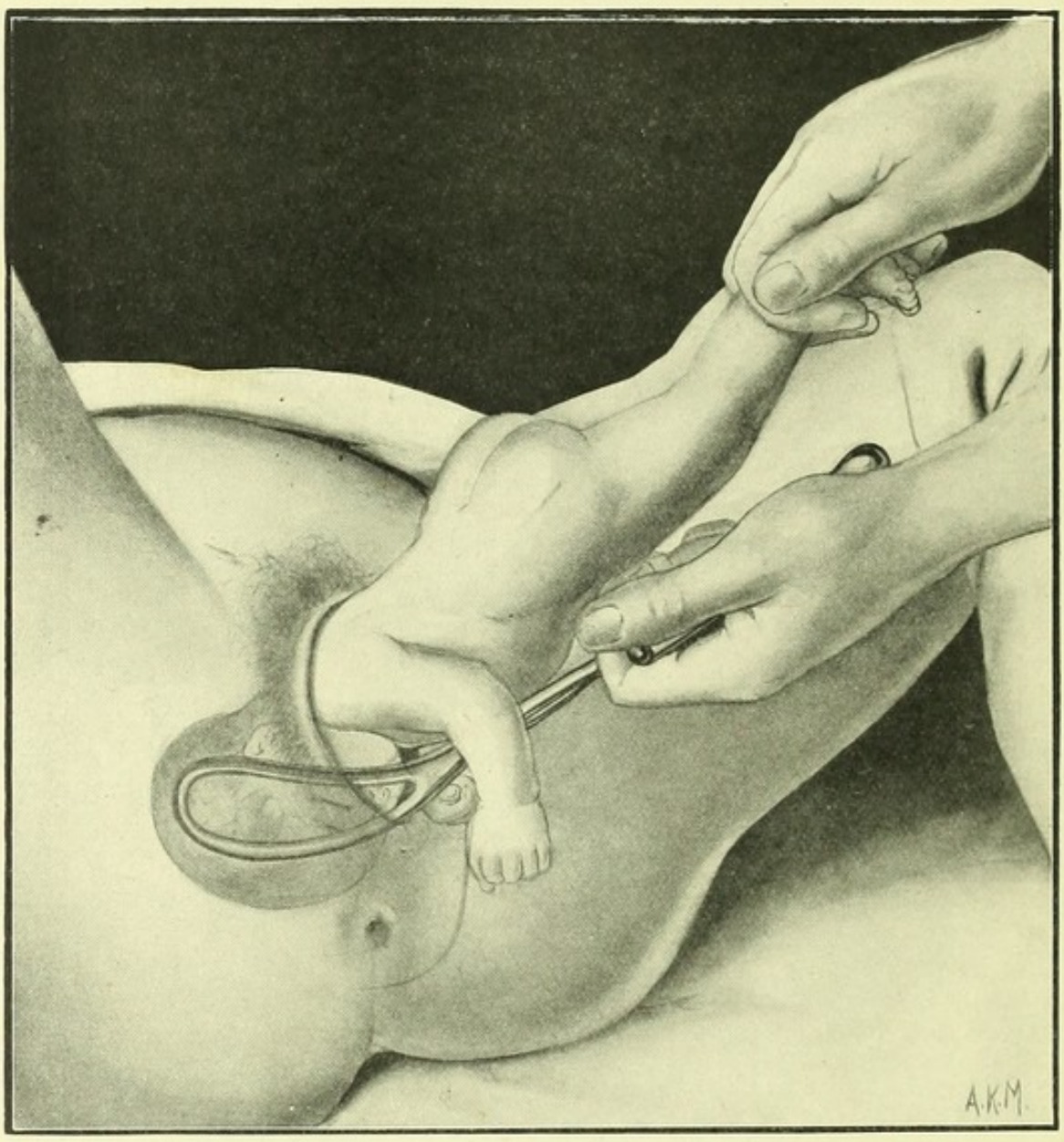


Fig. 41.—The Delivery of the After-coming Head with Forceps.

being looked upon with more favour. In both of two recent and most excellent German works on operative midwifery—I refer to those by Skutch and Nagel—and in Edgar's large text-book forceps is very favourably referred to, while in the most recent important German work, at present appearing—Winckel's 'Handbuch der Geburtshülfe'

[1] 'Obstetrics,' 1903, p. 378.

—Wyder considers the subject very fairly, and although he does not advocate forceps so strongly as I have done, he writes favourably of the employment of the instrument. The only cases in which I believe forceps unwarrantable are those in which the maternal pelvis is too small or the fœtal head hydrocephalic. I would place the lowest limit as a conjugata vera of $3\frac{1}{2}$ inches (8·7 centimetres).

But, as I have already said, although always having forceps ready for use, I seldom require to employ them. Like most modern obstetricians, I believe that the best of the many methods of extracting the after-coming head is the method now generally associated with the names of Mauriceau,[1] Smellie, and Veit.

[1] 'Traité des Maladies des Femmes grosses,' 4th edition, 1694, p. 284.

The following brief summary of the various methods which have been from time to time suggested for dealing with the after-coming head may be of interest (Winckel's 'Lehrbuch,' translated by Edgar, 1890, p. 687):

'The methods to deliver the after-coming head as rapidly and safely as possible are very old, and have been often modified and combined in many ways. An historical retrospect is at this point especially interesting. We find the following methods:

'1. Both hands are introduced, and with them the head only is grasped and retracted.—Hippocrates: "De Superfœtatione," Basel, 1546; ed. Cornarius, p. 66.

'2. The severed head is pressed from without into the pelvis with both hands, and extracted from the vagina with hooks.—Celsus: Liber VII., 491.

'3. The severed head is extracted with a finger introduced into the mouth and one or more hooks.—Paulus Ægenita: "De Fœtus Immortui Extractione et Exsectione," cap. 74.

'4. Traction on the body, sternutation of the parturient, and light compression of the lower portion of the abdomen.—Abulcasis: Liber II., "Exitus Embryonis super Pedes suas"; Jacob Rueff, 1580 (Hebammenbuch, s. 74).

'5. Traction from the mouth on the lower jaw and the shoulders.—Mauriceau: "Traité des Maladies des Femmes grosses," Paris, 1668; Marguerite de la Marche, 1677; Paul Portal, 1685; Chapman, 1735; Levret, 1747; Roederer, 1759; Prange, 1760; Fries, 1769; Baudelocque, 1781; Stark, 1801; Lachapelle, 1821; G. Veit, 1863. Modification by Stein, 1783; Steidele, 1784.

'6. Traction on the lower jaw and the feet.—Peu: "Pratique des Accouch.," Paris, 1694.

'7. Traction on the lower jaw and on the shoulders and the feet by an assistant. —Mauriceau: "Traité des Maladies des Femmes grosses," dernière edition, Paris, 1683; Dionis, 1718; Puzos, 1759; Lachapelle, 1821 ("Pratique," etc., pp. 334, 335); Ahlfeld, 1875, *Archiv f. Gyn.* viii. 360 (1887); "Ber. u. Arb. aus Marburg," 1887, p. 150.

'8. Traction on the upper jaw internally and pressure on the head externally. —L. Heister, 1718.

'9. Traction on the lower jaw and pressure against the occiput internally.— De la Motte: "Traité Compl.," 1725, p. 412; Mesnard, 1748; Roederer, 1759.

'10. Traction on the lower jaw with two fingers and on the upper with one finger, and traction on the shoulder.—Giffars, 1734.

'11. Traction on the upper jaw and pressure against the occiput internally.—

Mauriceau[1] was the first to lay down clearly instructions as to how the arms and after-coming head should be delivered. Smellie[2] seems to have been quite unaware of them, for he does not refer to Mauriceau in his writings on the subject. Veit, who perfected the manœuvre and described it most carefully, certainly deserves to have his name associated with the method.

The illustration (Fig. 42) indicates how the manœuvre is carried out. One finger of the right or left hand—whichever can most con-

---

Smellie, 1752; Josephi, 1797; Busch, 1801; Froriep, 1818; Ritgen, Joerg, 1820; Wigand, 1820; Lachapelle, 1821.

'12. Traction on the body and depression of the neck backward with the thumb of the other hand.—Japaner: Shauron von Genjetz Kagama, 1751 or 1754.

'13. Traction on the body alone over the shoulders with both hands.—A. Petit, 1753.

'14. Pressure from without on the head and traction on the shoulders.—Pugh, 1753; Kiwisch, 1846 ("Beiträge zur Geburtskunde," i., p. 69); Goodell, 1873.

'15. Traction by the operator on the lower jaw and shoulders, and by an assistant on the body of the child, and pressure by a second assistant from without on the head.—Eschenbach: "Grundlage zum Unterricht einer Hebamme" (11 Aufl., Rostock, 1687).

'16. Hooking the chin to flex it on the neck, expression of the head by pressure upon the occiput at the brow externally.—Wigand, 1800 ("Beiträge zur Theor. und prakt. Geburtshülfe," 11 Heft, Hamburg, 1800, p. 118); Lachapelle (*loc. cit.*, pp. 336-338); K. Ruge (*Zeitschr. f. Geburtsh. und Frauenkrankheiten*, von E. Martin, 1876, i., p. 82); Champetier de Ribes, 1879 ("Du Passage de la tête Fœtale à travers le détroit Supérieure Rétréci du Bassin," p. 78, Experience IX.); A. Martin, 1886 (*Berl. klin. Wochenschrift*, 1886, p. 660); Winckel: "Verhandlungen des 11 Gynäk. Congress," Halle, 1888).

'17. Pressure on the head from within and traction on the body.—Ritgen, 1820 (*Monatsschrift f. Geburtskunde*, viii. 233); Credé, 1854 ("Klinische Vorträge über Geburtshülfe," p. 763).

'18. Traction on the trunk alone, by the shoulders and feet (the Prague manipulation).—Kiwisch, 1846 (compare No. 14); Scanzoni, 1851.

'19. Traction on the upper jaw, pressure against the occiput internally, and pressure on the head by an assistant externally.—Wigand, 1820; Ritgen, 1848; Credé, 1854; Ed. Martin, 1865 (*Monatsschrift f. Geburtskunde*, xxvi. 434).

'20. Depression of the head into the small pelvis, and then extraction, combined with expression.—Kristeller, 1867 (*ibid.*, xxix. 383).

'21. Traction on the shoulders by the operator and an assistant; lighter traction on the lower jaw.—Ahlfeld, 1887 ("Ber. u. Arb. aus Marburg," 1887, p. 151).

'Of these twenty-one different methods, the action is—

'(1) By traction only and upon the head alone in Nos. 1 and 3; upon the body alone in Nos. 13 and 18; upon head and body in Nos. 5, 6, 7, and 10.

'(2) By traction and pressure, and upon the head alone in Nos. 2, 8, 9, 11, 16, 19, and 20; upon head and body in Nos. 4, 12, 14, 15, and 21.

'(3) By pressure only in Nos. 16 and 17.'

[1] 'Traité des Maladies des Femmes grosses,' 4th edition, 1694, p. 283.

[2] *Op. cit.*, vol. i., p. 311.

veniently be employed—is introduced into the mouth ; over the arm of this hand the child rides. By this means the head is maintained in an

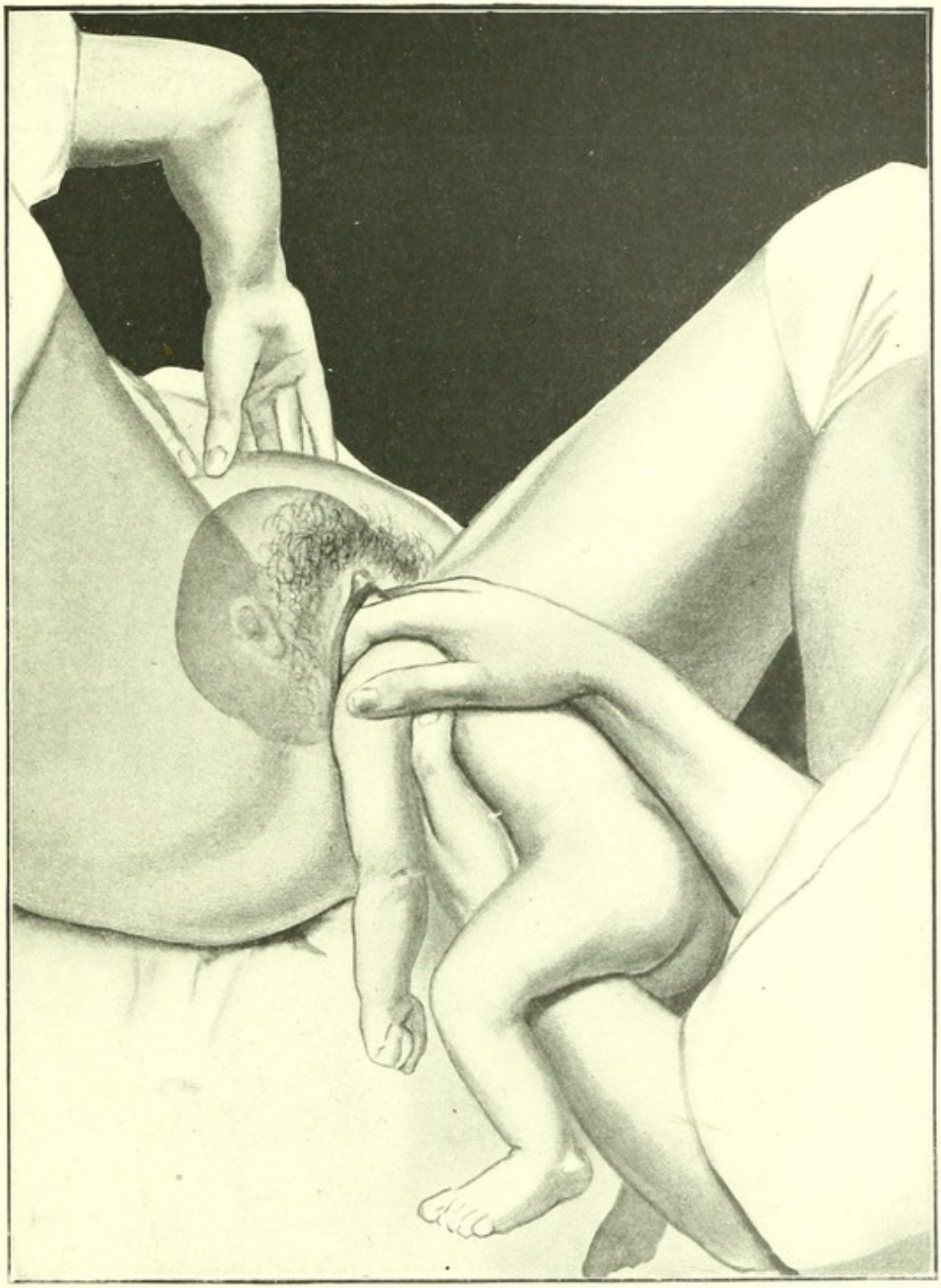


Fig. 42.—The First Stage in the Delivery of the After-coming Head (Mauriceau-Smellie-Veit Method). (Nagel.)

attitude of flexion. Two fingers of the other hand are applied over the child's shoulders, one finger on each side of the neck. Traction is now exerted in a downward and backward direction until the head is

brought through the pelvis. The passage of the head down through the pelvis is greatly facilitated by an assistant or nurse pressing the head into the pelvis from above. It is a great advantage if this is done during a uterine contraction.

Once the head has passed the brim and is well down in the

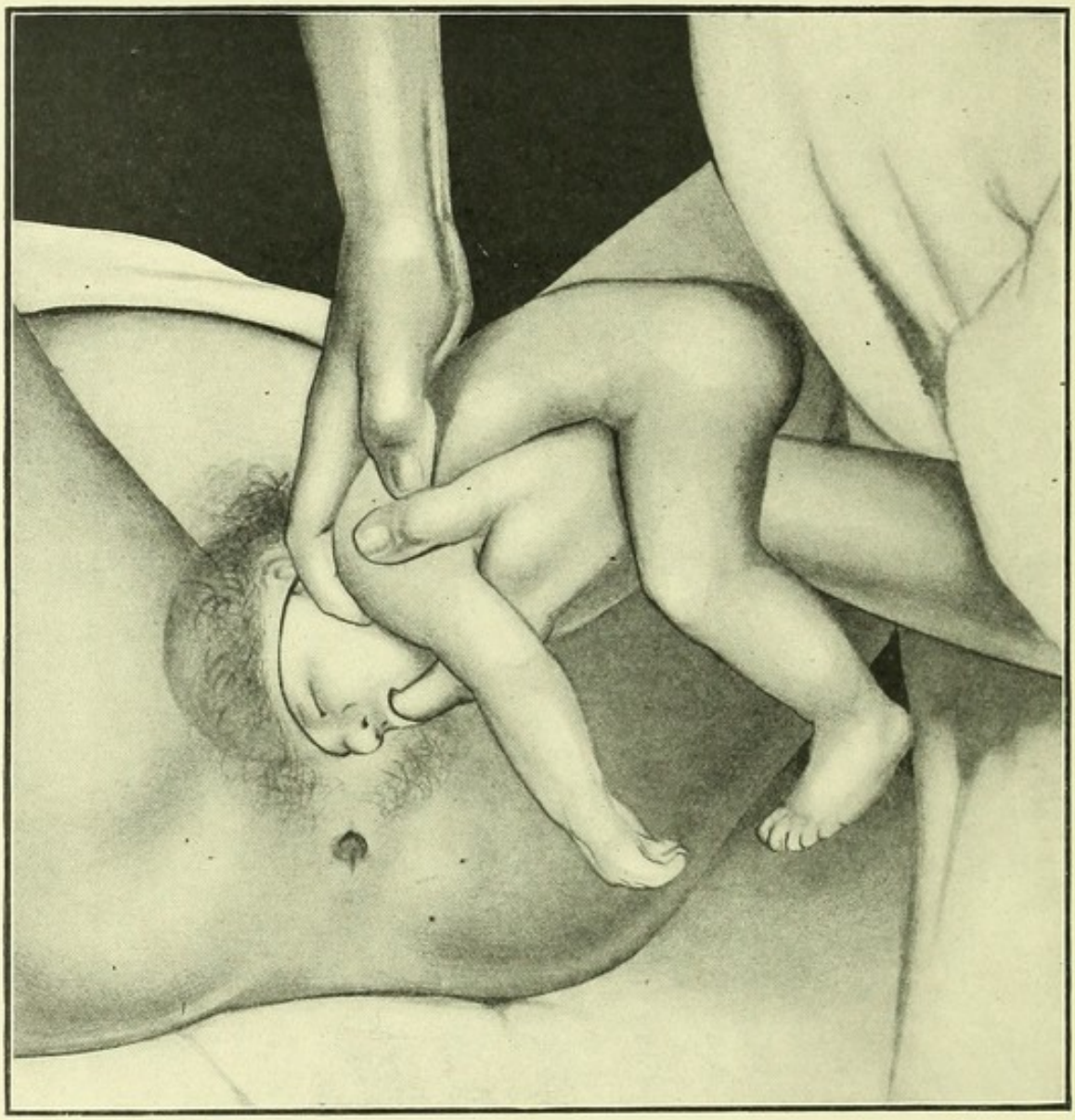


Fig. 43.—The Completion of the Delivery of the After-coming Head. The trunk is carried up towards the mother's abdomen (Mauriceau-Smellie-Veit Method). (Nagel.)

cavity, and the nape of the neck appears below the symphysis—but on no account before then, otherwise dislocation of the neck will result—the child is carried well up on to the abdomen of the mother (Fig. 43). At this stage suprapubic pressure ceases, otherwise the head will be forced out too suddenly. The face and forehead are now carefully guided over the perineum, after which the occiput escapes and the delivery is completed.

The illustrations of two other methods—the Prague and the Wigand-Martin (Figs. 44 and 45)—explain sufficiently the manner of their employment. They are not much used, the former because there is great danger of injuring the spinal column, and the latter

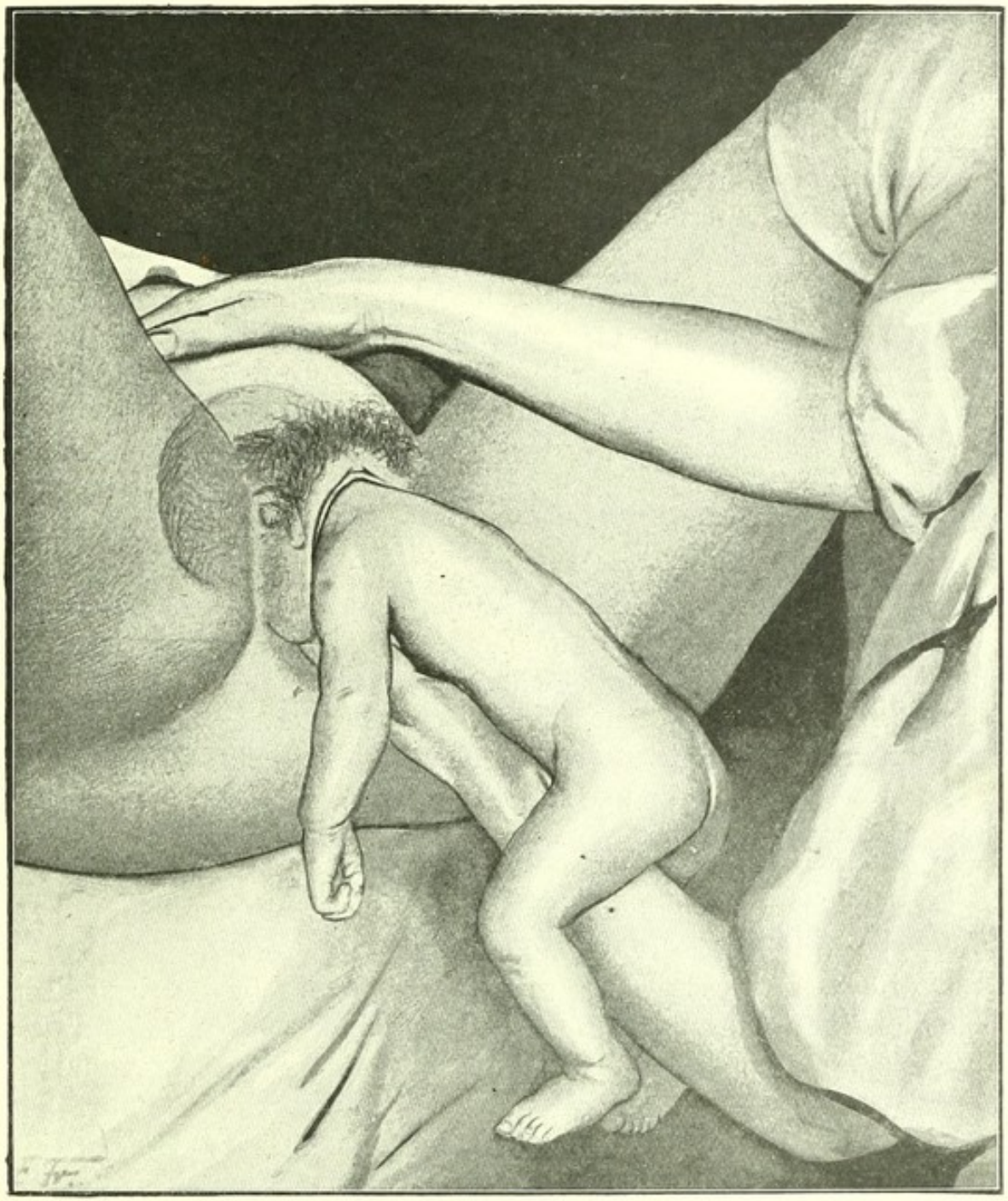


Fig. 44.—The Delivery of the After-coming Head (Wigand-Martin Method). (Nagel.)

because one cannot exert so much traction. They are useful, however, if the operator is single-handed.

Another difficulty in connexion with the delivery of the after-coming head is its extraction in cases where the occiput is directed backwards. Such a complication is very rarely encountered when the

accoucheur has been in attendance from the first, for in all dorso-posterior cases, if a spontaneous rotation of the back to the front does not occur with the escape of the limbs, a very slight rotation of the fœtal pelvis is sufficient to bring it about. It occasionally happens, however, that the child's trunk is born before assistance arrives, or that the rotation manœuvre referred to is not carried out, when of necessity one has to deal with a dorso-posterior position of the head. In such a position rotation may sometimes be accomplished by pressing the cheek or side of the jaw; but, better still, by passing a finger into the mouth. The head should be grasped in the ordinary way employed for delivering the after-coming head. The head is then pushed up a little and the occiput rotated forwards. If such a manœuvre is carried out, the head and trunk must be rotated together; there must be no attempt made to bring about the rotation of the head by simply turning the trunk, for that may readily lead to fracture of the upper part of the spine. As stated before, I do not favour such a device as trying to bring about rotation by pulling or pushing on one arm.

In some cases rotation is impossible, either because the head is too firmly fixed in the pelvis, or because the chin has become caught above the symphysis pubis. If the chin is down, one may try the ordinary method of passing a finger into the mouth and grasping the shoulders with two fingers of the other hand. The child is now pulled backwards, and then, when the forehead is fixed against the posterior surface of the symphysis pubis, the trunk is pulled upwards on to the abdomen of the mother. In such cases, forceps and a deep incision laterally into the perineum will, I believe, give the child the best chance. In cases in which the chin slips up, and which will sometimes require to be terminated by craniotomy, one should attempt to deliver the head by the Prague manœuvre (Fig. 45). Nagel describes a most interesting case where a woman delivered herself by pulling the child's limbs up on to her abdomen, as indicated in the illustration. If the child is of any size, craniotomy will often require to be performed, and one has little hesitation in having recourse to it, as the child will generally be dead.

There remains only one other matter to consider in connexion with the delivery of the after-coming head, and that is when the latter is arrested because of the cervix not being quite sufficiently dilated. Incidentally I referred to this, and pointed out the danger of its occurrence if one hastened the extraction of the child when the os was not sufficiently dilated. As such cases, however, occur, because labour has often to be accelerated, I will describe how this difficulty is to be overcome. In most cases, I believe, the best treat-

ment is craniotomy, for in the vast majority of such cases the child is dead or hopelessly asphyxiated. There has usually been great delay with the arms, and very probably some maternal complication which has already seriously jeopardized the child. If, however, the child's

Fig. 45.—The Delivery of the After-coming Head when the Occiput is Posterior. (Prague Method.)

condition is still such that its life is worth considering, then the best procedure is to make two deep incisions into the cervix. It is absolutely profitless to try to dilate the cervix; there is not time for such a proceeding.

Arrest of the Breech at the Pelvic Floor—Impaction of the Breech in the Pelvic Cavity.

This is by no means an uncommon occurrence in primiparæ. In most cases it is caused by uterine inertia; but in others the size of the breech, or the fact that there is some little pelvic narrowing, accounts for the condition. But there is another cause to which some writers have attached a good deal of importance—viz., an extended position of the legs along the body of the child (Fig. 46). The most important and interesting paper on the subject in the English language is by Griffith and Lea.[1] In this position the legs act like splints to the body, and prevent the lateral flexion of the trunk, which must necessarily occur in the progress of the birth of the breech. This extension of the legs may be primary or secondary to the descent of the breech, and one sees usually which it has been after birth by the attitude the child assumes, for on placing the new-born infant on the bed its legs immediately take up the extended position they occupied *in utero* if the condition was primary; whereas, if it was secondary, the legs seldom become so completely extended.

The condition should be suspected when the breech is found, early in labour, low down in the pelvis, and when the fœtal heart sounds are heard below the umbilicus. As can be readily understood, the presentation by abdominal palpation closely resembles one of the vertex, so that the diagnosis is made only after vaginal examination. No doubt abdominal palpation may reveal the exact position of the legs if the conditions are favourable for palpation, and certainly the head, if carefully searched for, will usually be felt up towards the fundus.

A breech arrested in the pelvis is a condition which may cause the obstetrician much trouble. So far, I have always succeeded in getting it delivered by one of the following devices: (*a*) Bringing down a foot; (*b*) traction with the fingers; (*c*) traction with a fillet or hook; (*d*) forceps.

These are the means to be employed if the child is alive. If the child is dead, the sharp hook or the cranioclast must be used.

One usually succeeds with a finger in the groin, and, as a rule, one can reach the anterior groin better. In order to get the forefinger into the groin, it is best to pass it up over the sacrum and to make traction more against the trunk, for there is the danger that, if one passes it over the thigh and exerts traction against the latter, the force applied may fracture it, although the fact that one can only exert

[1] Trans. Lond. Obst. Soc., 1898, vol. xxxix., p. 13.

a moderate force usually saves one from doing this. Sometimes the posterior groin can be more easily reached, and occasionally in multiparæ I have even managed to get a finger into each (Fig. 47).

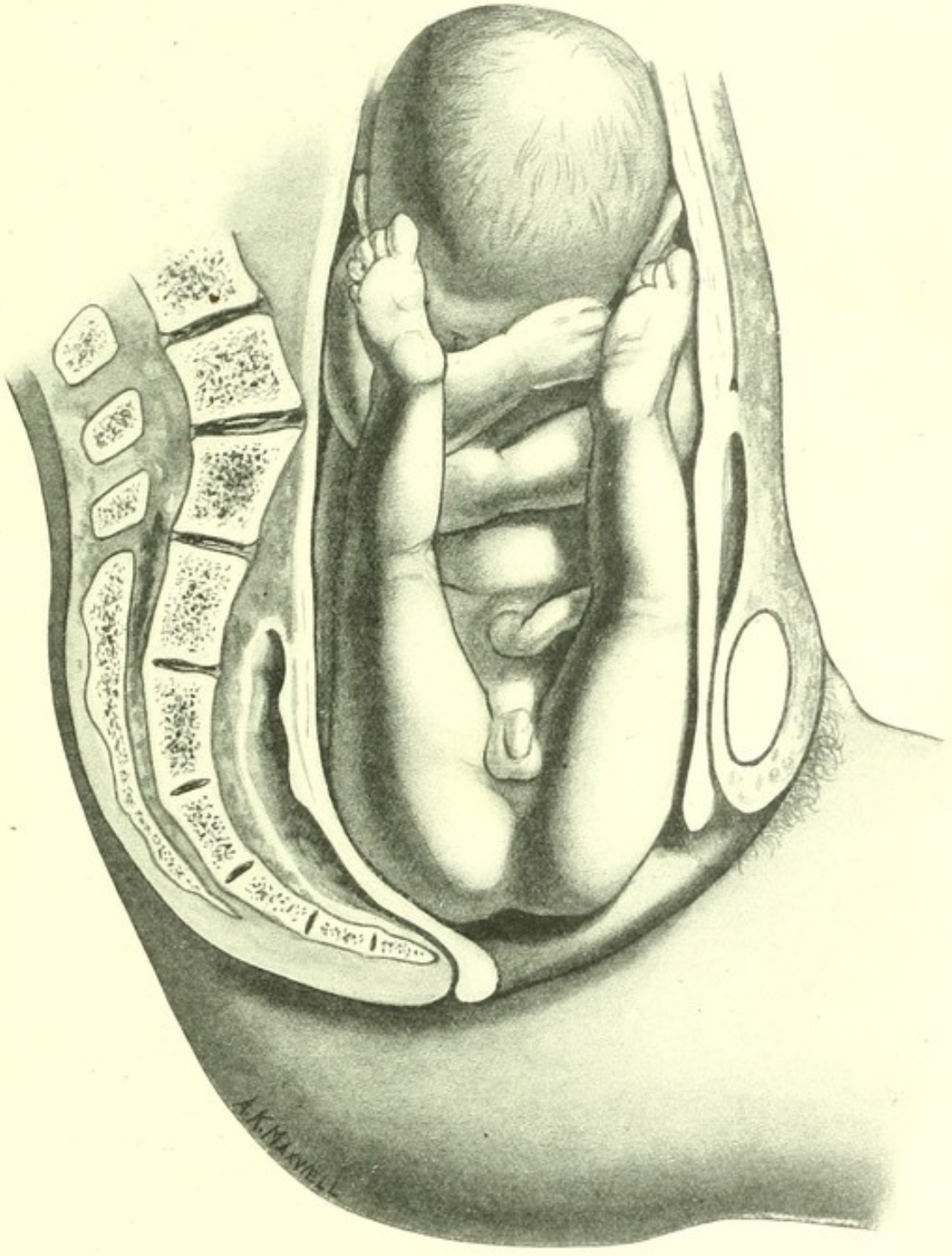


Fig. 46.—The Breech, with Extended Legs, impacted in the Pelvic Cavity.

Only one finger should be employed for each groin. If two are used there is greater danger of fracturing the thigh.

The successful carrying out of the manipulations described is greatly facilitated by pressure from above. This should be carried

out by a nurse or assistant, but only when the uterus is contracting firmly. The best plan is, just before the 'pain' comes on, to pass one finger into the groin, and so be ready for the uterus contracting; then, when the contraction is at its height, supplement it by external pressure.

I have always found great difficulty in applying a fillet (Fig. 48), either by means of a carrier or catheter. Both the catheter and

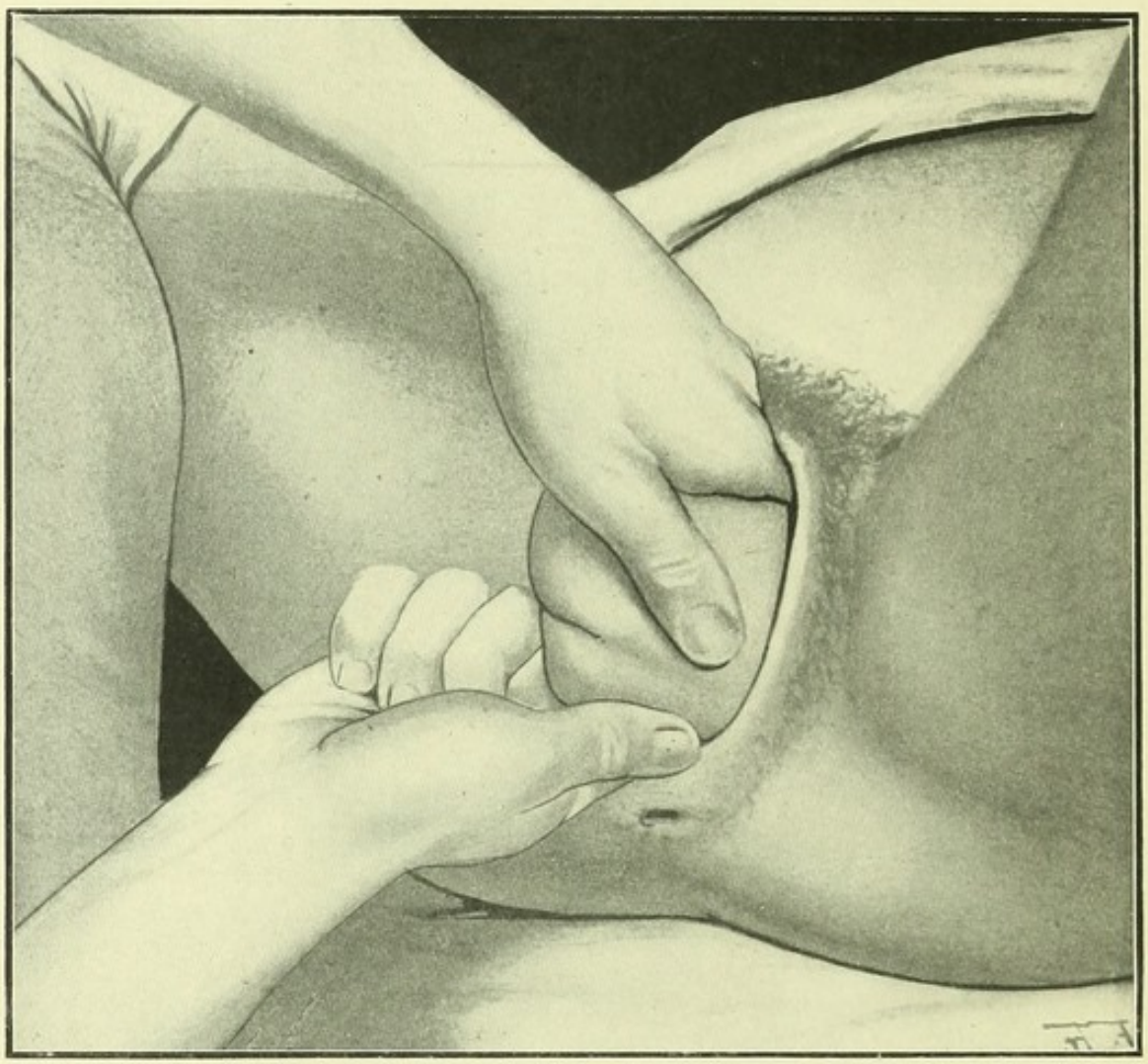


FIG. 47.—Impaction of the Breech—Delivery with a Finger inserted into Each Groin. (Nagel.)

carrier are used in the same way. The instrument is passed up over the sacrum, and the hooked part is then rotated over the thigh; two fingers are then passed up between the buttocks, and the rubber tubing or silk ligature seized and a piece of gauze attached; this latter is then pulled over the groin. Nagel[1] recommends the carrying of the gauze over by means of a plain gold wedding-ring thoroughly sterilized, and passed up from behind into the groin. Jellett[2]

[1] *Op. cit.*, p. 37.

[2] 'Manual of Midwifery,' 1906, p. 1020.

recommends employing a roll of gauze as follows: 'Take a small piece of double gauze about 18 inches long and 2 inches wide,

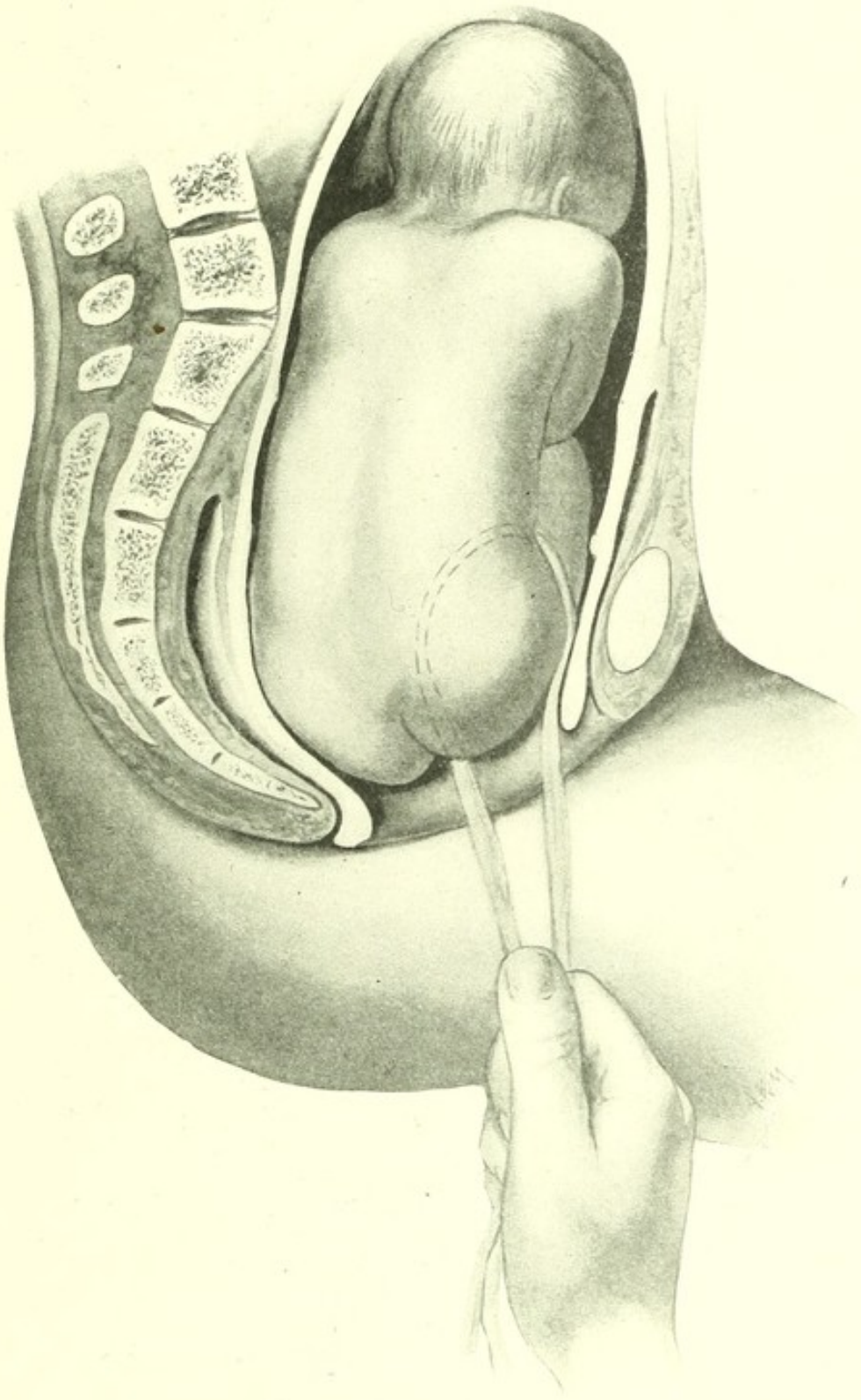


Fig. 48.—Impaction of the Breech—Delivery by Means of the Fillet.

and rolled like a bandage. The free end of this roll is held in the left hand, and the roll itself is pushed upwards between the

thigh and the anterior pelvic wall in such a manner that as it advances it unrolls. As soon as it has been pushed above the angle

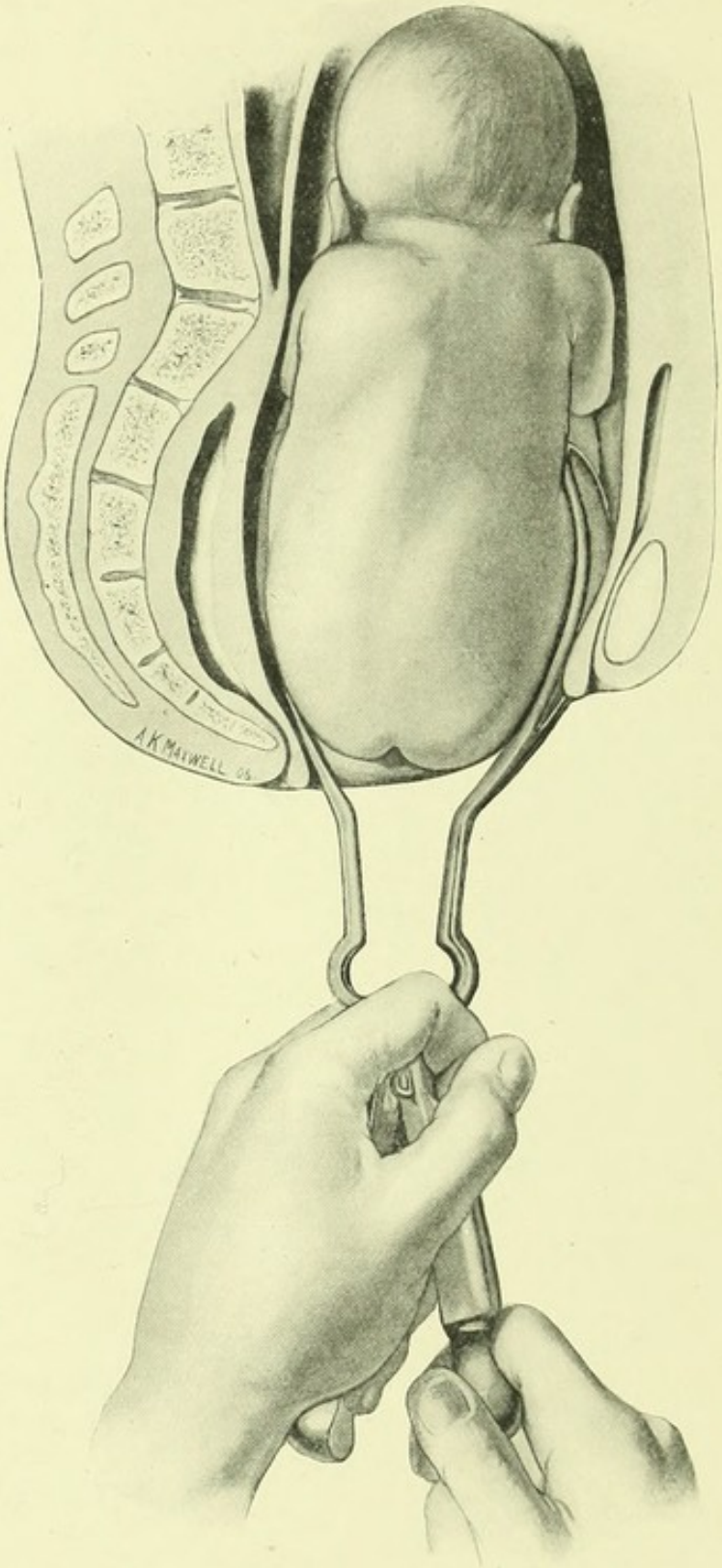


Fig. 49.—Impaction of the Breech—Delivery by Means of Forceps.

of the groin it is pushed inwards across the latter until it comes to lie between the thighs. Then the fingers are pushed upwards from

below between the thighs, and the roll of gauze caught and drawn downwards.'

But a fillet is not altogether safe, for there is danger not only of bruising the soft parts, but of fracture and dislocation resulting, if the gauze is not passed exactly into the fold of the groin. The blunt hook is even worse, and although I have employed it once or twice without any injuries occurring, I have on one occasion fractured a limb. It must, however, be risked if it is impossible to deliver the breech by means of the fingers, forceps, or a fillet; it should be passed along the dorsal aspect of the breech and then rotated into position, the point being guided over the thigh.

Some obstetricians have expressed themselves in favour of forceps in impacted breech, although most writers are opposed to the treatment (Fig. 49). Various attempts have been made to devise forceps suitable for the breech, but they have always proved unsatisfactory. Upon several occasions I have delivered the breech with forceps successfully when I have failed to do so with my fingers. I must also admit that I have frequently failed when the breech was firmly impacted. The great difficulty is getting a good grasp, for the two thighs are at different levels. I always try to grasp the breech transversely with a blade over each limb (Fig. 49). Naturally, one must be cautious in the amount of pressure and traction exerted, for if one compresses the blades too firmly injury may be done to the fœtal pelvis, and if one pulls too strongly and the blades slip, the maternal parts may be seriously lacerated. Here, again, great help will be obtained by an assistant pressing the uterus during a contraction.

In almost all cases, even those which look hopeless, with deep anæsthesia and the patient in the left lateral position, the advantages of which position have been considered, it will be found possible to dislodge the breech and bring down a leg. Barnes states that he has never failed in doing so; while, going further back, Smellie, La Motte, and others, describe cases where, even when the fœtal pelvis was showing at the vulva, the former was pushed back and a leg brought down. It has been suggested in cases where the legs are extended not to try and bring down the limbs, but simply to bend them at the knee so as to allow the limb to take the natural flexion. I very much doubt if such a manœuvre will be successful with the impacted breech. As I have already mentioned, it is often employed when the breech is movable.

So far I have always succeeded with my hand, the forceps, the fillet, or the blunt hook. Should, however, it be impossible to deliver the child by these devices, and the bringing down of a leg be also impossible, there only remains extraction by means of the cranioclast. If

this instrument is employed, the middle blade is introduced into the rectum of the child, and the two other blades applied outside its pelvis. Naturally, if one had ever to have recourse to such an instrument, the after-coming head should also be perforated, as otherwise the child might be born alive.

There is one other course open—viz., symphysiotomy. It is questionable, however, how far such a procedure is justifiable, for the fœtal mortality, under the circumstances, must be very high indeed. It might be argued that, at the stage we are considering, a breech impacted in the pelvis, the child's life has not been much jeopardized; consequently, although I would not care to have recourse to the operation, I can understand another taking up a different attitude, if the fœtal heart sounds were satisfactory.

Prophylactic Cephalic Version in Breech Presentations.—There is a matter in connexion with breech presentations which is worthy of consideration, but which I have not mentioned until now, as, properly speaking, it does not come into consideration in connexion with labour. I refer to prophylactic external cephalic version, which in this country has found so strong an advocate in Spencer.[1] Quite a number of accoucheurs, also, in other countries express themselves favourably, regarding it. Personally, I entirely approve of the treatment, and have carried it out successfully upon one or two occasions. It is best performed a week or two before term, at the time of the examination, which all recommend should be made about the thirty-sixth week. Not infrequently in multiparæ it may be successfully performed early in labour. I have heard a University teacher of midwifery criticize the treatment, and refer to it as a return to the practice of Hippocrates. But such criticism is not to the point, for Hippocrates employed internal cephalic version, and the os had to be sufficiently dilated to admit of the introduction of the operator's hand. In the case of prophylactic version, recommended by Spencer and others, the manipulations are entirely external. Of equally little account is the other argument urged against the treatment, that in the case of failure a more unfavourable —say an oblique—presentation is established. I have never found such a result in the cases in which I have failed. The objection is purely theoretical, for an oblique presentation in which the head remains higher invariably becomes a breech presentation when labour starts. At the worst, therefore, one can do no harm.

Should the correction of the presentation succeed, the child is maintained in its new position by fixing the head in the pelvis and applying a binder or other abdominal support.

[1] *Brit. Med. Journ.*, 1901, vol. i., p. 1192.

CHAPTER VI

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*)

Transverse or Oblique Presentations.

Of all presentations, oblique are the most unfavourable, for, except under the very rare conditions which will be referred to, spontaneous delivery is impossible. The presentation is often spoken of as transverse, but, as a matter of fact, the child lies obliquely in the uterus. A popular term for the presentation is 'cross-birth.' The frequency of the condition is, roughly, 1 in 125 births.

Theoretically, any part of the trunk from head to breech may present, and the older writers were in the habit of distinguishing various presentations of back and abdomen; but from the fact that an oblique presentation ultimately resolves itself into a shoulder, it is quite unnecessary to consider the refinements of the presentation.

As the position of the child may be either dorso-anterior or dorso-posterior, with the head to either side, there are four transverse positions. The dorso-anterior are rather more frequent than the posterior, for in about three-fifths of the cases the back is to the front. The head is also rather oftener directed towards the left side, so that the first position is the most common (Fig. 50). According to Raineri,[1] the right shoulder presented in 68 per cent. and the back of the child in 60 per cent. of cases.

It is not possible to discuss here in detail the etiology of this presentation. I can only mention some of the factors which favour its occurrence. On the part of the mother multiparity (86 per cent.), a large and flabby uterus and a pendulous abdomen—consequently more common amongst the poorer classes—an overdistended cavity from excessive liquor amnii or plural pregnancy, the presence of placenta prævia (7 per cent.), and a marked disproportion between the head and the pelvis, and especially a narrow pelvis (14 per cent.), are the most important.

[1] Ep. *Brit. Med. Journ.*, 1905, vol. xi., No. 9.

An interesting group of cases, referred to by all writers, and one that may give rise to special trouble, is where malformation of the uterus exists, especially such slighter forms, as uterus cordiformis, arcuatus, or duplex subseptus. In such conditions one part of the child occupies one half, and the rest the other half of the uterus. Vogel,[1] writing especially upon transverse presentations in primiparæ, states, that in eighty-six cases of transverse presentation a uterus arcuatus existed in nine, and in the eight cases in which the presentations occurred in primiparæ, it was observed in as many as five. I am inclined to

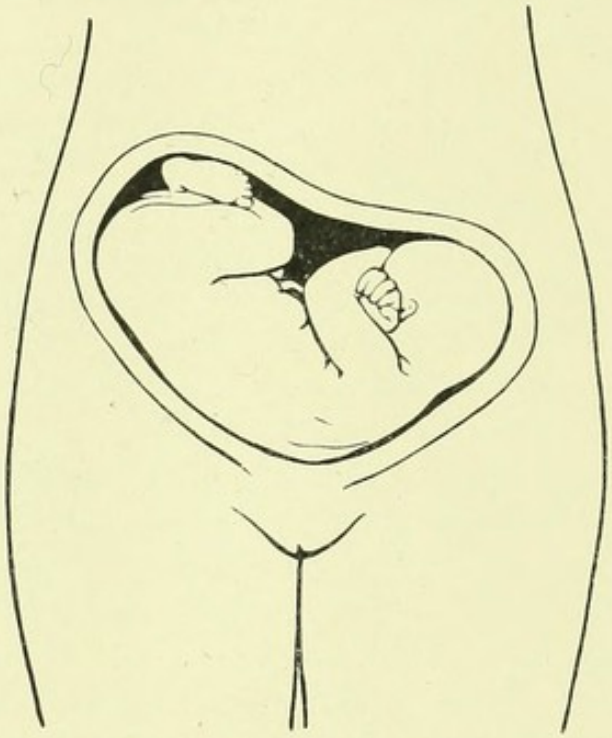


Fig. 50.—First Oblique Position.

think, however, that in some of these cases the shape of the uterus was the result, not the cause.

Very rarely ovarian and uterine tumours may influence the occurrence of this presentation.

On the part of the child may be mentioned prematurity, maceration, and deformity.

The natural course of labour in an oblique presentation is for the shoulder to become pushed down into the pelvis, and if the malpresentation is not corrected, for the labour to continue until the uterus becomes exhausted or ruptures. Very occasionally, however, spontaneous delivery does occur, although one must never reckon upon such a termination. If it does, it takes place in one of the three following ways: (*a*) Spontaneous version, (*b*) spontaneous evolution,

[1] *Zeit. f. Geb. u. Gyn.*, 1900, Bd. xliii., Heft ii., p. 312.

(*c*) birth with doubled-up body (partus conduplicato corpore). By spontaneous version is meant the changing of an oblique presentation into one of the head or breech by the uterine contractions. Naturally, it is difficult to estimate the frequency of this occurrence, but according to C. Braun conversion into a breech occurred in 75 per cent. of cases after rupture of the membranes, and in 80 per

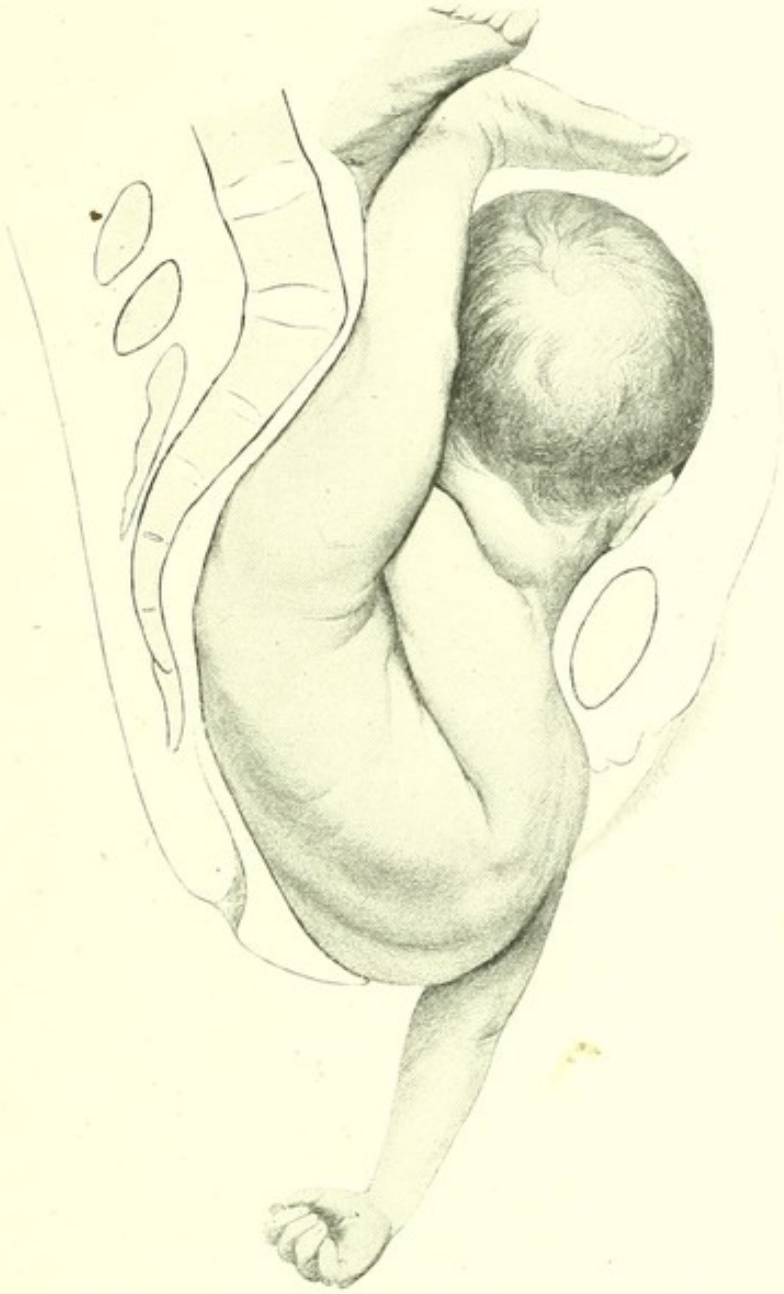


Fig. 51.—Spontaneous Evolution. (Bumm.)

cent. into a head before their rupture. Some writers have distinguished between spontaneous rectification and spontaneous version, the former being an alteration into a head presentation and the latter an alteration into a breech.

Spontaneous evolution (Fig. 51), which was first described by Douglas and later by Dubois, is a very much rarer occurrence.

Winckel puts it at 8½ per cent., but Von Franqué found it to occur only twelve times in 2,000 transverse presentations. Reed[1] goes into the subject very fully. I have only seen it once, and in that case the child was premature. Indeed, it can only occur in a living child when the latter is small or premature, and when the maternal pelvis is of

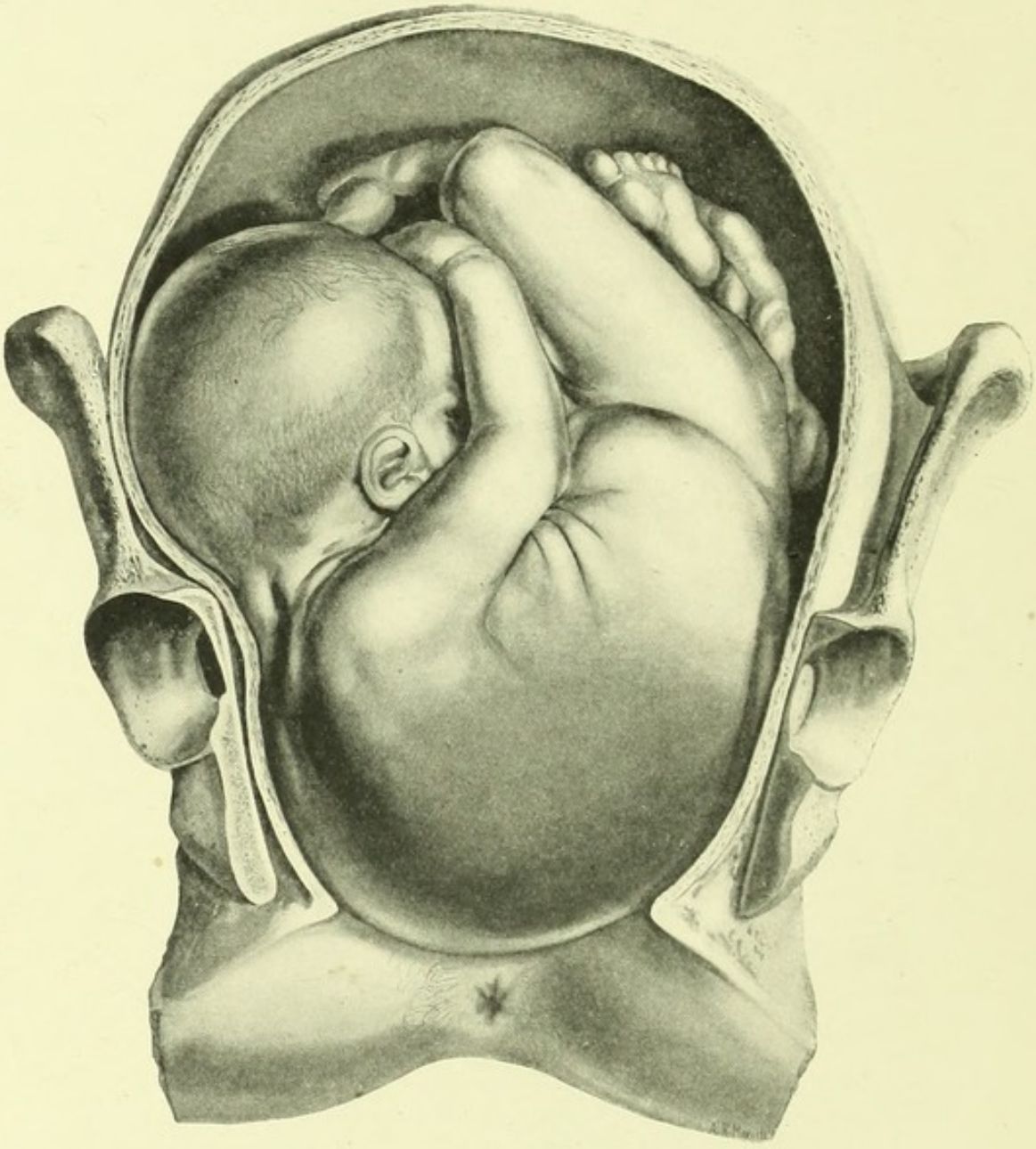


Fig. 52.—Partus Conduplicato Corpore. (Author's Case.)

unusually large size. In this variety of spontaneous birth the shoulder of the child is driven down into the pelvis and becomes fixed underneath the symphysis, while the trunk, breech, and limbs are driven past this part. Finally, the other shoulder and head escape. Almost invariably the arm is prolapsed beforehand.

[1] *Amer. Journ. Obstet.*, September, 1905.

In the third variety, the birth with the body doubled up (partus conduplicato corpore), the presenting part is driven down. If an arm has prolapsed, it will be the region below the shoulder, but if an arm has not fallen down, it may be any part of the trunk. The head and the thorax or pelvis are pressed together, and escape together from the parturient canal. The illustration (Fig. 52) represents a case recently under my care in the Maternity Hospital. Winckel found it occurred four times in 130 cases. Von Franqué puts it at 2·5 per cent. When it occurs the child is usually small, premature, and macerated.

Diagnosis.—A suspicion of a transverse presentation is often aroused by simply inspecting the abdomen, for the uterus is enlarged transversely and shortened vertically.

By abdominal palpation a swelling is recognized on both sides of the uterus, the one being the hard round head, and the other being the breech. The head is invariably lowermost; indeed, if that is not so, the presentation will almost invariably become a breech. When the membranes are still intact, there is little difficulty in palpating the head and breech, and the curved back connecting the two prominent parts if the breech is to the front; but when the liquor amnii is small in quantity or has drained away, differentiation of the two poles may be difficult, for the child gets crushed up in the uterus. If there is difficulty in differentiating the two poles, a confirmation of the suspicion of the presentation will be obtained by finding no presenting part engaging in the pelvic brim, unless the arm is prolapsed or the shoulder is well engaged.

By vaginal examination there will be no difficulty in reaching the presenting part if labour has been in progress for some time. The shoulder, the part which ultimately comes to present, is a small round body. It can only be distinguished from the other parts of the child which resemble it, by feeling the clavicle or ribs; the latter is the most important landmark, and should always be searched for. In all cases of doubt the parturient should be deeply anæsthetized, and a thorough examination of the presentation made.

In a considerable number of cases of transverse presentation one or more limbs prolapse. The prolapse of a foot, or of a foot or arm, as illustrated (Fig. 53), is rare, but it is by no means uncommon to find an arm slipping down. When an arm prolapses, most commonly the hand is the presenting part, but it may occasionally be the elbow. The hand is to be distinguished from the foot by the absence of the projecting os calcis, and on that alone, one's diagnosis should be made. It is perfectly true that the fingers are larger than the toes, and that the thumb moves more freely than the large toe; but if one trusts to

such distinguishing features mistakes will constantly be made. Let me again repeat that the absence of the projecting heel is the only feature that can be relied upon.

The particular arm which has prolapsed can be recognized by

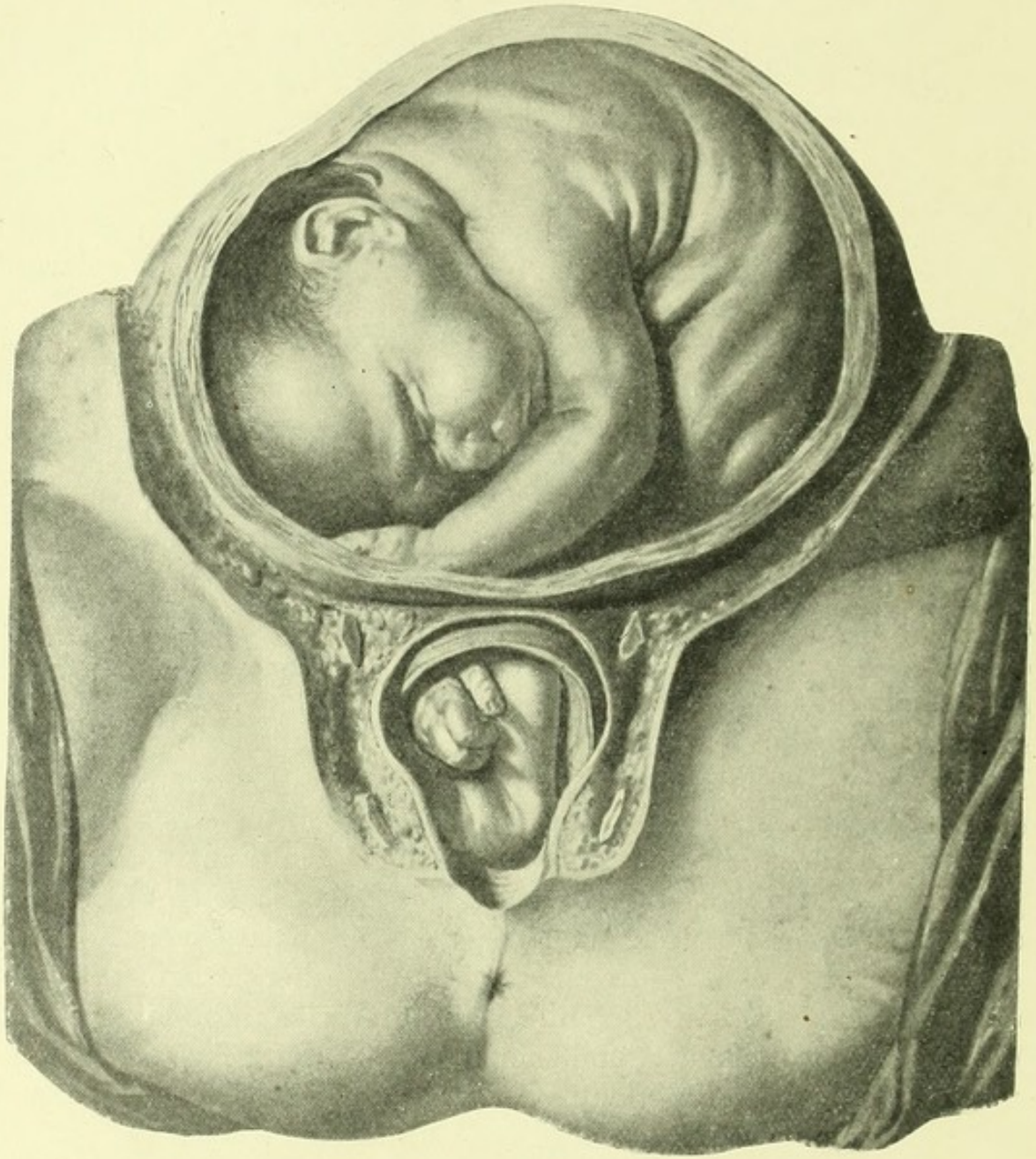


Fig. 53.—Prolapse of Hand and Foot in an Oblique Presentation.
(Photographed from Van Rymsdyke's drawing in the Hunterian Museum, Glasgow University.)

shaking hands with the fœtus (Fig. 54). If one does this with the right hand, then it is the right arm which has prolapsed; if with the left, then it is the left arm of the child which is down. Naturally, if the arm of the child should happen to be completely twisted a mistake might arise, but that practically never occurs.

But still more may be diagnosed from the prolapsed arm, for if the hand is presenting, the thumb points to the head.

In addition to the arm, one often finds that the cord prolapses in transverse presentations. Nor is this to be wondered at, as the umbilicus is brought so near the pelvic brim.

In those rare cases of transverse presentation where the back or the front of the fœtal thorax or abdomen are the presenting parts, there may be some difficulty in diagnosing the exact condition.

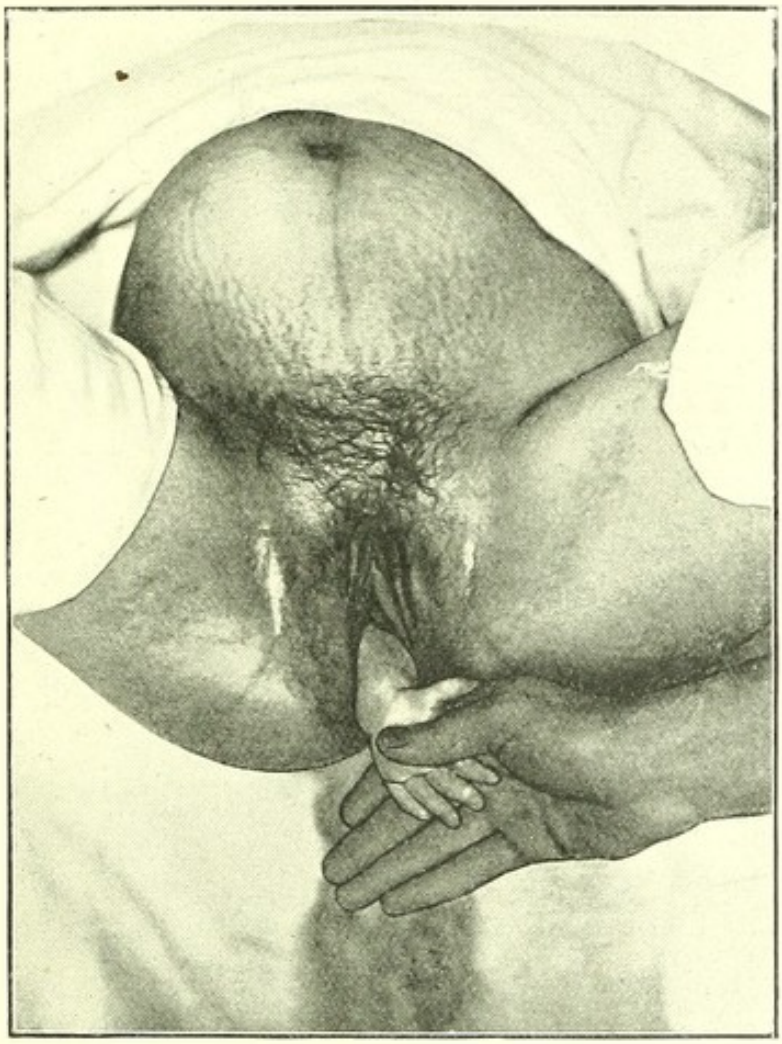


Fig. 54.—Distinguishing the Particular Hand which has prolapsed by Shaking Hands with the Fœtus.

When it is the front of the trunk, this difficulty is not so great, for the ribs or umbilicus will be easily felt. When, however, it is the back, as in the case of partus conduplicato corpore, mistakes may readily occur if the arm has not prolapsed. In a case (Fig. 52) quite recently in the Maternity Hospital, the presentation was mistaken by the house-surgeon and nurse for a breech. Theoretically, by feeling the spinous processes of the vertebræ, the exact nature of the presentation should be recognized; but in the case I refer to the

œdematous swelling, which formed over the back, masked this landmark entirely.

Again let me say, always put the patient under an anæsthetic and make a thorough examination, rather than remain in the slightest doubt regarding the presentation.

Prognosis.—The prognosis for both mother and child in oblique presentations is decidedly less favourable than in any other. As operative interference is always necessary, the dangers of sepsis and of injury to the parturient canal are very decidedly increased.

As will be seen when considering rupture of the uterus, this accident is by no means uncommon. In my cases of rupture the presentation was transverse in 17 per cent., while in Ivanoff's[1] it was so in 32 per cent. It is needless to say that in oblique presentations there is not the same proportion of ruptures. The frequency of rupture of the uterus in transverse presentation is variously stated. As far as I can judge, however, it occurs about 1 in 100 to 150 cases. The rupture, although usually described as uterine, is very generally in the vaginal vault. The most important practical point in this connexion, however, is that the rupture is invariably violent—viz., is produced while attempts at rectification are being made. Spontaneous rupture is very uncommon, and occurs in only about 1 in 300 cases. The operator, therefore, must carry out his manipulations of version with great care, especially in cases where the membranes have ruptured some time previously, and the uterine wall is firmly grasping the child.

The fœtal mortality in oblique presentations is enormous, somewhere about 40 per cent. Winckel for 883 transverse presentations found 8·3 per cent. born macerated, and 33 per cent. died during labour. Many factors contribute to this high death-rate, among which may be mentioned prematurity of the child, prolapse of the cord, and malformation of the maternal pelvis, rendering extraction of the child difficult. The prognosis is also unfavourably affected by prolapse of an arm.

Treatment.—Were the question asked, What is the treatment of oblique presentation? the immediate reply would be, rectification of the presentation by version. Such an answer is, however, not entirely correct. There are certain cases, where the shoulder has become impacted and the uterus is tetanically contracted, when version is absolutely contra-indicated, and it is because many fail to recognize this, and fail to appreciate the limitations of version, that I have introduced the consideration of treatment of oblique presentations in this somewhat crude manner. Fortunately, the number of cases encountered in

[1] *Annal. de Gyn.*, 1903.

practice where the shoulder is impacted and version is contra-indicated are not numerous, for they result, as a rule, from inattention and carelessness on the part of those in attendance.

Having sounded this warning note regarding the dangers of version in certain cases, let us consider the treatment of oblique presentations under the following headings:

1. When the presentation is recognized during pregnancy.
2. When it is recognized during labour.
3. When the shoulder is impacted.

1. **When the Presentation is recognized during Pregnancy.**—On several occasions I have emphasized the importance of examining a pregnant woman a week or two before labour. Here, again, will be seen the great advantage of doing this, for an opportunity of recognizing and correcting an oblique presentation will then occur.

Since Pinard and Leopold perfected abdominal palpation, and this most valuable method of examination has become universal, the correction of oblique presentations during pregnancy has become the recognized treatment. Long ago, however, it was hinted at, and the postural treatment for the condition is of ancient date. The postural treatment consists in placing the patient on the side towards which the head is directed, with the object of making the breech fall over and push the head down towards the brim. This postural treatment is often successful up to about the thirty-fourth week, but later than that the presentation is so fixed that the fœtus can seldom be dislodged by simple alterations in the position of the mother.

Perfected external version is, as has been stated, of comparatively recent date. It is now very widely practised in all maternity hospitals, especially on the Continent, where pregnant women so often seek advice at the outdoor department of the hospitals. The argument still advanced against the treatment is that the child frequently slips back into its old position, even when the manipulations are successful. But even admitting that it was successful in only 2 or 3 per cent. of cases, that would be quite a sufficient argument in its favour. Besides, in cases which return to their old position matters are left no worse, and there is this great advantage, that the nature of the condition is known beforehand, and so the patient can be warned of the danger of the presentation and the necessity of seeking advice whenever labour commences. Unfortunately, in this country one has not many opportunities of correcting the position during pregnancy, for so few seek advice prior to the onset of labour. I can give no exact figures of the successes from the treatment, although I have noted a considerable number.

The manner in which external version is carried out is detailed

elsewhere (Chapter XXII.). Having brought the child into a correct position, the head should be seized between the two hands and pushed into the pelvis; pads should then be placed along the sides of the uterus, and a firm binder round the abdomen or Pinard's *ceinture eutocique* should be applied. The patient is seen at intervals, and should the fœtus have slipped into its former malposition this is again corrected. Occasionally it has to be done many times, but usually there is less difficulty in carrying out the manipulations on each succeeding occasion.

2. **When the Malpresentation is recognized during Labour.**—By taking up the attitude of trying always to determine the presentation during pregnancy, one increases enormously the chance of seeing oblique presentations early in labour. The importance of this to mother and child, and especially to the child, cannot be overestimated.

External version is still often possible early in labour, if the membranes are unruptured, and it is especially easy in those cases in which, prior to labour, corrections have been made.

Should the external method fail, the question arises whether immediate attempts by other methods should be employed, or the labour be allowed to proceed until the os is considerably dilated. Many, especially in this country, favour the immediate correction by means of the bipolar method of Braxton Hicks, and I, too, incline to this procedure. In many cases it can be carried out without rupturing the membranes. But even if the membranes do rupture the child is not in danger, unless the cord prolapse. Impaction of the shoulder does not occur until labour has been long in progress and the os well dilated. The mistake made by those who favour early bipolar version is to proceed to internal version if they find the membranes ruptured. It always increases the risks to the child to dilate forcibly the cervix and perform internal version.

When rupture of the membranes occurs and bipolar version has not succeeded, internal version should be delayed until the os is well dilated.

With both varieties of version either the head or the breech may be brought down, but while external and bipolar cephalic version are often successful, internal cephalic version seldom is. Details regarding the operation of version are given in Chapter XXII.

Having turned the child and brought down a foot, the progress of the case should be left to Nature, and the delivery hastened only if the os is fully dilated, or the mother's or child's life is in danger from some additional complication. A very large number of children are lost by hastening the delivery. No doubt, with the foot hanging out of the canal, one is very much tempted to drag upon it, but the result is

always the same—the arms and after-coming head are caught by the undilated os uteri.

3. **When the Shoulder is Impacted.**—The obstetrician of little experience will find it a difficult matter to decide when he should desist from making attempts at version in cases where the waters have drained away and the shoulder is impacted in the pelvis. To desist only after many fruitless attempts have been made is not a right attitude to assume, for during these attempts much injury may be done. Naturally, the greater the operator's experience, the more often will he be successful, but no matter how experienced he is there are cases in which he cannot perform version with safety and must have recourse to decapitation. I have frequently found that medical practitioners consider it a disgrace if they fail to perform version. They forget that all operations have their limitations.

In a case of impacted oblique presentation, one should first of all satisfy oneself regarding the condition of the child. In most cases the condition is unsatisfactory: the child is dead, or its vitality so low that its life need not be considered; consequently, one should consider only the mother. The fœtus should therefore be decapitated and delivered. But the reader may say, How is one to be sure of the death or impending death of the fœtus? Auscultation of its heart sounds through the abdominal wall is difficult, owing to the restlessness of the parturient and the firm retraction of the uterus. Should that be so, the hand passed a little way into the uterus will usually encounter the umbilical cord and permit of an estimate being formed of the strength and frequency of the fœtal heart. It must not be forgotten that in passing a hand into the uterus for this purpose, and more especially for the purpose of performing version, the parturient must be deeply anæsthetized. Internal manipulations are infinitely more dangerous and difficult when one attempts to perform them with the woman only partially anæsthetized Should by any chance the child's vitality be satisfactory, a little more may be risked, but, personally, I desist from making attempts at version, no matter what the condition of the child is, when I find a very much thinned out lower uterine segment with a well-marked retraction ring above the head. To pass the hand into the uterus and push back the retraction ring with the back of the hand and allow the fœtal head to slip up along the palm of the hand may sometimes be successful, but it is difficult and dangerous, unless the accoucheur has had considerable experience (Chapter XXIX.).

CHAPTER VII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*)

Malformation of the Fœtus.

Abnormal Size of the Fœtus as a Whole.—Undue size of the fœtus may be general or confined to certain parts—the head, the shoulders, the thorax, the abdomen, the pelvis.

It is peculiar to certain women to have large children. I recently attended a patient where the first child weighed 12 pounds and the second weighed 11 pounds. Speaking generally, where the parents are of large stature the children are above the normal. This is most markedly seen in the case of giants. Next to heredity may be mentioned prolongation of pregnancy. Jocoby,[1] in reviewing 6,976 labours, found that in 8·7 per cent. the fœtus weighed 4,000 or more grammes; 20 per cent. were primiparæ, 10 per cent. women who had more than one child, and 9·5 per cent. women who had borne several children. In 9·4 per cent. gestation was prolonged beyond 300 days, and in 69 per cent. beyond 280 days.

The largest child delivered at the Maternity Hospital in recent years weighed 15 pounds. Craniotomy and cleidotomy had to be performed. Sheill[2] recorded a similar difficulty with one about the same size. If the maternal pelvis is roomy, labour, although tedious, is usually terminated without very great difficulty; but if there is any pelvic malformation, no matter how slight, the labour may be both difficult and dangerous, and any of the major operations may require to be performed. As I have mentioned elsewhere, rachitic mothers have often relatively large children.

The head of the child causes, as a rule, the most trouble, for, apart altogether from its size, the bones are often unduly ossified, and so the head does not mould well. Not infrequently, however, the shoulder girdle is the part of the fœtus which has the greatest difficulty in passing through the pelvis.

[1] *Archiv f. Gyn.*, Bd. lxxiv., Heft iii., p. 556.

[2] *Dub. Journ. Med. Sciences*, July, 1905.

General Fœtal Dropsy (Fig. 55) occasionally may cause considerable dystocia. Some time ago in the Maternity Hospital I had a case under my care, and although the delivery was not extremely difficult, it was somewhat troublesome, for the limbs tore off whenever any traction was made upon them.

A case of this kind was recently reported by Walther[1] where there

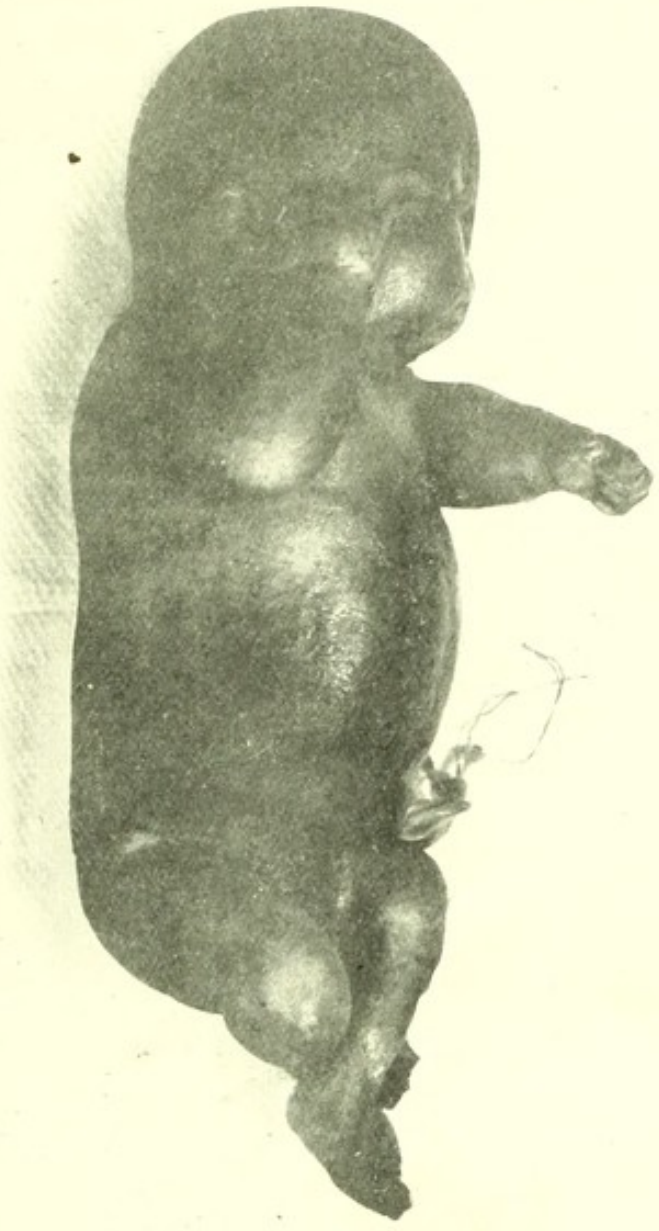


Fig. 55.—General Fœtal Dropsy.

(From a photograph of a case in the practice of Dr. James Dunlop.)

was considerable difficulty in getting the second twin away, as the limbs came off with the slightest traction, and, even although the tissues were torn, little fluid escaped.

Ballantyne,[2] summing up the histories of the labours in such cases,

[1] Frommel's 'Jahresbericht über Geb. u. Gyn.,' 1904, p. 887.

[2] 'Antenatal Pathology and Hygiene,' p. 290.

writes: 'The birth of a dropsical infant was, if near the full term, a tedious and often an instrumental matter. Abnormal presentations were unusually common. The delay in labour was sometimes overcome by the natural efforts and sometimes by manual or instrumental traction; but in certain instances the procedures which were finally adopted before birth (in fragments) was effected reached the utmost limits of embryulcia, evisceration, disruption, and dilaceration. In some cases the medical attendant seems to have lost all nerve, as first one limb and then another, and then a fragment of the trunk or the head, was dragged to light from the maternal passages. When, however, the fœtal abdomen, being within reach, was tapped, it was seldom found necessary to resort to such embryoclastic procedures. The third stage of labour was often rendered somewhat difficult on account of the large size and dropsical state of the placenta, and by reason of uterine inertia due to delay in the earlier stages. The puerperia, it is noteworthy, were generally quite normal; in fact, the rapid disappearance of many of the maternal symptoms immediately after the emptying of the uterus suggested the conclusion that the fœtal condition was often the cause rather than the result of the mother's ill-health.'

Localized Enlargement of the Fœtus.

Hydrocephalus.—Amongst the enlargements of the fœtal head causing dystocia the most important is hydrocephalus, a malformation which is by no means uncommon (1 in 1,000), and which, by reason of the fact that it is so easily and so often overlooked, is frequently accompanied by very serious consequences to the mother. In this condition the ventricles are distended with fluid, and according to the amount of fluid the brain tissue is thinned out and destroyed. The quantity of fluid contained in a hydrocephalic sac may be as much as 17 to 20 pints (10 to 12 litres), and the circumference of the head may measure as much as 30 inches (75 centimetres) in extreme cases. The base of the skull and the face bones are well formed, although small, but those of the vault are very much separated, and although not always, still very frequently, defectively ossified. The trunk and limbs are usually small, and other abnormalities, such as spina bifida, talipes, etc., are not uncommon.

A history of the previous birth of malformed children may sometimes be obtained.

The condition, as I have said, is not as a rule diagnosed until labour has been in progress for some time; indeed, often not until the accoucheur has failed to deliver the fore-coming head with forceps

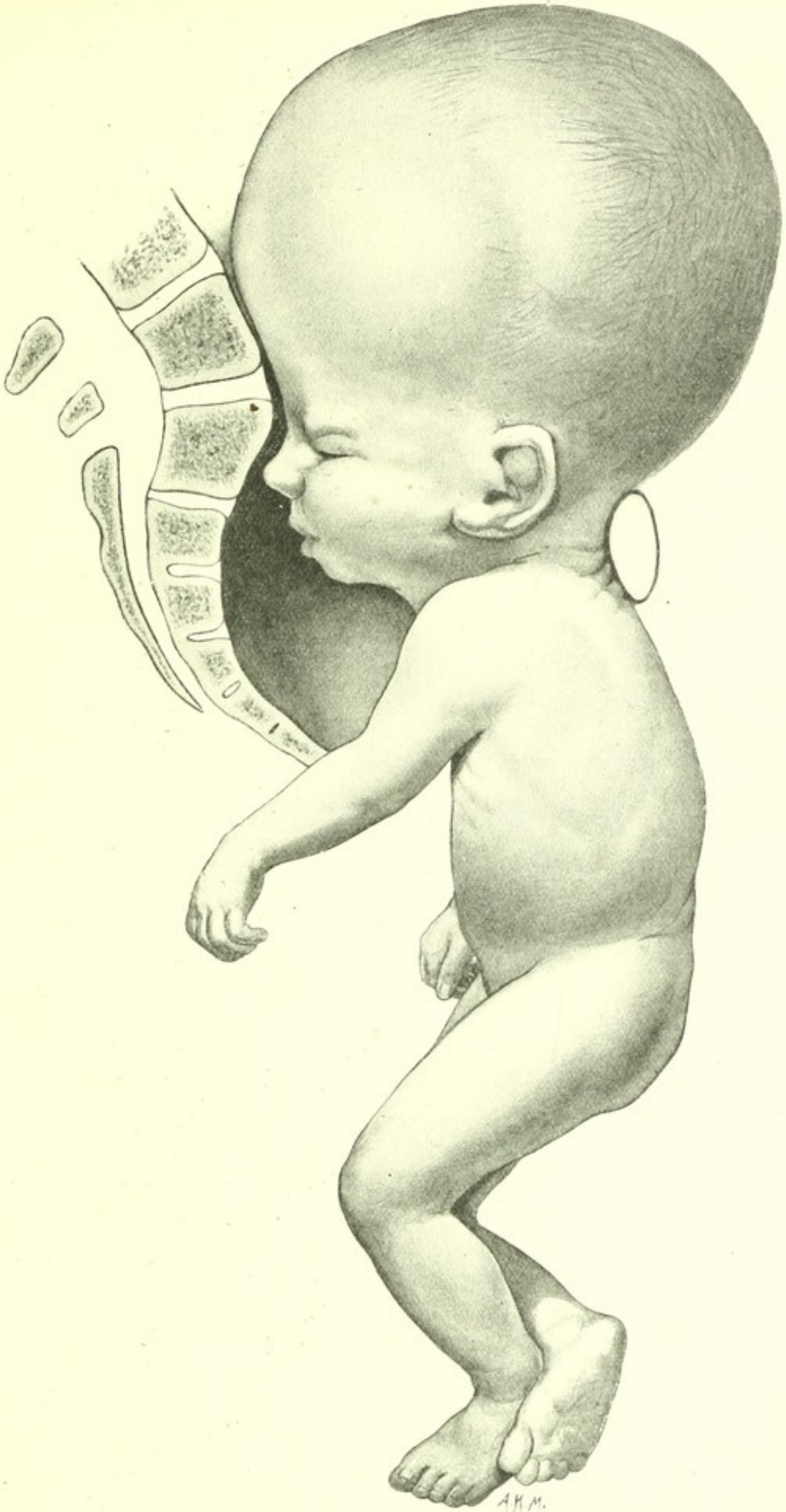


FIG. 56.—Hydrocephalus, showing how the After-coming Head is caught at the Pelvic Brim. (After Bumm.)

or the after-coming head by traction. That is the reason why rupture of the uterus occurs in somewhere about 12 per cent. of cases. The child almost invariably presents by the head or breech, transverse presentations being very rare indeed.

Breech presentations are very common (25 per cent.), and as the diagnosis of the condition is most difficult in such cases, I will speak of them first. Theoretically, by abdominal palpation the enlarged and elastic head should be felt at the fundus, and without doubt in some cases this has been done. It is seldom, however, that even the most alert accoucheur makes this out, for prior to rupture of the membranes palpation of the head is difficult, because of the liquor amnii being often excessive; while after rupture the fœtal parts cannot be defined, because the head and the rest of the body are so pressed together, and the lower segment is so tensely distended.

It may be assumed, therefore, that even with the highly experienced, the condition will be but rarely recognized until the after-coming head has to be delivered (Fig. 56). But if it is excusable for the accoucheur to overlook the condition prior to this time, it is quite reprehensible for him to do so later. It is true that the base of the hydrocephalic skull is well formed and ossified, and that if the fingers be passed along the trunk, with the object of getting them into the mouth of the child to aid its delivery, he may feel nothing of the enlarged head, but he should feel at once with his first traction effort that the head is too large to pass the brim. Especially should he be surprised at any difficulty when he looks at the child, usually puny and ill-nourished, and sometimes with a spina bifida or other malformation. Besides, the uterine swelling above the pubes is still of large dimensions.

The mischief is done just at this stage; the accoucheur pulls, and whoever is assisting presses on the uterus above, with the result that the uterus ruptures. He has again made the fatal mistake of trying to deliver by force. His first failure to effect delivery should have raised in his mind the possibility of the condition of hydrocephalus being the cause of the difficulty. The only cases in which there is any excuse for the mistake are those where, in addition to the enlarged head, there is pelvic deformity, to which he attributes all the difficulty. With such he will be guided to the correct nature of the condition by appreciating the large swelling present above the pelvic brim.

When the fœtus affected by hydrocephalus presents by the head, the recognition of the condition is easier. Abdominal palpation, even with this presentation, does not always give as much information as one might expect. The lower part of the uterus is unduly

distended, and the large head is freely movable; but, owing to the fact that the uterus so tensely grasps the head, the latter cannot be defined. Still, the condition is overlooked often because the examination is made hurriedly, not because of its obscurity.

The presenting part, being high, is difficult to reach from the vagina, although I once saw a case where, the child being dead, a portion of the lax head projected down into the cavity, and felt exactly like a large caput succedaneum. Others have mistaken a similar condition for the bag of membranes. In most cases one can feel the gaping sutures and fontanelles, and although a caput succedaneum might obscure them, it is long in forming in this condition. A crackling sensation on pressing the head is mentioned as being appreciable sometimes, although I have not remarked it.

The prognosis for the mother, if the condition is recognized and suitably treated, is not serious. Unfortunately, however, the condition is often overlooked, and many fatal attempts at delivery are made before the true nature of the complication is appreciated. As a result, bruises and tears of the soft parts, with subsequent septic manifestations, are not uncommon. Rupture of the uterus occurs in some 12 to 15 per cent. of cases. Keith found it occurred 16 times in 74 cases; and in 159 cases reviewed by Hohl, Schuchard, and Veit, 21 ruptures were observed. Although, as I have said, the accoucheur is usually to blame for this, it sometimes happens that he is not, for the rupture may be spontaneous, and may even occur early in labour, as recorded cases illustrate.

Another danger to the parturient is post-partum hæmorrhage, the result of the overdistension of the lower segment and the feeble retractility and contractility of the uterus.

Unfortunately, therefore, the maternal mortality is still very high, and is certainly not below 12 per cent., although, taking recent cases, such as those recorded by Hoffman and Bertino,[1] it works out at 6·6 per cent. My own results are one in six (16 per cent.).

In certain cases, where the hydrocephalus is slight, delivery may be spontaneous or easily terminated by forceps or by traction on the lower limbs of the child. In such cases the condition will be appreciated only after the birth of the child. Even with a dead child, where the head is of some size, spontaneous delivery may result because of the laxness of the hydrocephalus. Rupture of the sac has occasionally occurred, the whole scalp giving way; but more commonly the fluid is effused into the cellular tissue only, and extends down over the neck and shoulders of the child.

Such terminations, however, do not affect the treatment, which

[1] Winckel's 'Handbuch der Geburtshülfe,' Bd. ii., Teil iii., p. 1646.

must be to remove the fluid as soon as the condition is appreciated and the operation is possible.

The first question which naturally occurs to one is, How far should the child's life be considered in this condition? There are a few cases where the children have remained alive for some little time. But if one looks at the figures given by Kleinhans[1] one sees how hopeless the condition is, for, taking 271 cases the different authorities mention, although a few children lived for weeks, there is only one definite case of cure. Modern French writers express themselves very decidedly. Budin[2] says: 'À supposer qu'ils survivent affligés ou non d'autres déformations, ils sont atteints d'impotence cérébrale et ne peuvent guère être que des crétins ou des idiots'; and Ribemont-Dessaignes and Lepage[3] remark: 'S'il survit et s'il atteint l'âge d'un an, l'hydrocéphale présente habituellement tous les signes de l'idioté, de telle sorte qu'au point de vue de la conduite a tenir pendant l'accouchement, la vie du fœtus ne doit pas entrer en ligne de compte.'

To tap the head and inject a quantity of fluid equal to the amount removed, and so possibly save the child for a few months, is quite quixotic. If the head is of such a size as to necessitate tapping, the child should be destroyed by the operator stirring up the brain with the perforator.

The fluid in the ventricles may be withdrawn by a trocar, or by making an opening with the perforator. Any sharp instrument does for this purpose, and twice I have employed a pair of sharp-pointed scissors. The best instrument is, of course, the perforator. The perforation of both the fore-coming and after-coming head is very simple. In the former presentation the instrument is pushed through one of the gaping sutures, while in the latter it is pushed through the skull in the neighbourhood of the postero-lateral fontanelle. The manner of employing the perforator is detailed fully in the chapter on Craniotomy (Chapter XXIX.).

The delivery of the child in breech presentations is readily accomplished by making traction on the body. When the presentation is the head, however, unless the case is left to Nature, one must have recourse to the cephalotribe or forceps. Usually a sufficient hold can be obtained with the forceps, but should that not be possible, the cephalotribe must be employed.

Quite recently Ballantyne[4] drew attention to the advantage of withdrawing the fluid by spinal tapping. This treatment was suggested by Van Hueval, and first carried out by Tarnier in 1868. Certainly it is a very simple method, especially if there is a spina bifida. After

[1] Winckel's 'Handbuch,' Bd. ii., Teil iii., p. 1646.
[2] Tarnier and Budin, 'Traité de l'Art des Accouchements,' 1901, tome iv., p. 28.
[3] 'Précis d'Obstétrique,' 1904, p. 1008.
[4] Edin. Obstet. Trans., 1905, vol. xxx., p. 20.

opening into the spinal canal, a silver or gum elastic catheter is passed into it and pushed up into the cranium (Fig. 57).

As there is danger of post-partum hæmorrhage with this complication, it is advisable to have everything ready for such an accident.

In cases of cranial presentations, if the hydrocephalus is detected early in labour, before the os is dilated, the head should be punctured and the further progress of the labour left to Nature.

Fig. 57.—Removal of the Fluid in Hydrocephalus by Spinal Tapping. (Tarnier and Budin.)

Meningocele and Encephalocele.—Such localized tumours of the head are occasionally encountered. The accompanying illustration (Fig. 58) of a fœtus, recently delivered at the Maternity Hospital, is an example of the latter. They appear along the sutures, but especially at the fontanelles, and more particularly the posterior fontanelle. They rarely cause trouble at birth, for, although the sac is sometimes of large size, it is lax, and becomes stretched or flattened out during labour. They frequently, however, as in the case illustrated, cause alteration in attitude and position of the fœtal head. Facial presentations are specially common.

The condition is often not recognized until after the birth of the child. Theoretically, the swelling might be appreciated by abdominal palpation, but it is usually so placed that it is difficult to define. With the fore-coming head the condition has been mistaken for a double monster, twins, and a cystic tumour of uterus or ovary. In all cases of doubt the hand should be passed into the uterus and a careful investigation made.

If spontaneous delivery does not occur, the head can usually be delivered by forceps, but should there be any difficulty the sac must

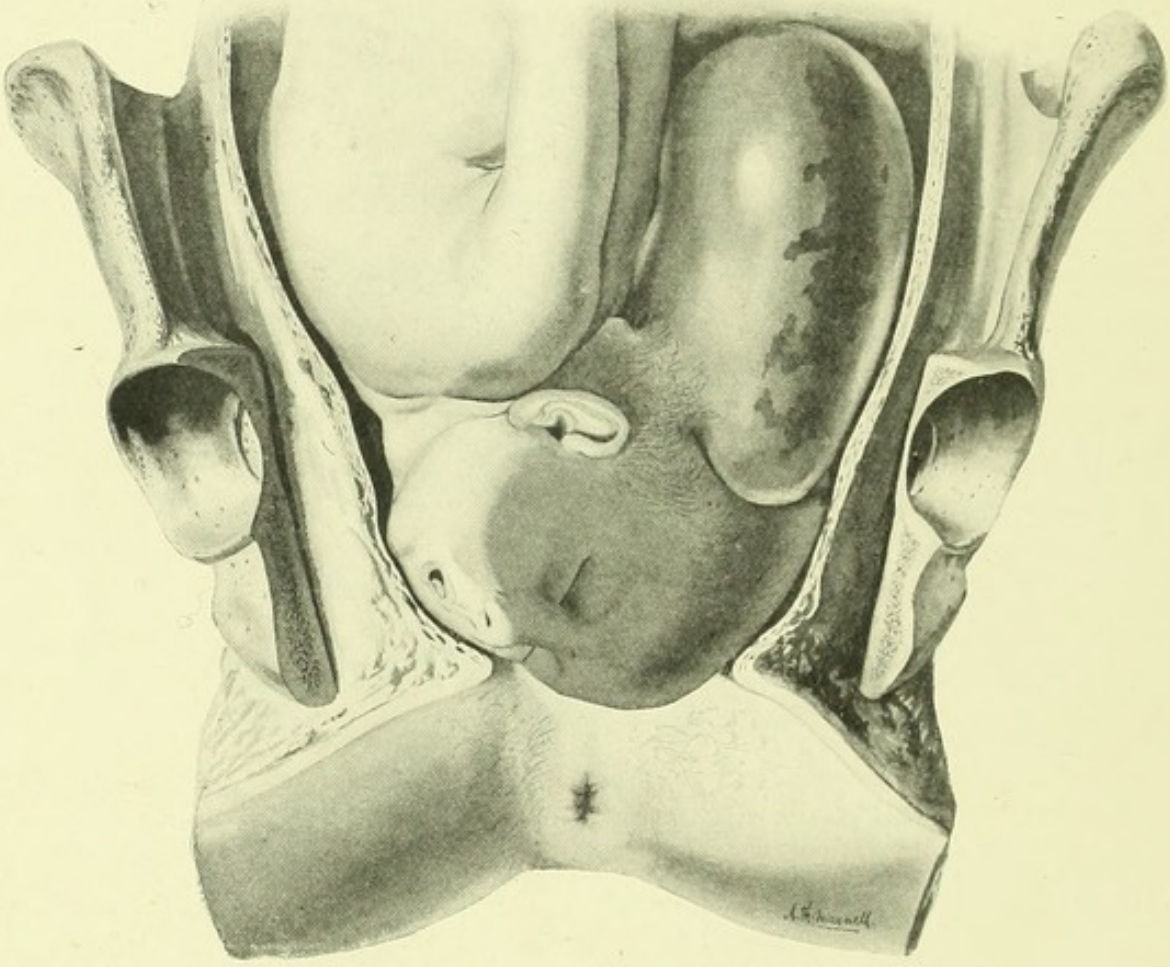


Fig. 58.—Encephalocele. (Author's Collection.)

be tapped. In cases of this group, if the tumour is a meningocele and has a narrow stalk, a few of the children may be cured by operation, or sometimes even without interference if the stalk of the sac shrivels up. Hence the reason for simply tapping. Most of the children are born dead or die shortly after birth. It is curious that, although compression of the tumour after the child has been born often causes convulsions, this has not been observed during labour. The death of the child, however, must sometimes be the result of

compression during labour, for many of the children have evidently died quite recently.

Dystocia from Large Shoulder-Girdle, Tumours of Neck and Thorax.—During or after the escape of the head, the descent of the child may be interfered with by reason of the size of the shoulder-girdle or the presence of tumours about the neck or thorax.

Dystocia caused by a large shoulder-girdle is the most frequent of these conditions. In most cases the whole child is of unusual size, and weighs sometimes 11 or 12 pounds. Unusual size of the head and thickness of the neck should lead one to suspect the shoulders as being the cause of the dystocia, if there is any difficulty in delivering them. I have once or twice seen the trunk proportionately larger than the head, and it has been remarked that the anencephalic fœtus has often an unusually large body.

Difficulty with the shoulders after the birth of the head can only arise from the shoulders getting caught by reason of their size and position or by reason of pelvic deformity. It is not conceivable that at this stage Bandl's ring could be the obstructing cause. I have once or twice found the cord wound round the neck, and no doubt actual or relative shortness of the cord may hinder the delivery of the child. The differential diagnosis between large shoulders and short cord will usually not be difficult, and in all cases of doubt should be arrived at by a thorough exploration with the hand in the vagina.

In the slighter degrees of difficulty with the shoulders it may be found that the cause is a failure of the shoulders to rotate. Should that be the case, the hand must be passed along the back of the neck over the shoulder, and the rotation aided.

When decided difficulty arises with the fore-coming shoulders, the course to pursue depends upon whether the child is living or not. If it is dead no further attempts at delivery should be made, both clavicles should be divided. This operation (cleidotomy) is fully described in Chapter XXIX. I have always succeeded in delivering the child by this means. It has sometimes happened that the operator has removed the head and then separated the arms before he could bring the trunk down, and I cannot see any great objection to such treatment, although it is generally considered inadvisable, seeing that one loses the benefit of the head for traction. Theoretically, with the head away, however, any limb may be brought down. Provided there is no large stump of neck left, the arm is about as good as the leg for traction, except that it is more easily pulled off. It might be a little awkward if one were left with a large trunk and both arms removed. Therefore, I think it wisest to divide the clavicle, and, should

the shoulder still not come down, to pass a sharp hook into one axilla, preferably the anterior.

With a living child whose shoulders are so large that they prevent the descent of the trunk, one is in a very awkward predicament. After having failed to effect delivery by means of a finger inserted into the armpit, it is safer to run the risks of the blunt hook than to make extreme traction upon the neck, for the danger to the child of such a proceeding is very great. When the hook is employed, it should be passed into the anterior axilla, if at all possible, for if one passes it into the posterior, and the anterior is still above the brim, the latter will catch upon the brim, and the delivery of the shoulders rendered more difficult.

Should by any chance these devices fail, the child's condition will have become almost hopeless. The clavicles should therefore be divided, and the extraction completed as if the child were dead. It has been suggested to perform symphysiotomy; but few, I fancy, would favour such a treatment, as it would increase the maternal mortality, already very high, without much prospect of saving the child.

A very similar dystocia — viz., a difficulty in extracting the shoulders or even the head—may be caused by tumours of the neck and by hydrothorax. Cystic and solid tumours of the neck are rarely of a size sufficient to cause obstruction. The one figured in Winckel's 'Text-book'[1] is the largest I know of. One recently described by Hewetson[2] in great detail is through the kindness of the author reproduced here (Fig. 59).

Distension of the fœtal thorax is of great rarity. Winckel[3] mentions seven cases. Hydrothorax is invariably accompanied by ascites. Ballantyne[4] refers to such a case reported by Hardouin and Moreau. If there is much distension of the chest, the shoulders will always have difficulty in engaging, and perforation of the chest is necessary.

Tumours connected with the Abdomen and Pelvis. — The next malformations we must consider are those connected with the abdomen and pelvis. In certain cases these conditions may even hinder the engagement of the shoulders. As a rule, a diagnosis is only possible if the hand is passed into the vagina.

Distension of the abdomen from ascites (Fig. 60) and tumours of the spleen, liver, testicles, ovaries, kidneys (Fig. 61), bladder, although rare, is not very uncommon. Each of these tumours is of pathological interest, but unfortunately they cannot be considered here. From

[1] Edgar's translation, 1890, p. 430.
[2] *Journ. Obstet. and Gyn. Brit. Empire*, 1903, vol. iv., p. 355.
[3] *Op. cit.*, p. 434.
[4] *Op. cit.*, p. 362.

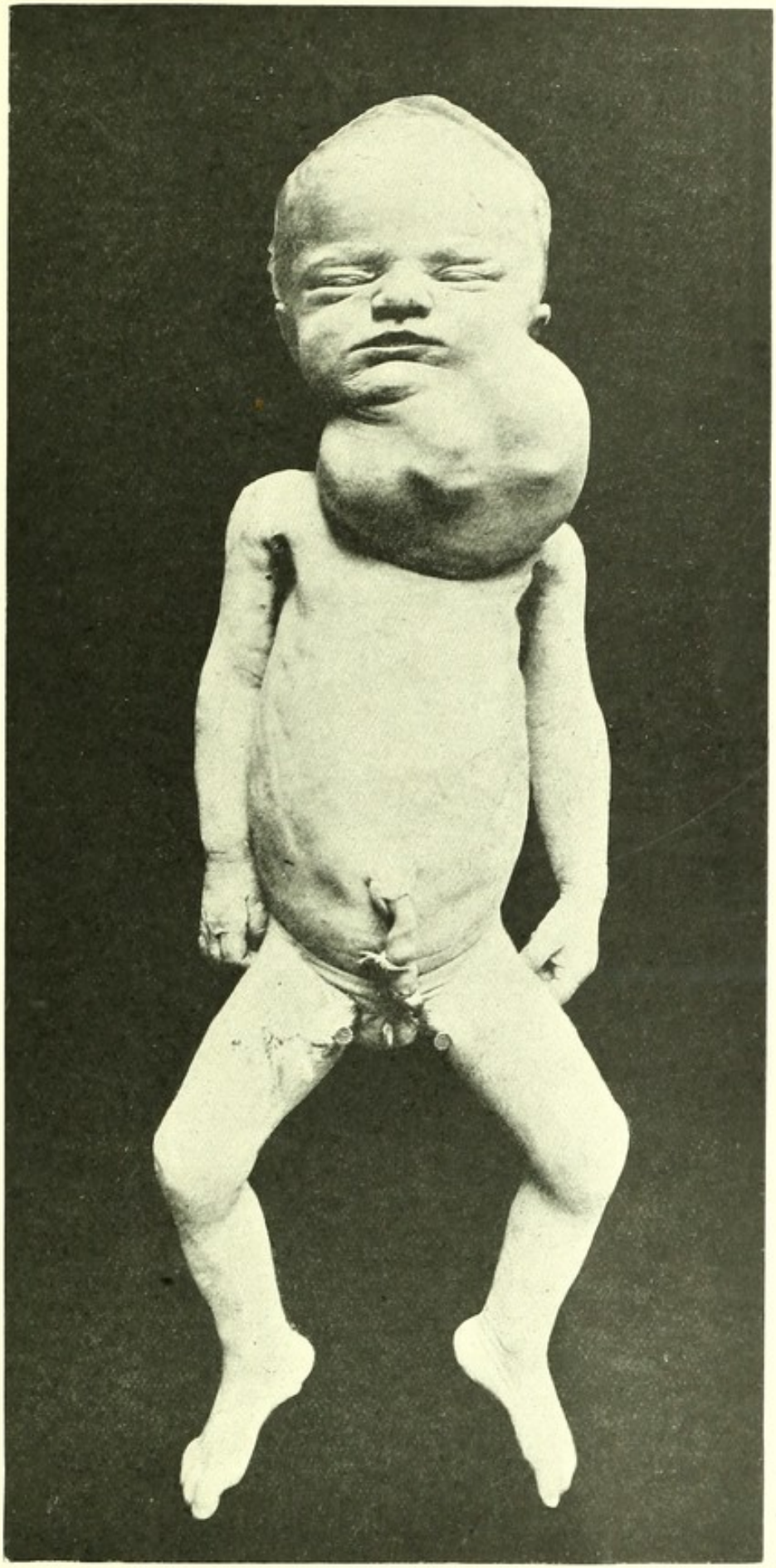


FIG. 59.—Congenital Adenomatous Bronchocele. (Hewetson.)

the obstetric standpoint they all present the same feature. The distended abdomen prevents the descent of the fœtus.

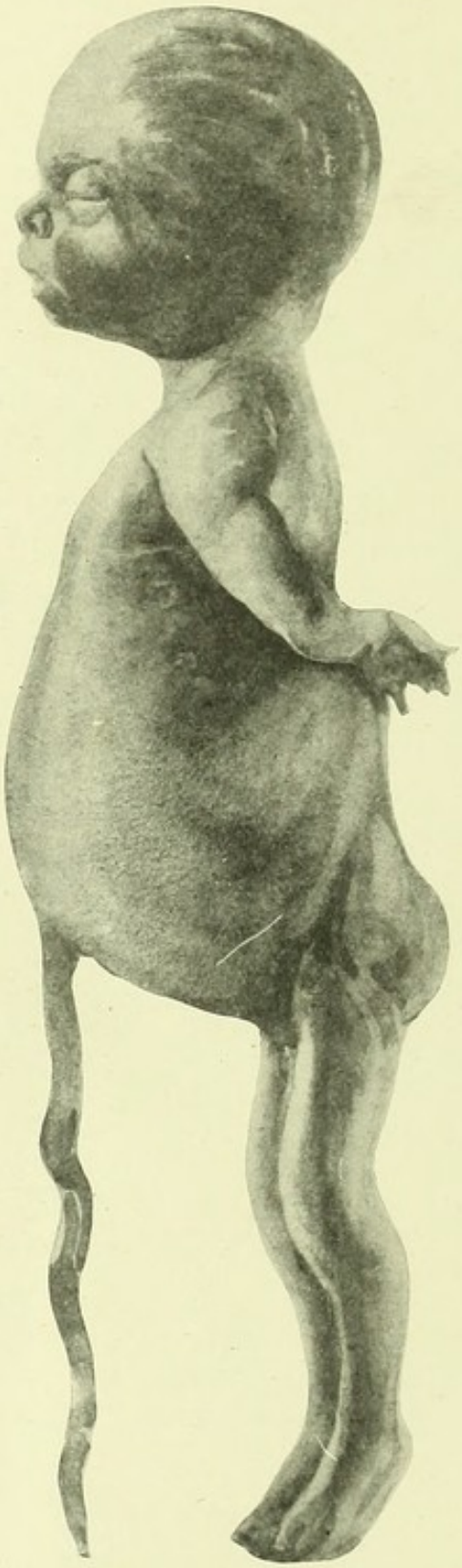


Fig. 60.—Fœtal Ascites. (Ballantyne.)

If the presentation is cranial, unless the abdominal distension is extreme, the shoulders can usually be delivered; the trouble is in

extracting the trunk. In these cases the diagnosis is simple, for the trunk of the child should always pass through the maternal pelvis easily. When, however, the shoulders also refuse to descend, there is a little more difficulty in appreciating the cause of the dystocia. The

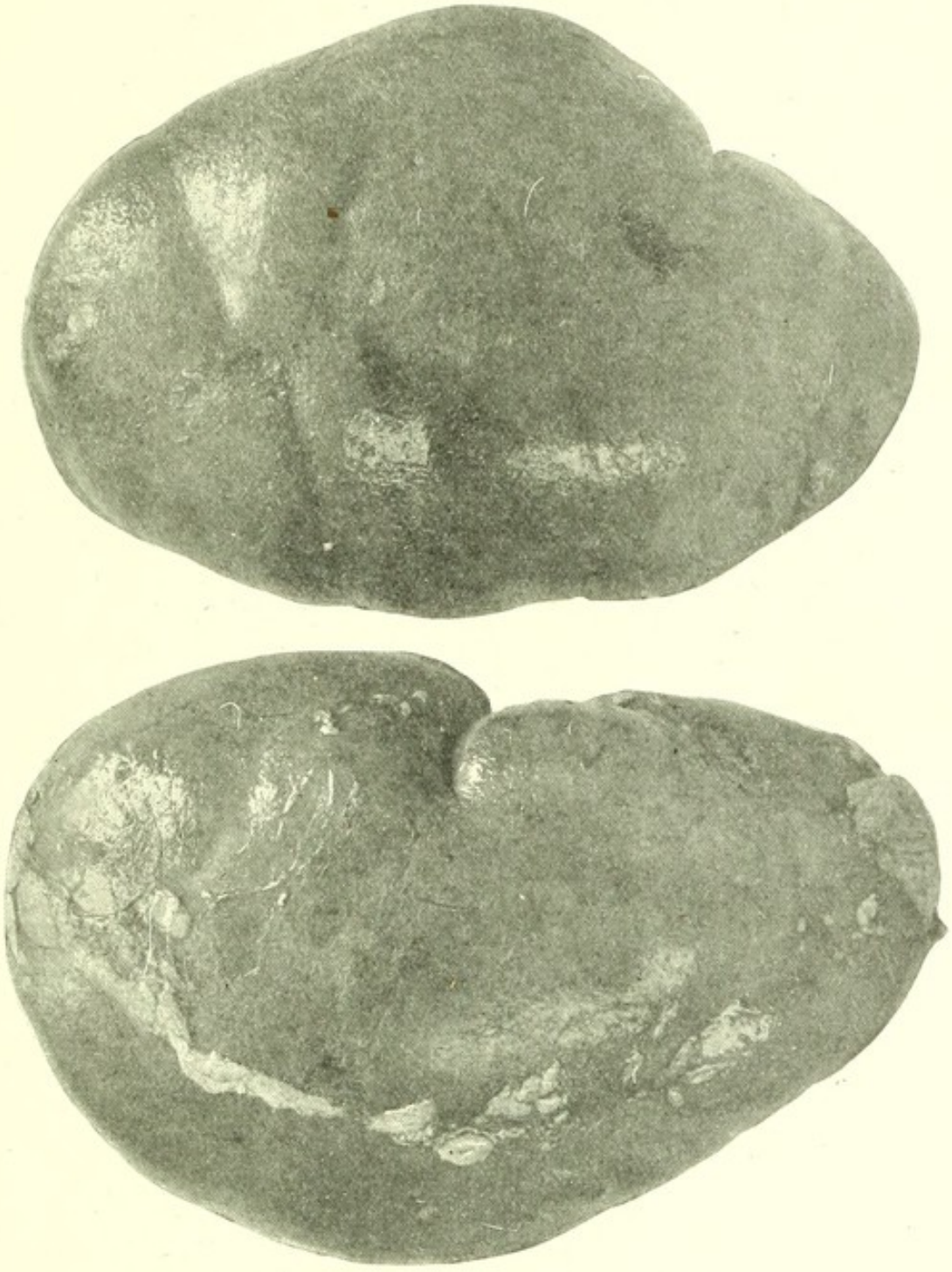


FIG. 61.—Congenitally Enlarged Kidneys (Natural Size). (Ballantyne.)

unusual distension of the mother's abdomen may arrest attention, but sometimes the hand has to be passed into the uterus before a diagnosis can be made. I had an illustration of this recently in a case of extreme ascites.

Should the child present by the breech, one or both legs may be brought down, but further delivery is impossible. The other conditions which may give rise to a similar difficulty are tumours of the sacrum and the arrest of the child by the retraction ring. The latter condition—a very interesting one—is referred to elsewhere. Here, again, the passage of the hand into the uterus alone will clear matters up.

In cases of distension of the fœtal abdomen, the bulk of the child

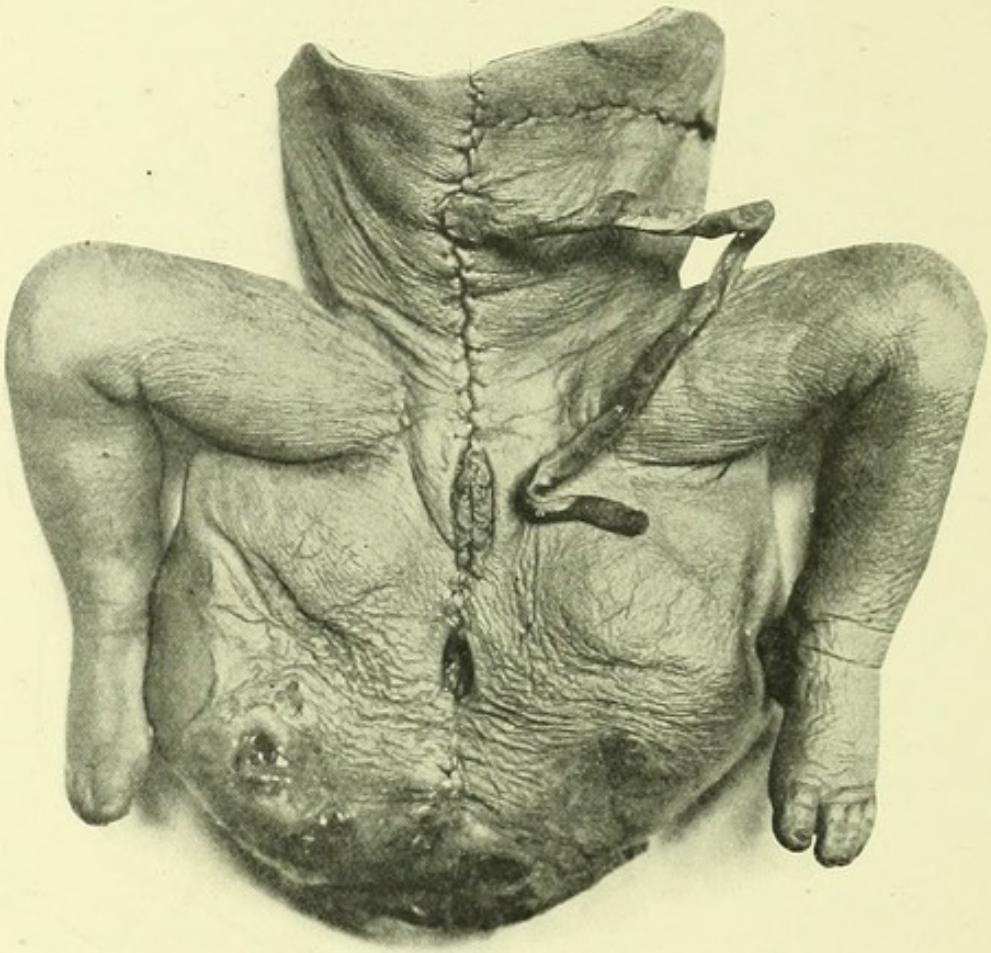


Fig. 62.—Enormously Large Congenital Sacral Tumour.
(Museum of the Pathological Institute, Glasgow University.)

can usually be sufficiently diminished by withdrawing the fluid by an aspirator, as most of the conditions encountered are cystic. It sometimes happens, however, when the tumours are connected with liver, spleen, or kidney, that they cannot be sufficiently lessened by this simple device, and so a large abdominal opening has to be made, and the tumours broken up and removed by the hand. In cases of ascites the fœtus is usually born dead, but when the other tumours mentioned are present it may be born alive. Should, therefore, any evisceration

have been necessary in cases of breech presentation the after-coming head should be perforated.

Sacral congenital tumours obstructing labour (Fig. 62) usually give most trouble when the child presents by the breech. With the fore-coming head, the legs and tumour slip through the pelvis more easily. In several cases—one, for example, recently recorded by Hewetson[1] and one by Frommel[2]—the child could only be extracted after the tumour was broken up. In the former case the child presented by the breech and in the latter by the head.

The diagnosis of the condition when the tumour presents may be very difficult, and is most likely to be confused with a submucous myoma. As I have repeatedly said, however, in all cases of doubt a manual exploration of the uterus should be made under anæsthesia.

[1] *Journ. Obstet. and Gyn. Brit. Empire*, 1903, vol. iii., p. 203.
[2] 'Jahresbericht, über Geb. u. Gyn.,' 1904, vol. xviii., p. 886.

CHAPTER VIII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS *(continued)*

Presence of More than One Fœtus.

We cannot discuss here the etiology or anatomy of plural pregnancy, the most interesting questions in connexion with this subject, nor can we consider the effect the former has upon such complications as eclampsia, toxæmia, etc. We are concerned with the condition only as it affects labour.

The ease with which the diagnosis of plural pregnancy can be made depends very much on how the ova are placed. In the cases where they lie side by side (Fig. 63), or in the rare condition in which the one is above the other (Fig. 64), it is not difficult. When, however, both lie longitudinally and are placed the one behind the other (Fig. 65), there is, as a rule, considerable difficulty.

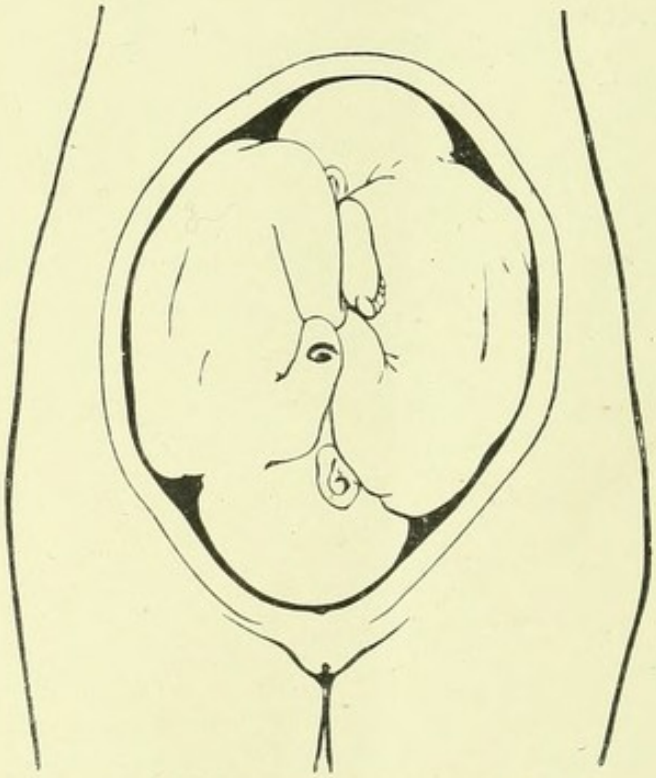


Fig. 63.—Twins lying Side by Side.

As regards the diagnosis, absolutely no reliance should be placed upon such subjective symptoms as a feeling of unusual size, the sensation of a great deal of fœtal movement, etc.; similarly, in palpating the abdomen, one must not conclude that there are twins simply because of the size of the abdomen or the apparently unusual number of limbs. I have been so often deceived that I only diagnose plural

pregnancy when I feel two fœtal heads. Two breeches should make it quite as conclusive; but the breech is much more difficult to define, and I definitely decide upon plural pregnancy only when I feel two heads.

I have purposely not referred to the outline of the abdominal swelling in the case of twins, for I have not found it of great service. Without doubt, especially if the children are lying side by side, a sulcus may mark the division between the two sacs, but as often as not no such dividing mark is present. Very much the same applies to the fœtal heart sounds. It is frequently stated that hearing these sounds over two areas, separated by an area in which they cannot be heard, should lead one to suspect plural pregnancy. It should not, however, do more, for I have several times observed the same when there was only one fœtus. To be absolutely certain that there are two fœtal hearts beating, the accoucheur must make out the heart sounds to be of different rhythms over the two areas. They should therefore be counted simultaneously by two observers, for it is surprising how quickly, and often after the slightest movement, the fœtal heart rhythm becomes altered.

FIG. 64.—Twins lying One Above the Other.

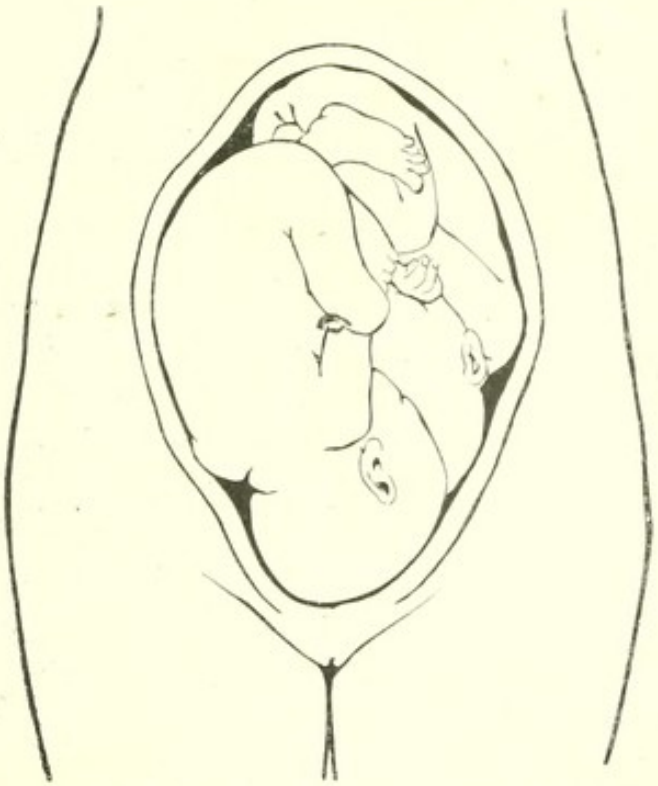


FIG. 65.—Twins lying One in Front of the Other.

Lastly, the feeling of two distinct sacs through the os is only

possible where the os is sufficiently dilated. Although not infrequently with plural pregnancy the os is dilated for some time before labour, I have only been able to make out this feature on two occasions, and in both the fœtuses were lying side by side. It is stated that even when they lie one in front of the other the two sacs may occasionally be felt; but I fancy that is unusual, for in such cases the one is invariably higher than the other.

The relative frequency of the positions of the fœtuses is as follows :[1]

Total Cases, 1840 (Leonhard).

First child	-	head;	Second child	-	head	-	38·5 per cent.
,,	-	head;	,,	-	breech	-	21·1 ,,
,,	-	breech;	,,	-	head	-	14·3 ,,
,,	-	breech;	,,	-	breech	-	10·7 ,,
,,	-	head;	,,	-	transverse	-	8·3 ,,
,,	-	transverse;	,,	-	head	-	0·8 ,,
,,	-	breech;	,,	-	transverse	-	4·2 ,,
,,	-	transverse;	,,	-	breech	-	0·7 ,,
,,	-	transverse;	,,	-	transverse	-	0·9 ,,

As regards the overlooking of plural pregnancy, or diagnosing it when it does not exist, both errors are common. Sometimes the coexistence of such conditions as hydramnios, cystic tumours, or malformation of the uterus may confuse matters, but as a rule that is not the reason of the mistakes. Most generally they result either from simply overlooking the condition altogether or from basing a diagnosis on insufficient evidence. As I said before, I always now withhold a diagnosis in a doubtful case, unless I can palpate from the abdomen two fœtal heads or can feel two bags of membranes *per vaginam*.

As a rule, the recognition of plural pregnancy prior to labour is a matter of no great practical importance. The exact state of matters is appreciated after the birth of the first child, and that is quite sufficient. I once, however, did find the correct diagnosis during pregnancy of importance, and others have had a similar experience. It was a question of inducing labour in a contracted pelvis in which the deformity was of the medium variety—viz., a conjugata vera of about $3\frac{1}{8}$ inches (7·8 centimetres). After a careful examination of the case and a diagnosis of twins I did not induce labour, because, presumably, the children would be smaller than usual, and so would pass through the pelvis more readily. My surmise proved correct, and the result was highly satisfactory, both children were born alive without any interference being necessary.

The effect of more than one fœtus being present is generally to

[1] Strassmann (Winckel's 'Handbuch,' Bd. i., Heft ii., p. 1273).

delay labour. The contractions, owing to the overdistension of the uterus, are weaker, and bearing down after rupture of the membranes is more feeble. The contractions, too, are often very painful. Against, and counteracting to some extent, these conditions is the smallness of the children.

In cases left absolutely to Nature there is not a little delay between the birth of the two children. According to Strassmann, in seventy cases left to Nature the average duration of time between the birth of the two infants was twenty-eight minutes. In thirty-one, however, it was only ten, and in sixteen it was only fifteen minutes. The longest time was three hours. The other extreme of many hours and even days intervening will be found in the records of a few cases scattered throughout the relative literature.

The general rule is that both placentæ follow the expulsion of the second child. I have never seen it otherwise, and Strassmann, in a series of 476 cases, found it occurred in all except three cases. When, however, there is a very long interval between the birth of the two children, it sometimes happens that the placenta of the first passes into the vagina and remains there, and may become septic. Füth[1] recently referred to such cases, and pointed out the dangers to mother and child.

Bearing in mind these few facts regarding the progress of labour in plural pregnancy, let us consider the treatment which should be followed.

Speaking generally, labour should be interfered with as little as possible, and it should never be forgotten that there is always a period of uterine quiet after the first child is born.

It may occasionally happen that rupture of the bag of membranes of the first child will help matters, for it will diminish the overdistension, and therefore it is sometimes quite a wise course, even before the os is fully dilated, to rupture the membranes. Then, again, the fact that the contractions are often feebler than normal will not infrequently compel one to assist delivery by forceps, or by traction on the lower limbs. It is inadvisable, however, to perform version upon the first child unless there is some coexisting complication, such as placenta prævia, for there may be difficulty in extracting the after-coming head, especially as suprapubic pressure cannot be very effectively employed.

The first child being born, and the cord tied both distally and proximally, one should wait for a little time unless there is some indication, such as hæmorrhage, for hastening the delivery. If the membranes do not rupture in fifteen or twenty minutes, that should

[1] *Cent. f. Gyn.*, 1901, p. 1055.

be done artificially. At the same time the exact presentation of the second child should be determined, for it occasionally happens that after the birth of the first the second one changes its position. Although the change may be for the better, it is often for the worse, a previously longitudinal lie being converted into an oblique. The membranes being ruptured, the second child is, as a rule, soon expelled; if not, its delivery must be completed by artificial means. It is a mistake to hurry too much the delivery of the second child with forceps, for in grasping a head which is still movable it will very often be pulled into an unfavourable position. If possible, then, let the head engage before applying the instrument. Indeed, like many others, I consider it better to employ version, for there will seldom be any difficulty in performing it, and, the passage being already dilated, the second child passes readily, unless, of course, it is of unusual size.

It would be quite out of place to discuss further the dangers and complications of plural pregnancy. Every one is aware that plural pregnancy throws a greater strain upon the mother, and that such complications as eclampsia, toxæmia, placenta prævia, and post-partum hæmorrhage, are more common. One can understand, therefore, why the maternal mortality and morbidity should be higher.

The fœtal mortality is also high. The fact that the children are so often premature, poorly developed, and malformed; that the circulation in one or both is interfered with by the communication of their bloodvessels and the faulty insertion of their cords; and that during their birth complications readily arise, explains why that should be so.

Before leaving the subject, however, I must consider for a moment a most interesting accident which occasionally arises in connexion with twin births—viz., '*locking*.' I have purposely kept it quite apart from my general remarks on the management of plural pregnancy because it is such an extremely rare occurrence. According to V. Braun, it only occurred once in 90,000 cases in the two Vienna cliniques. Personally, I have seen it once in a case of premature labour, when both children were small. The condition may threaten when two fœtal sacs appear together. In such cases it is well to favour the delivery by rupturing the sac which contains the child with the head presenting, and following upon that, to place the woman, if possible, so that the force of gravity will tend to withdraw the other child from the pelvic inlet.

There is here represented two forms of 'locking,' and, as can be seen at a glance, the first locking of fore-coming and after-coming head is much more serious than the other in which the two fore-coming heads become impacted.

Taking the first variety (Fig. 66), where an after-coming head becomes caught by the fore-coming head of the second child, an attempt should first of all be made to push up the second, and under

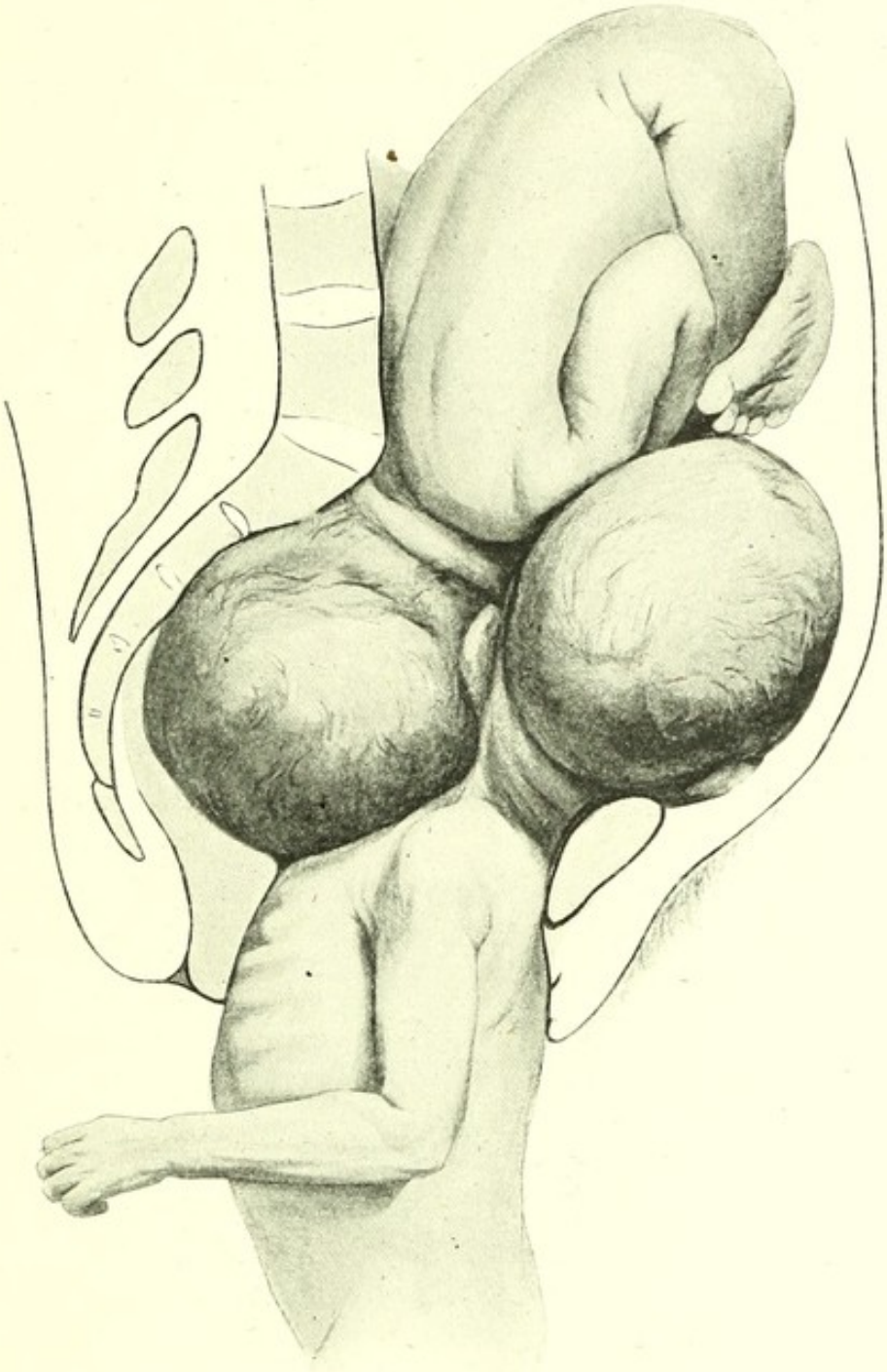


Fig. 66.—Locking of After-coming Head of First Child with Fore-coming Head of Second. (Bumm.)

deep anæsthesia this may succeed. It did so in a case under my care. Should that manœuvre prove unsuccessful, it is inadvisable to do as has been suggested, even although it has been successfully carried

out—viz., apply forceps to the fore-coming head of the second child. The dangers to the second child are great and the risks to the mother not inconsiderable, as she will, almost certainly, have her parturient canal considerably lacerated. Consider the condition of matters.

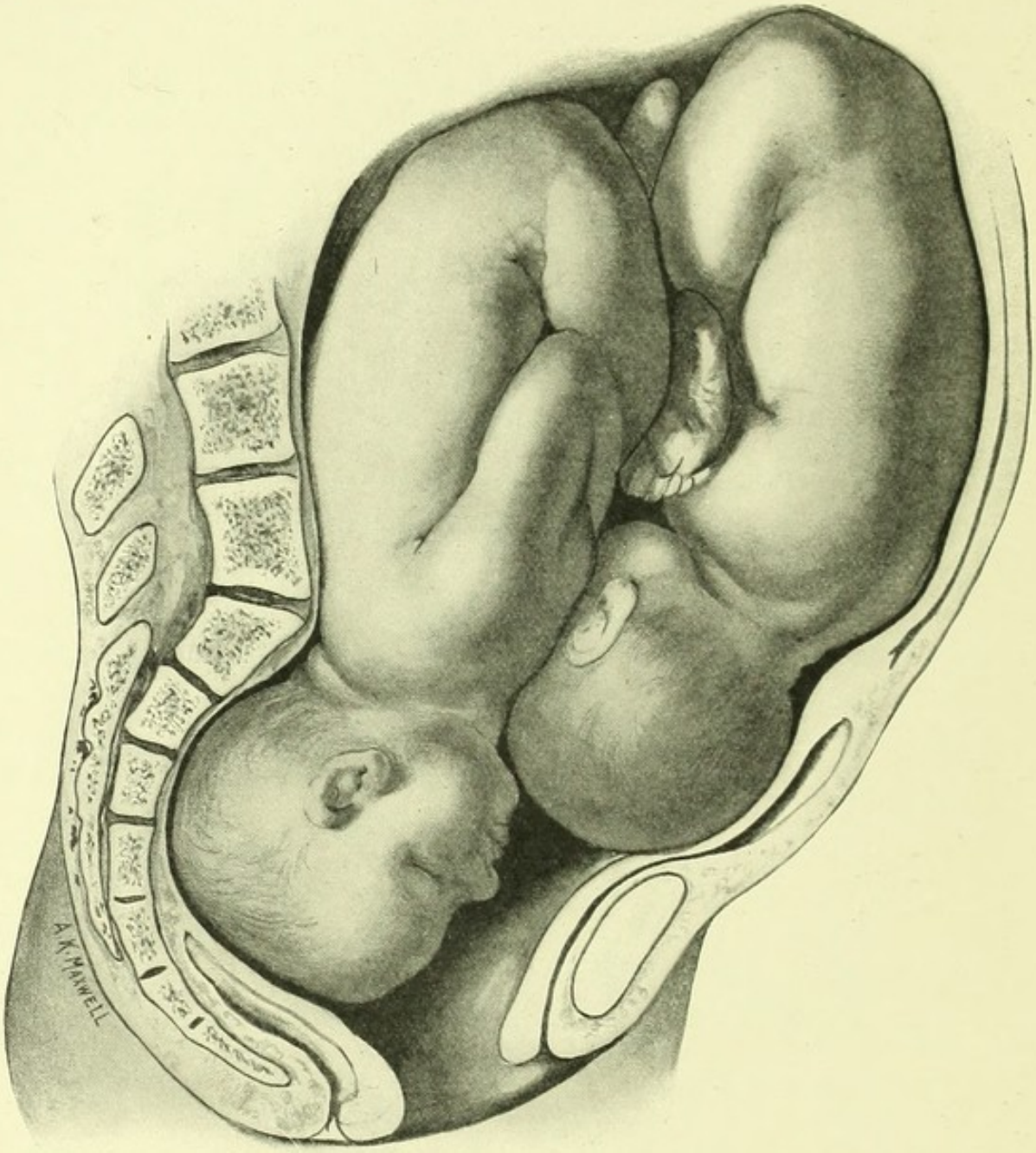


Fig. 67.—Locking of Two Fore-coming Heads.

The chances of the first child being saved are almost nil. It has already had its circulation seriously interfered with, owing to pressure upon its cord. The second child, on the other hand, has not yet had its life in the least endangered. Of course, if it is known that the second child is dead, then everything must be done to try and save

the first; but presuming that the second child is living, the only course is to decapitate the first, apply forceps to the head of the second child and deliver it, and, finally, remove the severed head of the first with forceps or the cephalotribe.

As regards the locking of two fore-coming heads (Fig. 67), it is

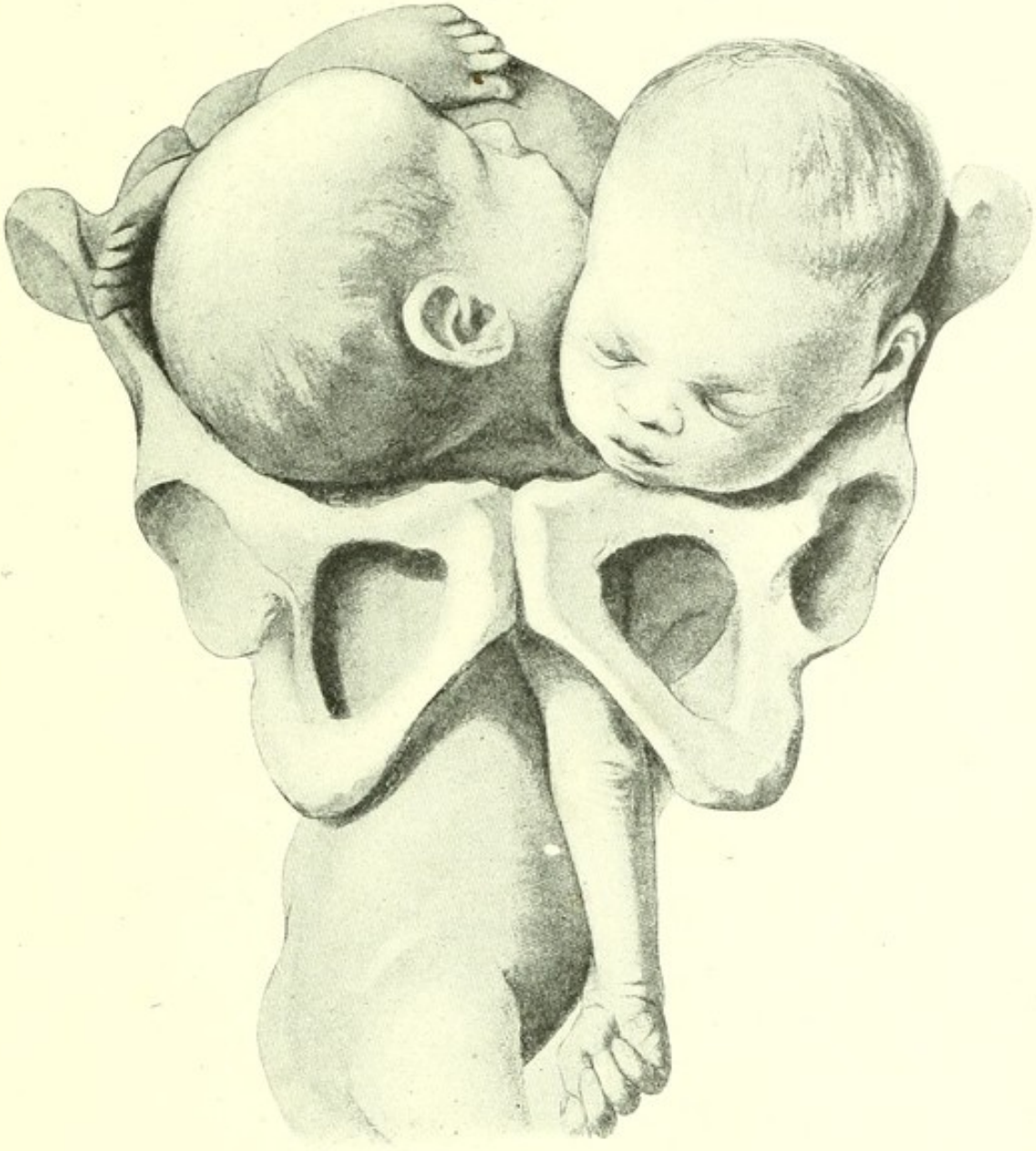


FIG. 68.—Locking of After-coming Head of First Child with the Shoulder of the Second. (Bumm.)

seldom of any consequence, for the second can usually be pushed out of the way. Failing that, attempts at extracting the first with forceps should be made, and if that still fails, craniotomy on the first child is preferable to craniotomy on the second, whose life so far is not at all endangered.

A most hopeless condition is that in which an after-coming head and a shoulder with a prolapsed arm become impacted (Fig. 68). Baudelocque accomplished delivery by decapitating the first child and performing version on the second, which would certainly appear to be the best course. Should it be quite impossible to reach the neck of either child, Cæsarean section is the only alternative.

CHAPTER IX

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*)

Double Monsters.

By J. W. BALLANTYNE, M.D., F.R.S.Ed., etc.

Few medical men are called upon to conduct a case of labour in which the product consists of a double monster, and even obstetricians of considerable experience will see no more than two or three confinements so complicated in a lifetime. Nevertheless, any practitioner may any day find himself face to face with such an obstetric emergency, either in his own or in a brother practitioner's practice; and it is, therefore, necessary for him to know what has been the usual history of such cases, and in what way the difficulty in delivery can best be overcome.

It is safe to say that in the past cases of difficult labour, in which the cause of the difficulty was the presence of united twins in the uterus, have generally been dealt with without any consideration for the life of the double monster. As a matter of fact, the only cases (two in number) with which the writer has had to do were ended after great difficulty by a sort of general dismemberment of the fœtuses. There are, however, certain circumstances which may now make it necessary for us to revise our views regarding such a mode of obstetric interference. In the first place, the profession regards with very different feelings the operation of craniotomy on the living fœtus, and is striving to substitute methods of interference, such as Cæsarean section, symphysiotomy, and the induction of premature labour, which shall give a chance of survival to the infant. The life of united twins may not, perhaps, appear to have a high value; but it is a fact that some individuals thus congenitally fused have survived for a number of years, and not unhappily. The Siamese twins constitute an instance of this, for these brothers lived from 1811 till 1874, and begat normal children. In the second place, Cæsarean section can now be performed with a much lower mortality than

formerly, and gives an alternative method of delivery in cases which used always to be terminated by embryulcia. In the third place, united twins are not now condemned to pass their lifetime so fused together, for modern surgery has attempted, and in one or two instances has carried out with partial success, the separation of the two bodies. At the same time, while these new circumstances ought to make us take a different view of our responsibilities in the treatment of labours complicated by the presence of double monsters, it is doubtful whether it will be found possible as yet to apply them to the actual obstetric management of cases. There is still the difficulty of the ante-partum diagnosis of the existence *in utero* of such a monstrosity. Although it may be possible for the more skilful diagnostician to suspect abnormalities of the unborn infant as a result of his palpation of the uterus, it is the general rule that the malformation is not recognized till labour is in the second stage, and till, therefore, induction of premature labour is out of the question, and Cæsarean section can only be performed under disadvantageous conditions. It must be borne in mind that the antenatal diagnosis of twins can rarely be made with certainty, the obstetrician being forced to content himself with intranatal recognition of this complication of labour. And I know of no way in which the nature of the twins can be foretold before their birth, for even if a radiogram could be made showing the presence of two fœtuses, it would be useless for the diagnosis of the presence or absence of union of the twins, unless, indeed, the union were an osseous one.

Varieties of Double Monsters.

There are two great groups of united twins: in the first, the two fœtuses are of almost equal size, and are symmetrically disposed and united by corresponding parts (*e.g.*, chest to chest, head to head, gluteal regions to gluteal regions); in the second, the two fœtuses are of different sizes (often of markedly different sizes), are asymmetrically disposed, and are apparently united by unlike parts (*e.g.*, head to chest). In the former group the united twins may be called symmetrical disomata, and in the latter asymmetrical disomata. In the former group each twin has the same degree of formation and vitality, while in the latter one of them is obviously a parasite upon the other.

It is not with the parasitic or asymmetrical disomata that the obstetrician has much to do. Labour may indeed be retarded, but the degree of retardation, the means which require to be taken to overcome it, and the effects produced upon the mother, do not differ

from those met with in cases of localized enlargement of the fœtus from any cause whatever (*e.g.*, fœtal ascites, hydrocephalus, etc.). For instance, in a case of *fœtus in fœtu* (included fœtus) reported by Wright and Wylie[1] the labour was long and difficult on account of the large size of the infant's abdomen. Some time after her birth the infant was operated upon, and a mass removed from the cavity of the lesser peritoneum. This mass was sent to me for examination, and I reported that it was an included twin fœtus of the variety known as amorphus or anideus, and that by increasing the size of the abdomen of the co-twin it had led to the delay and difficulty in labour. Instances might be multiplied, but I pass to the consideration of the obstetrical relations of the symmetrical disomata or united twins in the ordinary sense of the term.

There are three great subdivisions of the symmetrical disomata. For convenience and ease of description these groups may be called the *chioid*, the *hypsiloid*, and the *lambdoid united twins*, the names being given to them on account of their resemblance to the Greek letters Chi, Upsilon, and Lambda respectively. In other words, the united fœtuses in these three subdivisions have the shape of an X, of a Y, and of a small Lambda or an inverted Y respectively. In text-books of teratology and antenatal pathology they are more often called *thoracopagous*, *dicephalous*, and *syncephalous fused or united twins;* but from the present obstetric standpoint I think it will be helpful to keep the general construction of the monstrosities before the mind's eye by means of these short descriptive names—X-shaped, Y-shaped, and inverted Y-shaped. The first group contains the cases in which there are two almost perfectly formed infants united more or less completely, thorax to thorax or back to back; the second contains the two-headed monstrosities, in which the lower parts are more or less fused into one; and the third includes the single-headed monstrosities, which show duplication of the lower limbs and sometimes of the lower part of the trunk as well.

Labour in the Case of the Chioid Double Monsters.

When one looks at chioid united twins (Fig. 69), whether of the kind in which the place of union is situated anteriorly (region of thoraces or of abdomens), or of that in which the twins are fused in the gluteal regions, the first thought which comes into one's mind is that it must be impossible for such twins to pass alive and uninjured through the genital canal. Yet, as a matter of fact, records of the live birth of such monsters are found in obstetric literature, both old

[1] *Brit. Med. Journ.*, vol. ii., 1900, p. 1428.

and recent. It is true that the confinement is occasionally stated to have been premature, and that the twins themselves are generally smaller than single fœtuses of the same age, yet cases are not wanting in

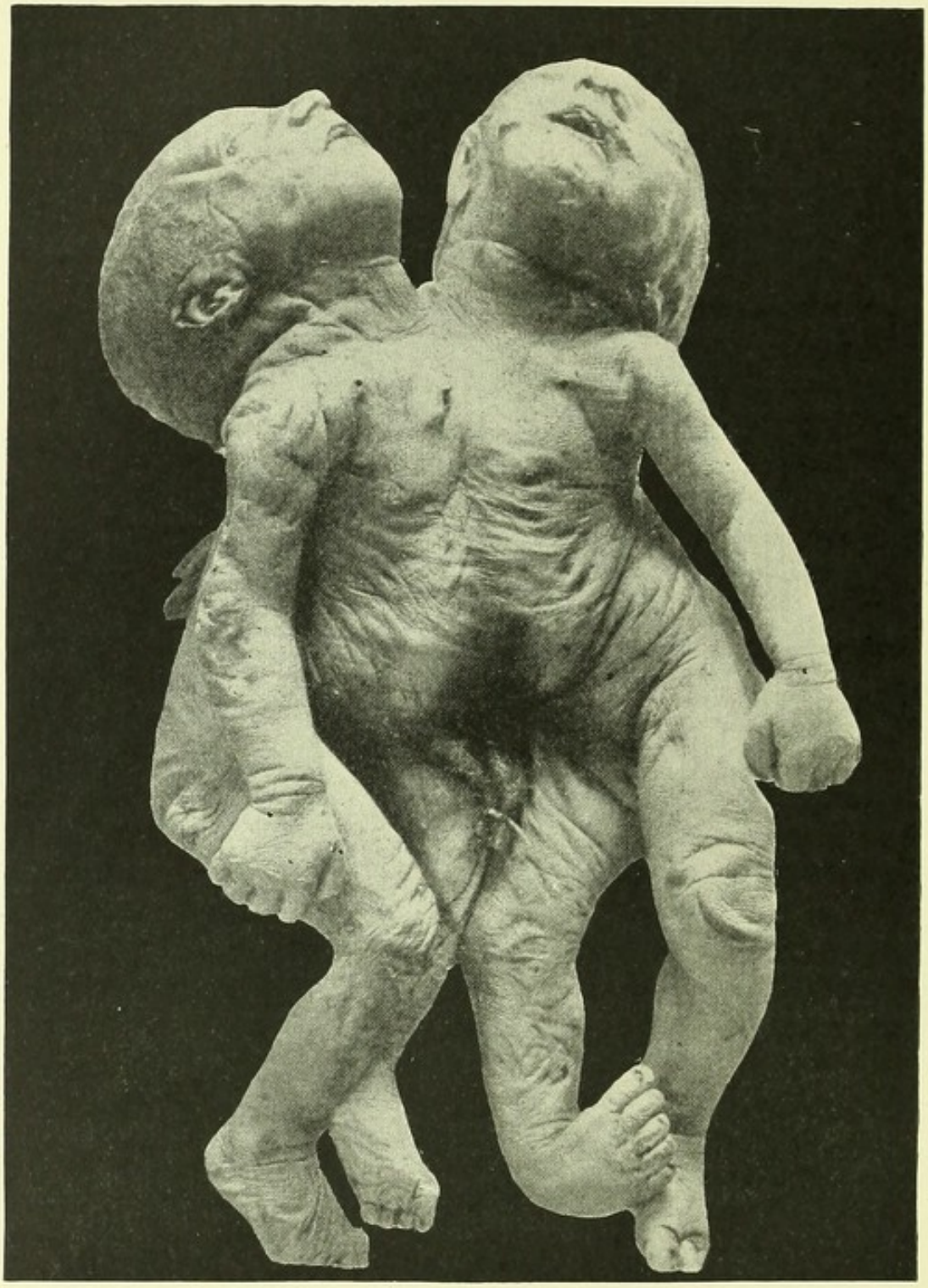


Fig. 69.—Chioid or Thoracopagous Monster. (Haultain.)

which they have been of good size and born at full term. There is, of course, the well-known instance of the Siamese twins, and of late years Chapot-Prévost has recorded the case of Chinese brothers born

alive, and surviving birth, at the full term. In the latter example it is further affirmed that the mother of the united twins was a primipara.[1]

From a scrutiny of the cases in which details of the confinement are given (not a very large number, it may be remarked) it would seem that the natural mechanism of delivery (if it may be so called) has been as follows: The united twins have presented by the feet, the bodies have descended parallel to each other through the vaginal canal, and then the obstetrician has carried the bodies well forward over the symphysis pubis, with the result that the posterior head has engaged in the pelvis and been born, while the anterior head has then been able to follow. This seems to have been the mechanism which proved effectual in the case recorded by Dr. Haultain in the Transactions of the Edinburgh Obstetrical Society for 1901-1902.[2] When the obstetrician has been successful in the management of one of these labours, it will generally be found that he has imitated as far as possible the natural mechanism indicated above. Version, therefore, gives the best results as a rule, for by its means the feet are made to present and the natural mechanism facilitated. The chief difficulty will arise in connexion with the birth of the heads. Here, again, the rule is to imitate Nature, and get the posterior head to enter the pelvis first, the bodies for this purpose being carried well forward over the symphysis pubis.

Occasionally cases have been recorded in which delivery has taken place or been brought about without performing version, and in which, nevertheless, the heads have been the presenting parts. Such cases almost necessarily imply that the maternal pelvis has been large. In H. Hanks' case[3] the double fœtuses presented by the heads. One head was born first, the other in the meantime occupying the space between the chin of the first twin and its chest; then the second head was expelled with the help of traction on the first; and then the two bodies came away simultaneously. But the two heads do not always come away together, as they did in Hanks' case. In an interesting record by P. Boulton[4] the following details are given. The mother was a small, weak woman, thirty-seven years of age, who had had eight pregnancies, all ending in normal confinements. In the present labour the first head presented as a face; forceps was applied and the first head extracted. Next, the shoulders, arms, and trunk of this child were brought down; then the four feet and the trunk; and finally the head of the second twin appeared at the vulva, and was born in that order. The labour was premature and the fused twins

[1] 'Chirurgie des Teratopages,' Chapot-Prévost; Paris, 1901.
[2] Trans. Edin. Obst. Soc., vol. xxvii., p. 176.
[3] Trans. Obst. Soc. Lond., 1862, vol. iii., p. 414. [4] *Ibid.*, 1882, vol. xxiii., p. 260.

small; but for these facts it is doubtful whether such a mode of delivery could have taken place.

When a part of the fused twins has been expelled, and when no further progress takes place, or can be accomplished by ordinary obstetric measures, the indication will be to reduce the size of the product of conception by embryulcia; but it will be advisable to regulate the plans of procedure as far as possible. If, for instance, the connecting band between the fœtuses can be reached, and if it be not of too solid a nature, the obstetrician will divide it, and then deliver the fœtuses separately. If one head be at the vulva and the other be jammed in the pelvis, decapitation of the first head may make it possible to complete the delivery. In almost any of the impacted cases the performance of cleidotomy (division of one or both clavicles) will facilitate other obstetric manœuvres, if it does not of itself make labour possible. Craniotomy of one or both heads may be necessary; and in a case in which the specimen afterwards came into my possession for examination both heads as well as the two abdomens had been opened into before the fœtuses could be extracted. In all such cases the obstetrician will, of course, do his best to prevent sepsis, and will be well advised to wash out the interior of the uterus thoroughly. One of the great dangers associated with the delivery of double monsters of this type is the fact that not infrequently several medical men have to do with the case, either as principal or consultant or assistant, and that several different hands may thus be passed into the uterus during the manipulations, each hand, of course, increasing the risk of sepsis. Further, the labour is often a prolonged, an anxious, and a disappointing one (dead-born infant), and for these reasons the patient may be less able to resist septic infection.

Labour in the Case of Hypsiloid Double Monsters.

The dicephalous or hypsiloid fused twins (Fig. 70) have two heads, three or four upper limbs, two necks, a body showing some signs of duplicity, and (usually) only two legs, which belong one to each head. A classic case of this type of double monster is the Scottish brothers who lived during the reigns of James III. and James IV., and attained to the age of twenty-eight years; another instance is that of Ritta-Christina, born in Sardinia in 1829, and living for a few months; and yet another is that of the Tocci brothers, born in Italy in 1877. It is, however, somewhat uncommon for fused twins of this type to survive birth, although, as a matter of fact, the obstetrical conditions are not worse, but better, than those of the

chioid type. In Dr. Pallarés' case of dicephalus which I reported some time ago[1] the cause of the fœtal death seems to have been the complication of the labour with a placenta prævia.

The obstetrical history of the hypsiloid twins closely resembles in its main outlines that of the chioid type. If the presentation be

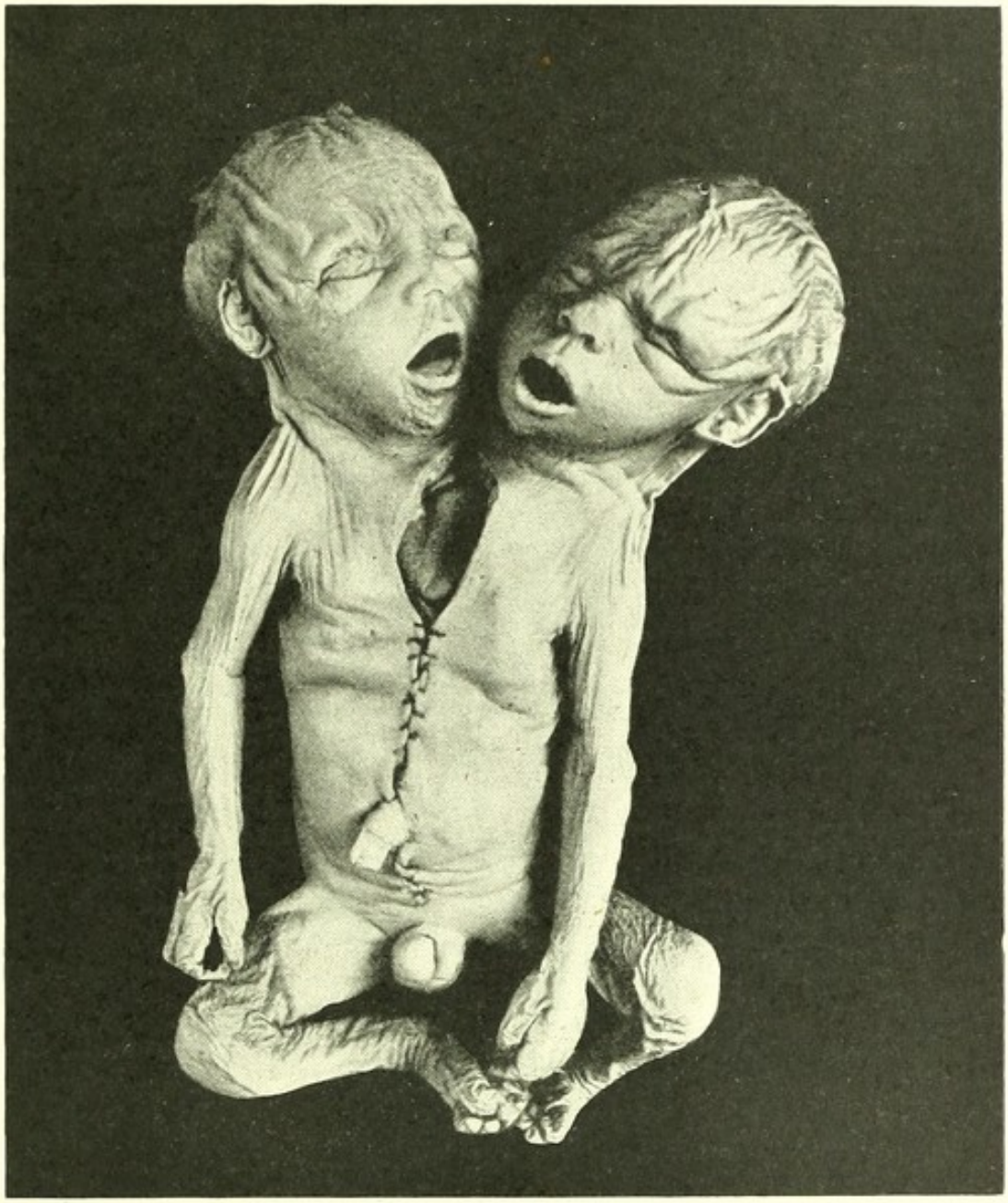


Fig. 70.—Hypsiloid or Dicephalous Monster. (Hunterian Museum, Glasgow University.)

breech or footling, the single body is born with perhaps some delay; then the first head enters the pelvis, and, if it be the posterior one of the two, is expelled by pulling the body well forward; then the second or anterior head follows without further difficulty. It may, however, be necessary to decapitate. A fairly typical case is thus described by

[1] 'Teratologia,' 1895, ii. 210.

Horrocks:[1] 'The presentation was breech, and nothing abnormal was found until the child was born as far as the shoulders. Two necks and two chins were now made out. The left head was anterior and lower than the right, both faces looking towards the mother's right. The pains were strong, and presently the right head descended below the sacral promontory, got lower than the left head, swept over the perineum, and was born first, with the occiput posterior and to the left. The left head was born last.' In a case reported by Phillips[2] the anterior head was born first, but the labour was premature.

When the heads present, delivery, if it can occur at all, takes place in the following way: One head is born and becomes fixed under the arch of the pubes; then the body is driven past it by a sort of spontaneous evolution; and finally the second head emerges. If, as is not uncommon, the delivery cannot be effected by this mechanism, it will be necessary to decapitate the first head and perform version. The same precautions must be taken, as regards asepsis and the avoidance of prolonged and purposeless traction, with the hypsiloid as with the chioid fused twins.[3]

Labour in the Case of Lambdoid Double Monsters.

The cases are comparatively rare in which the fœtuses are fused in the region of the heads (Fig. 71) and upper part of the trunks, and separate in the lower parts and the lower limbs. The name lambdoid twins may be given to such monsters, although the more familiar appellation is syncephalic (fused heads). The obstetrical difficulties are in these cases usually associated with the large size of the single head, for, although single, it represents two heads, indications of which are often forthcoming in the presence of two faces. The name 'Janus fœtus' has been given to it on account of the existence of the two faces, which are sometimes placed side by side (with a common central eye) or back to back. If in such cases the lower extremities present first, it is quite likely that the two bodies may be born, with some delay, perhaps, but without any great difficulty; but the after-coming head will remain at the brim of the pelvis. The necessity will then arise for perforation, and perhaps for basilysis, of that head, and in order to reach it easily it may be good practice to reduce the bulk of the shoulders by cleidotomy. If, on the other hand, the head

[1] Trans. Obst. Soc. Lond., 1885, vol. xxvi., p. 326.

[2] *Ibid.*, 1887, vol. xxviii., p. 278.

[3] Interesting details (with a bibliography) of the birth of dicephalic double monsters are given by Dr. J. Phillips (*Edin. Med. Journ.*, 1888, vol. xxxiii., pp. 308, 604).

presents, the case will no doubt be treated by the usual methods, for the obstetrician will not guess that there are two bodies following; in

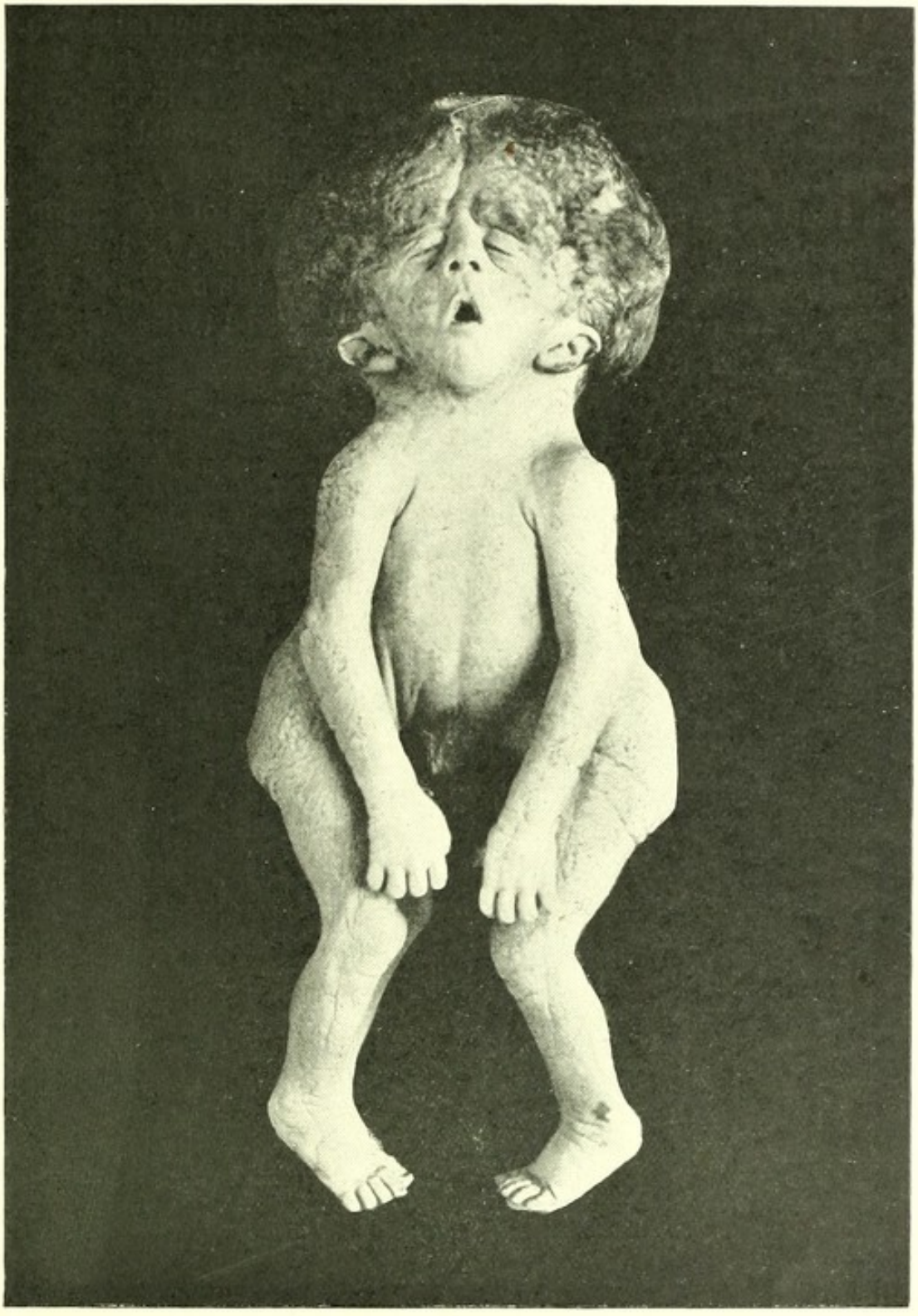


FIG. 71.—Lambdoid or Syncephalous Monster. (Hunterian Museum, Glasgow University.)

other words, forceps will be applied, and will doubtless fail, and then recourse will be had to perforation. Probably it will be necessary to reinforce the perforation by considerable comminution of the head

(removal of large pieces of the cranial vault bones) and by basilysis. Since, however, these lambdoid double monsters have usually a very repulsive appearance, and little chance of surviving, there need be little hesitation in pursuing the line of treatment indicated above.

There are some types of double monster which do not fall into any one of the three groups referred to; but, as a rule, the obstetric difficulties they cause are no more than those which would be produced by separate twins. Thus, in the very rare cases of *craniopagus* (in which the two fœtuses are united by the vertices of the crania, and are separate in all the other regions) one twin is born by the feet, the two heads come one after the other, and finally the body and limbs of the second twin appear. The craniopagous fused twins may survive birth for months, even for years.

CHAPTER XV.

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE FŒTUS (*continued*)

Cord—Placenta—Membranes.

Complications connected with the Cord.

Presentation and Prolapse of the Funis or Cord.—In considering this subject, it is still the custom of many to follow the classification of Naegele, and distinguish between *presentation* and *prolapse* of the funis, the former being a falling down of the cord in front of the presenting part before rupture of the membranes, and the latter being a similar occurrence after rupture. The distinction is useful, as the treatment for the two conditions is quite different. Doubtless, prolapse in most cases is a natural consequence of presentation, but in not a few it is only with rupture of the membranes and the escape of the liquor amnii that the former occurs, while occasionally the latter has disappeared during the course of labour. The frequency of the condition in the Glasgow Maternity Hospital is 1 in 150 cases.

Speaking generally, the conditions favouring the occurrence of prolapse of the funis are those which interfere with the close application of the presenting part to the lower segment of the uterus. The head of the fœtus best accommodates itself to the lower pole of the uterus; consequently, prolapse of the cord is much less frequent with it than with pelvic and transverse presentations. Von Winckel[1] found transverse presentations twenty to twenty-five times and breech nine to ten times as often as head presentations. For the Glasgow Maternity Hospital the figures are: Head, 73 per cent.; breech, 6 per cent.; transverse, 21 per cent.

Malformations of the pelvis, and tumours of the uterus and surrounding parts, by hindering the engagement of the presenting part, also favour prolapse, while such conditions as low implantation of the placenta, marginal attachment of the cord, undue length of cord, sudden rupture of the membranes, especially if the parturient is in an

[1] 'Handbuch der Geburtshülfe,' Bd. ii., Teil iii., 1905, p. 1522.

erect position, need only be mentioned. They are evident and important factors.

The condition is found about five times as often in multiparæ as in primiparæ. But it is at once apparent that such a comparison

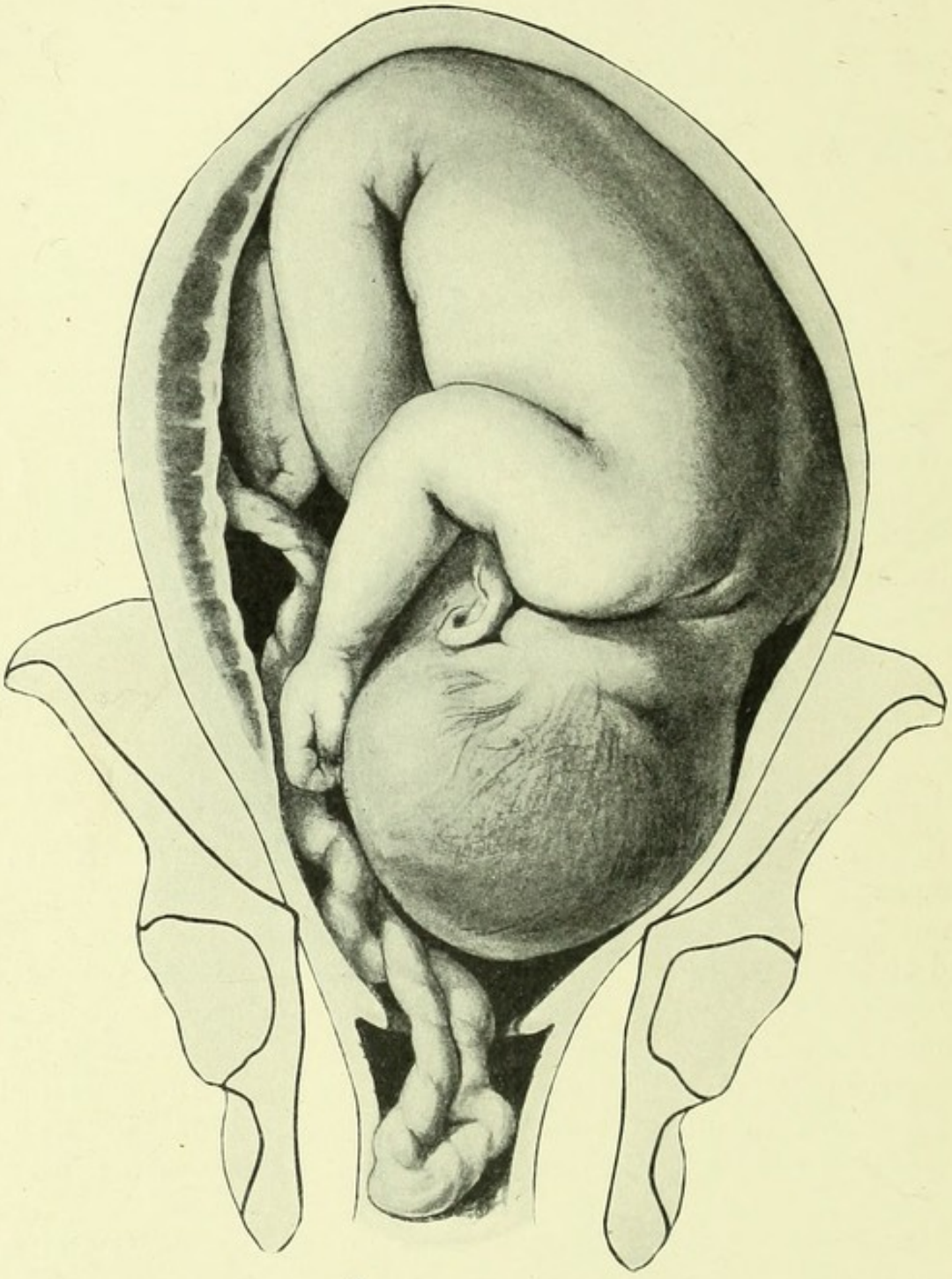


Fig. 72.—Prolapse of Cord. (Bumm.)

does not really give a correct idea of the relative frequency in primiparæ, the practical bearing of which is that it is more common in the latter than is generally supposed.

The position of the prolapsed funis depends chiefly upon the position of the fœtus, for the cord tends to fall down on the side to which its abdomen is directed. It is, consequently, usually found to one or other side of the promontory (Fig. 72), rarely in front or at the sides of the pelvis. If it does prolapse in front, as in occipito-posterior positions, it will usually be found in the neighbourhood of the right ileo-pectineal eminence.

The extent to which the cord prolapses varies. Sometimes only a small loop, but at other times many inches, fall down. Be the loop, which is compressed, large or small, the danger to the child is grave if the condition is left alone. A small loop is more easily replaced and kept up; it is more readily overlooked, however.

Few conditions simulate a prolapsed cord. None if pulsations in it can be felt. Sometimes, when there is great difficulty in reaching the presenting part, the tips of the child's toes or fingers resemble it, for they move away from the examining finger just as the cord does. It is commonly stated that the prolapsed intestines of the mother or child may be confused with it also; and certainly in cases of ruptured uterus I have felt the prolapsed intestine very much like the funis, but only for a moment was there any doubt as to the real nature of the condition.

Until the other day I thought nothing could really simulate a prolapsed cord, but I was disabused of the idea, for in a patient I was attending, and in whom it was extremely difficult to reach the presenting part, owing to her stoutness, a flattened, pedunculated, submucous myoma exactly resembled the cord (Fig. 73). Indeed, I only came to a diagnosis after putting the patient under chloroform and inserting my hand into the vagina.

From what has been said, it is evident that prolapse of the cord can only be diagnosed by vaginal examination, and, consequently, a labour must not be conducted by abdominal palpation alone, as some enthusiasts of abdominal palpation advocate. I am perfectly well aware that interference with the circulation of the cord, such as results from pressure upon it when prolapsed, produces alterations in the fœtal pulse-rate and rhythm which can be recognized by auscultation. But the important point is, that by the time the alterations are distinct the child may have suffered considerable injury.

Having ascertained that the prolapsed body is the cord, one must estimate the presence and strength of the pulsations. This can be done by pressing the cord against the fœtal head or maternal pelvis, or, better still, feeling it between the two examining fingers. The sources of error are the pulsations in the mother's vessels and in the

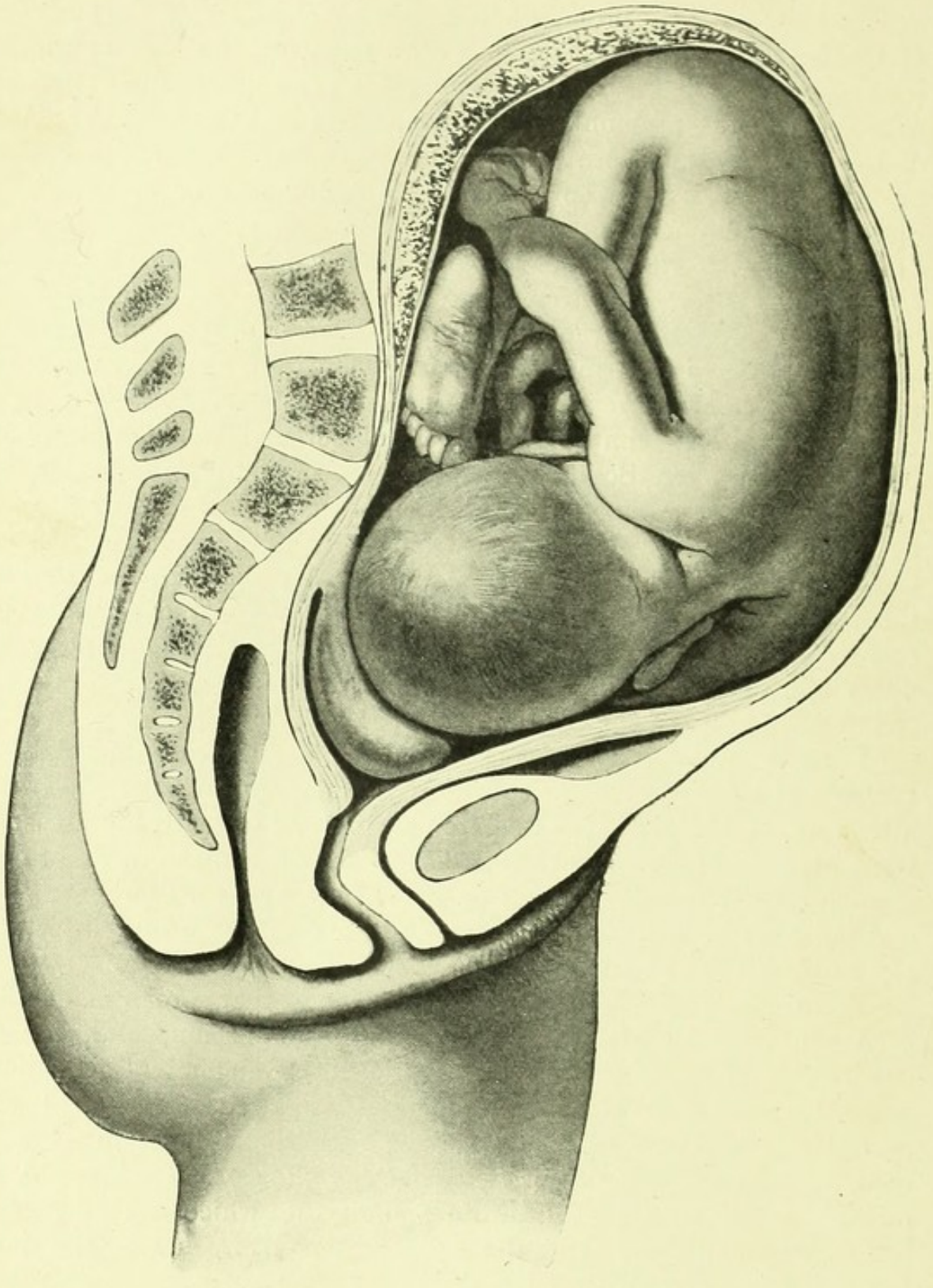


Fig. 73.—Flattened Submucous Myoma which simulated a Prolapsed Cord. (Author's Case.)

examining fingers of the accoucheur, and I must admit, if the fœtal pulsations are feeble and slow, it is sometimes not a little difficult to exclude these fallacies.

The child, it must be remembered, is not always dead, even although pulsations in its cord are absent. When the cord is completely compressed—during a uterine contraction, for example—the pulsations cease entirely, although they return again as the contraction passes off. Again, as the child dies slowly, it is evident that the heart will continue beating some time after the pulsations cease to be appreciated. Every one has had experience of the former condition, and I have once or twice had experience of the latter, but I have no recollection of ever having saved a child under the latter circumstances. When the pulsations are slow, and especially if they are feeble and irregular, one must extract the child quickly if it is to be saved.

Prognosis.—In prolapse of the cord one has obviously to deal with a complication in which the chief danger is to the child. The mechanical obstruction of the cord to delivery is quite negligible, so that the mother can only be injuriously affected by the operative interference that may be had recourse to in the interests of the child.

The fœtal mortality is very high, but owing to the fact that the conditions which favour prolapse prevent engagement of the head, the cord often escapes pressure. It is more likely to be unfavourably pressed on when the presentation is a head and the pelvis is normal. Up to a certain point in the labour the condition is most favourable with transverse presentations, so much so that a temporary conversion into a transverse presentation while the os is dilating has been suggested. With a contracted pelvis, also, I have frequently seen the prolapsed cord but little pressed upon. In one of my cases of Cæsarean section the cord was down in the vagina for an hour and a half after rupture of the membranes, and yet it continued pulsating quite normally. The child was extracted alive.

As a rule, in a particular case the presence or absence of the intact membranes is the most important circumstance influencing the prognosis. Speaking generally, presentation of the cord—that is, a falling down of the cord when the membranes are intact—is of little immediate consequence. It simply indicates that when the membranes rupture it will be endangered. Still, this is not always the case, for if there is little 'fore-water,' and the head is low in the pelvis, there will certainly be undue pressure on the cord, even although the membranes are intact. Next in importance is the degree of dilatation of the cervix, as it is self-evident that delivery or replacement are difficult in proportion to the expansion of the cervix. Then, again, the extent of the prolapse distinctly influences the prognosis, for the more cord down, the more difficult it is to get it replaced

and retained in a safe situation. Lastly, any coexisting complications affect the outlook unfavourably.

Treatment. — The treatment to be adopted in the complication under consideration depends upon several circumstances. Chief of these are, the condition of the membranes, the condition of the child, and the extent to which the parturient canal is dilated.

When the membranes are unruptured and the os only partially dilated, all one's energies must be directed to preserving the membranes intact, for except in those comparatively rare cases where the presenting part is low in the pelvis, with little fore-water, the cord is safe from pressure. With that object in view, the patient is kept in bed, and all vaginal examinations and manipulations are desisted from. In addition, an attempt is made to replace the cord by change of posture. The positions which are employed are the genu-pectoral or knee-elbow position, Sims', and Trendelenburg's. All act in the same way. They raise the pelvis, and bring the cervix to a higher level than the fundus, and so permit gravity to act on the prolapsed loop. It is stated that ballotting the fundus with the hand favours the return of the cord. Theoretically, the treatment is sound, but, unfortunately, it does not always prove successful in practice.

Sims' position (Fig. 74) is quite as good as, and less irksome than, the knee-elbow or the Trendelenburg position. It also possesses this advantage, that it lessens the risk of premature rupture of the membranes. As a further preventative to this occurring, the employment of a hydrostatic dilator, introduced into the vagina, is recommended. Personally, I have never employed the metreurynter at this stage and with the object mentioned.

The course to pursue, in cases of prolapse of the cord with ruptured membranes, will depend upon the state of the child and the degree of dilatation of the cervix. It is perfectly evident that if the pulsations in the cord have ceased, and the child is dead, nothing need be done in its interest, and so the labour should be allowed to pursue its ordinary course. Any interference must be in the direction of making the delivery as easy as possible for the mother. For example, in such a condition, if uterine contractions fail, and the extraction of the child is deemed necessary, the fore-coming head, delivered by forceps, or the after-coming head, delivered by traction on the trunk, may be perforated, so as to remove all chance of the head doing damage to the soft parts of the parturient canal. I have several times perforated the head already grasped by the forceps, and have always been satisfied that it lessened the bulk of the head, and did not render the instrument appreciably more liable to slip.

One must, however, be quite sure that the pulsations have ceased, and so the loop of prolapsed cord must be carefully felt, not only during the ' pains,' but also in the intervals between them. As I have pointed out elsewhere, the child usually dies slowly, and for a considerable time before its death pulsations may be quite good during the intervals, although they are entirely absent while the pains are in progress. One should also observe the condition of the fœtal heart.

If the os is fully dilated, the child should be extracted by forceps. In cases where the os is fairly dilated and the cord has

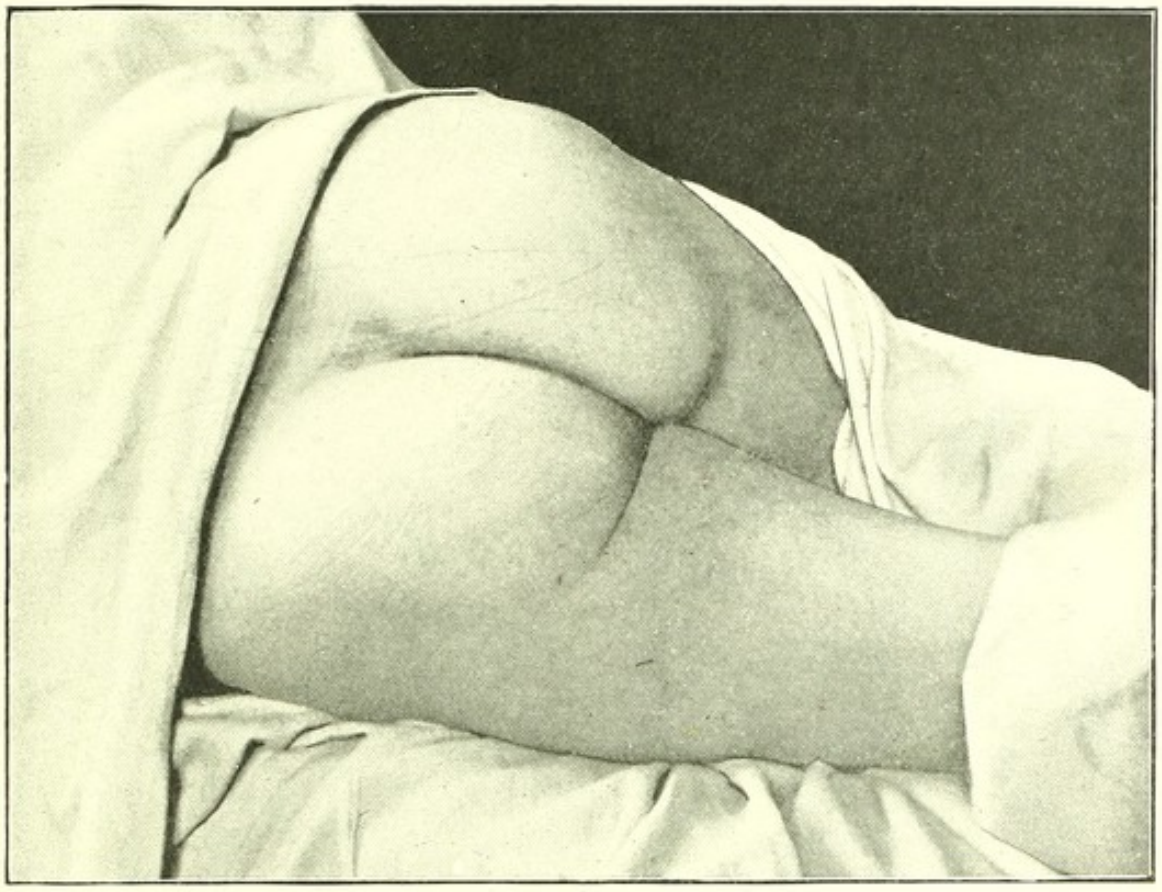


FIG. 74.—Sims' Position. The woman lies on left side, with right leg drawn up over left.

been pressed upon, it may be not a little difficult to decide how far one is justified in forcibly delivering the child, with the object of saving it, knowing, as one does, that by such a course one appreciably endangers the mother. From my experience, I would say that when the fœtal pulsations slowly return in the intervals between the uterine contractions, and remain slow and intermittent and irregular, unless the child can be slipped out of the vagina immediately and with ease, it is profitless to add to the maternal risks by doing anything in the interests of the child. When, however, regular and strong pulsations return immediately after the uterine

contractions have passed off, and one is not pressed for time, manual dilatation or incision of the cervix may be practised. One thing must never be done—viz., dragging the child through the undilated cervix; for with the after-coming head it is absolutely profitless, as the child will certainly perish, owing to the difficulty and delay in bringing down the arms and head, and with the fore-coming head it causes severe and irregular laceration of the cervix uteri. But in such cases hard-and-fast rules cannot be laid down. Experience, and a careful consideration of all the circumstances, must be one's guide.

We must now turn to prolapse of the cord when it is recognized earlier, and when there is still a possibility of replacing it, altering the posture of the child, or introducing a hydrostatic dilator. As stated already, Louise Bourgeois (1609) suggested replacing the prolapsed cord. According to Fasbender, our latest obstetric historian,[1] she recommended reposition and the maintaining of the cord in place by means of a tampon. Guillemeau and, later, Mauriceau also advocated reposition, although the latter fully appreciated the fact that it often proved unsuccessful. De la Motte opposed reposition.

As forceps became perfected and more generally employed, and extraction by means of it was recommended by Levret, Smellie, and others, version and forceps came to be the only methods of treatment employed. Writing in 1853, Rigby says:[2] 'Reposition has, nevertheless, met with so little success as to have fallen into complete disuse until the last few years.' A revival of the treatment of reposition was initiated by Michaelis. This great obstetrician, best known, of course, in connexion with his work upon deformities of the pelvis, wrote several papers upon the subject of prolapse of the cord. Basing his opinions on his own results (22 per cent. fœtal mortality), he became a strong advocate of the treatment by reposition. The chief value of Michaelis' work in connexion with reposition was the importance he attached, and that very rightly, to pushing the cord above the retraction ring. About this time a great variety of repositors were devised by Braun, Martin, Murphy, and others.

The results from manual reposition for the last five years in the Glasgow Maternity Hospital show a fœtal mortality of 24 per cent., and failure to effect reposition in 10 per cent. Reuter[3] has made a most careful analysis of some 1,600 cases, and his figures go to support the contention that the best results are now obtained by reposition.

[1] *Geschichte der Geburtshülfe*, 1906, p. 157.

[2] 'A System of Midwifery,' p. 236.

[3] Inaug. Dis., Bonn, 1894.

Regarding manual reposition, it must be remembered that the results of to-day cannot be compared with those before the days of

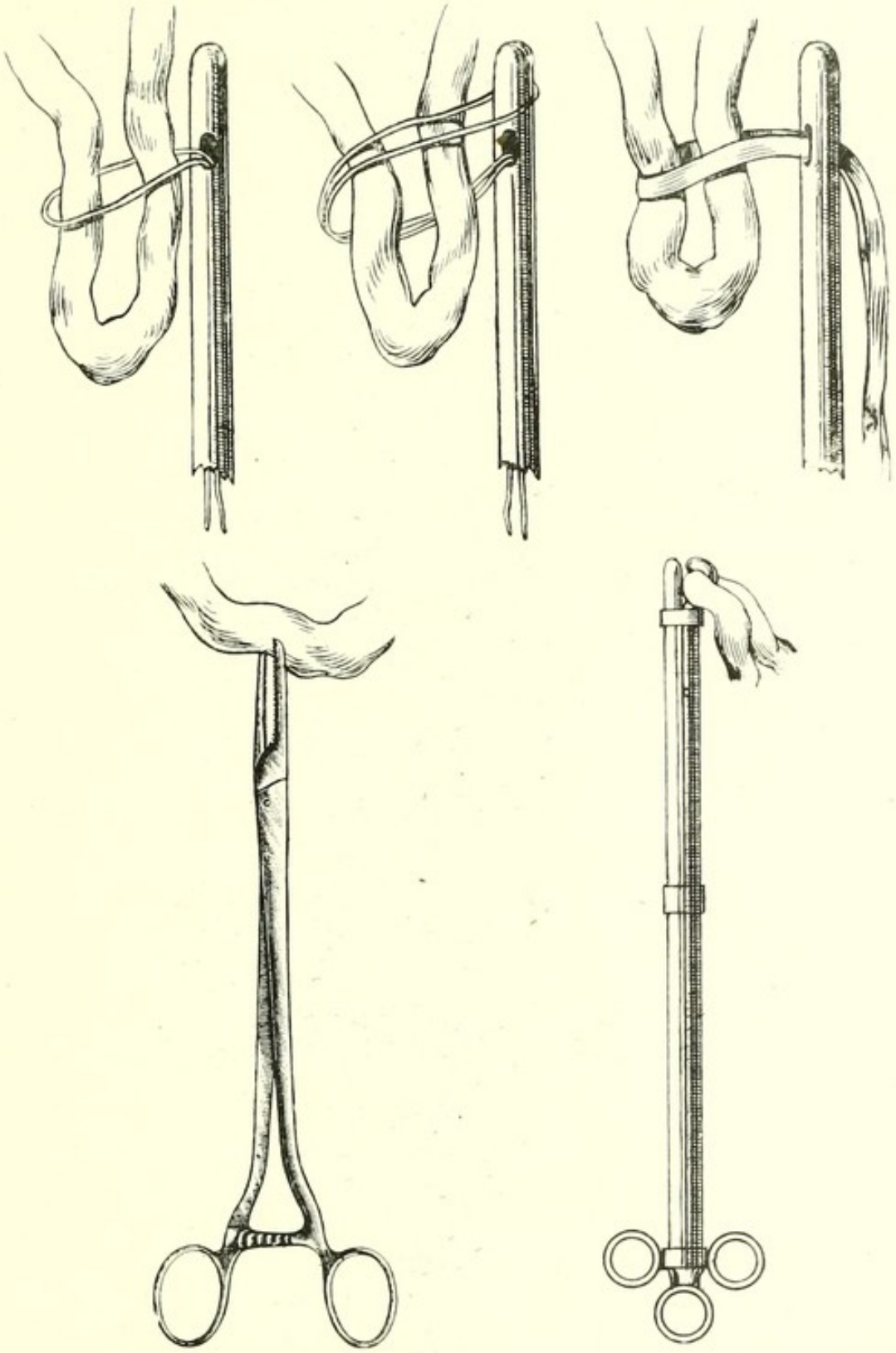


FIG. 75.—Simple Devices for replacing the Cord. (After Edgar.)

anæsthesia, when the cord was not pushed up high enough. I have no hesitation in recommending replacement of the cord under anæsthesia.

At the same time the cord may be hooked over a limb. When, however, the os is not sufficiently dilated to permit of manual replacement, repositors may be employed. The earliest repositor used was gauze, and it and a large sponge have frequently proved of value. Of the various repositors, the most effective and the simplest is the catheter, employed as seen in the illustration (Fig. 75). A loop of a double thread of silk ligature or thin tape is brought out through the eye of a gum-elastic catheter. The prolapsed piece of cord is then inserted into the loop in one of the manners shown. The catheter and cord are then carried up into the uterus, and the silk thread loosened by moving the catheter about or removing the stilette.

In the majority of our cases where the cord was replaced, delivery was completed by forceps. With the latter the results have been infinitely better than with version, which gave a fœtal mortality of 56 per cent. It must be admitted, however, that version was performed late, and in many of the cases the pelvis was decidedly deformed. My feeling with regard to the operation is that, if it is to prove successful, one would require to perform it prior to rupture of the membranes, or, at least, immediately rupture occurred. As we have seen, however, every one is agreed that it is the greatest possible mistake to rupture the membranes prior to full dilatation of the os externum; and consequently I think version is unsuitable, except in transverse presentations, or some coexisting complication, such as placenta prævia.

The metreurynter of Champetier de Ribes, or similar hydrostatic dilators, are favoured by only a few enthusiasts, for the cord may be compressed between the rubber bag and the uterine wall just as readily as between the fœtal head and the uterine wall.

Before leaving the subject, let me say that in certain cases of contracted pelvis I have seen the cord so little pressed upon, even with the membranes ruptured, that I have not interfered. I simply examined the condition of the cord from time to time, and auscultated the fœtal heart regularly. In such cases the real danger to the child is when the head has passed the brim and is in the cavity. Consequently, all that is necessary is to direct the cord into one of the 'bays' at the side of the promontory, and leave the case to Nature until the os is sufficiently dilated and the head is moulded. The forceps are then applied, or any other operation had recourse to which is deemed suitable for the particular case.

Shortness of the Umbilical Cord.—The umbilical cord may be actually short, or relatively short by reason of its being wound round some part of the fœtus—most usually the neck. Actual shortness of the cord causing dystocia is very rare. I have only witnessed it on

two occasions ; once in the malformed fœtus shown in the illustration (Fig. 76), and once in an otherwise normal fœtus, where it measured

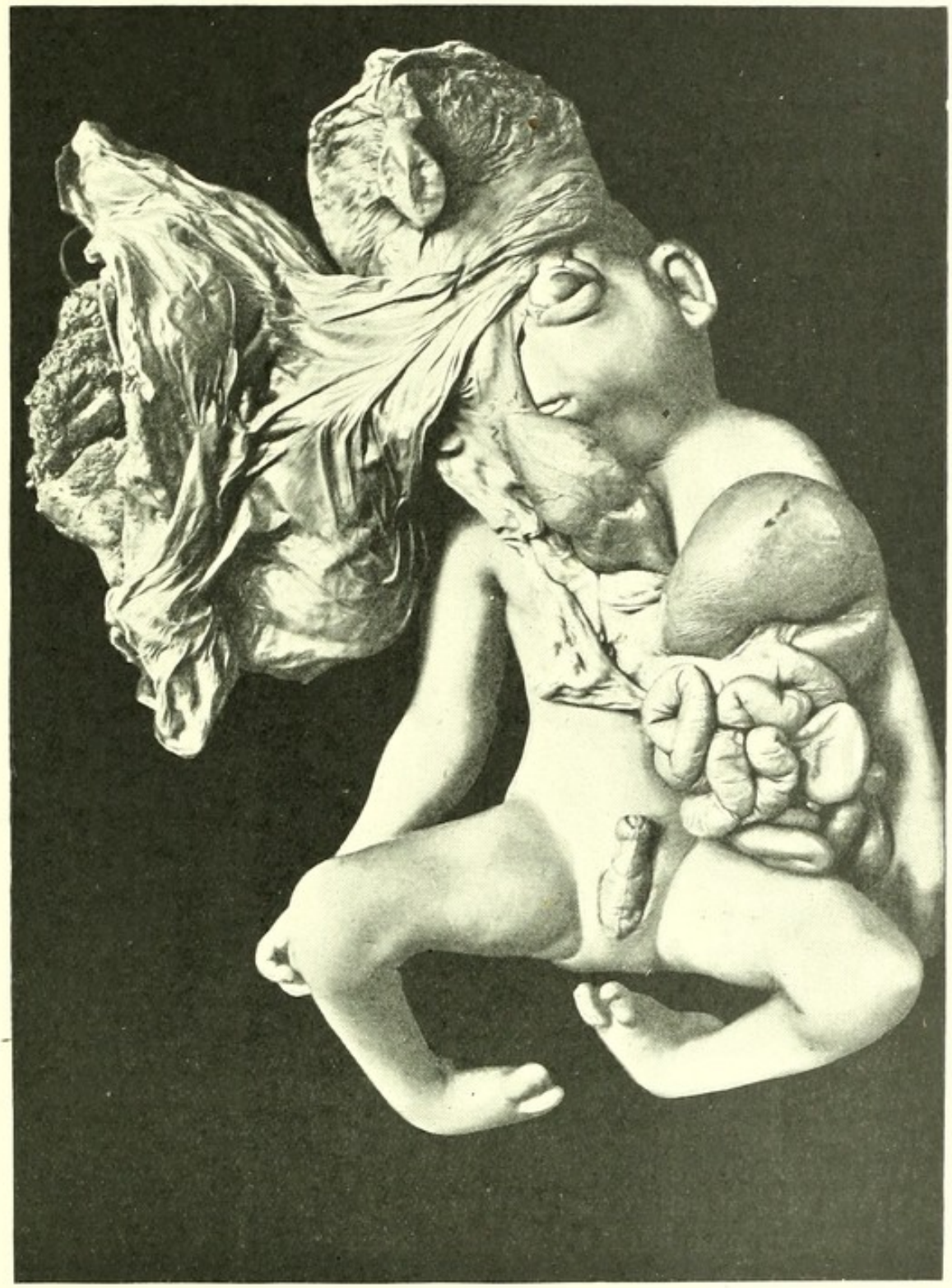


Fig. 76.—Adhesions between Amnion and Head ; also Extreme Shortness of the Cord in a Fœtus born Alive, and presenting many Recognisable Malformations. (Author's Collection.)

about 8 inches (20 centimetres). In the latter case, during the extraction of the trunk (the child presented by the vertex), I felt that the child

was prevented from escaping owing to the shortness of the cord, and so divided the latter and completed the delivery. Similar cases have been recorded by many others. Amongst the most interesting was the one described by Braxton Hicks,[1] where actual shortness of both cords in a twin pregnancy was very marked. In the first child, which presented by the breech, the funis was exceedingly short, so that it scarcely could be tied and divided. The second child, dead and œdematous, also presented by the breech. As the latter had been long delayed at the outlet, the author states: 'I hooked a crotchet into its abdomen; some fluid escaped, which allowed more freedom of action. I now could feel the funis very tense, the umbilicus being stretched up. It was above the symphysis pubis. I determined to divide the funis, and having in my bag the osteotome of the late Sir James Simpson, I guided it up between two fingers of one hand and divided it. Upon using fair traction, the body came down. The funis was about 4 inches (10 centimetres) long altogether.' Bayer[2] describes a case where the cord measured 4·2 inches (10·5 centimetres). The most extreme cases of shortness are found in association with malformations, more particularly exomphalos, as in the preceding illustration. It would appear that shortness below 10 inches (25 centimetres) usually gives rise to more or less dystocia.

With relative shortening of the cord the latter is usually found round the neck of the child, for the shoulders catch the cord. If it is simply round the body (Fig. 77), the child escapes through the loop as a rule. The child 'riding' the cord—that is, 'astride of it'—naturally only causes dystocia if there is actual shortness.

With shortness of the cord, in addition to the birth of the child being retarded, rupture of the cord, separation of the placenta, and even inversion of the uterus, may follow. In the malformed fœtus seen in the illustration placenta and fœtus came away together. In Hicks's case a retroplacental hæmatoma formed as also occurred in Meyer's.[3] Matthews Duncan[4] experimented upon the power of the funis to resist a breaking strain, and found it averaged $8\frac{1}{4}$ pounds, while the extent of elongation before breaking averaged nearly 2 inches (5 centimetres). The rupture occurred some little way from the umbilicus. But although that is the rule, it sometimes happens that it occurs at the placenta, as in the case mentioned by Wynn Williams in the discussion which followed Duncan's paper.

[1] Lond. Obst. Trans., vol. xxiii., p. 253.

[2] *Samml. Klin. Vorträge*, No. 265, 1900.

[3] *Prager Med. Wochenschrift*, Nos. 48 and 49; ref. Winckel's 'Handbuch,' Bd. ii., Heft iii., p. 1498.

[4] Lond. Obst. Trans., vol. xxiii., p. 244.

The diagnosis of a short cord has occasionally been made

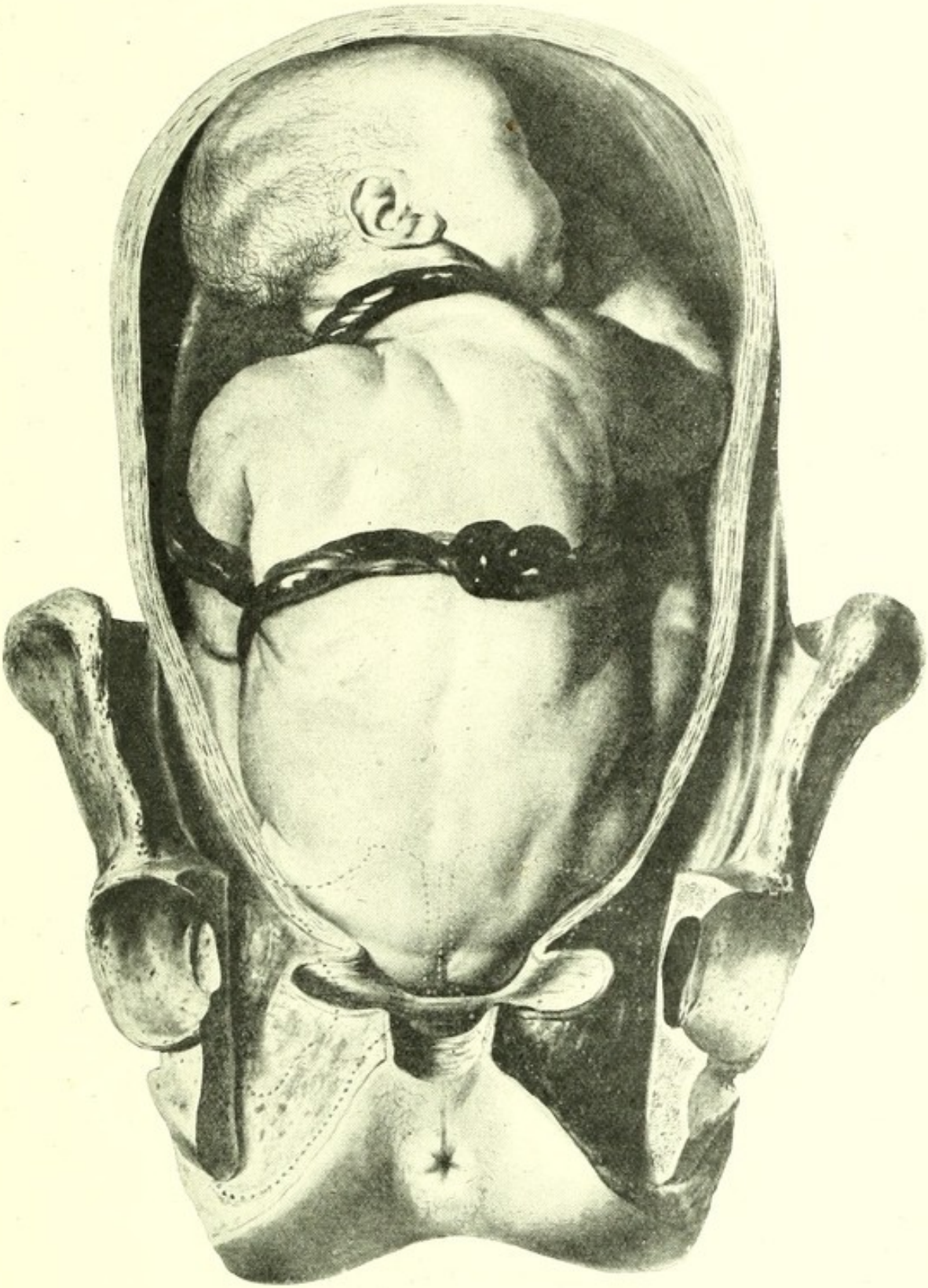


FIG. 77.—Cord twisted round Body and Neck of Child.
(From Van Rhymsdyke's drawing in the Hunterian Museum, Glasgow University.)

before the actual delivery was in progress, as, for example, in

McLennan's cases. McLennan,[1] quoting Weidemann, says the condition may be diagnosed from the following:

1. The presence of the funic souffle.
2. The recession of the presenting part in the intervals between the pains.
3. One-sided pain in the abdomen (Wigand).
4. Variability of the position of the head within narrow limits (Rachel).
5. Discharge of some blood after each pain (Rachel).
6. Frequent emptying of the bladder in the pauses between the pains (Brickner).

I can offer no opinion regarding these signs and symptoms. Theoretically, they are self-evident, and I doubt not are often present. How difficult, however, it must be to appreciate them! In all probability, in the future, as in the past, the condition will at earliest be appreciated when there is a difficulty in the extraction of the child, or when it is forcibly expelled with a ruptured cord, attached placenta, or inverted uterus.

When actual shortness of the cord exists, the latter should be divided, the child quickly extracted, and the cut cord immediately secured. When the cord is round the neck, difficulty in extraction will only occur in head presentations. In such cases, if a loop cannot be slipped over the shoulder, it is futile to try to bring it over the head, as is the ordinary procedure; the cord should be divided and the child at once delivered. It is unnecessary to waste time in clamping the cord with pressure forceps or passing a ligature round it.

The most exhaustive recent papers on the subject of shortness of the cord are by La Torre.[2]

Other abnormalities in the umbilical cord, such as undue length, twisting round the neck, trunk, or limbs, and knots, have little effect upon labour, and so need not be considered in any detail.

Undue length of the cord—Gottschalk recently recorded one in which the length was 36·8 inches (92 centimetres)—naturally predisposes to prolapse, to twistings, and to the formation of knots. Prolapse has been considered already, and twistings round the neck may lead to relative shortening, as we have seen. Occasionally the cord has so tightly constricted the part round which it has been wound as to lead to the death of the child, or to interference with the development of a particular part. There are not a few cases on record where the neck of the child has been extremely constricted, where the trunk has been deeply indented, and where even a limb has been

[1] 'Abdominal Manipulations in Pregnancy,' 1902, p. 95.

[2] *La Clinica Ostetr.*, vol. vi., Nos. 1-9.

amputated, although the latter condition probably more often results from amnionic bands and errors of development. The most interesting cases of knotting are those in which two or more knots have occurred in the cords of twin fœtuses in one amnionic sac. Such cases are very rare. An example is seen in the accompanying illustration (Fig. 78). Dr. Lindsay, of Glasgow, very kindly gave me the specimen. The knots, if they are tight, invariably lead to the death of the child. The condition naturally is only recognized after the expulsion of the placenta and membranes.

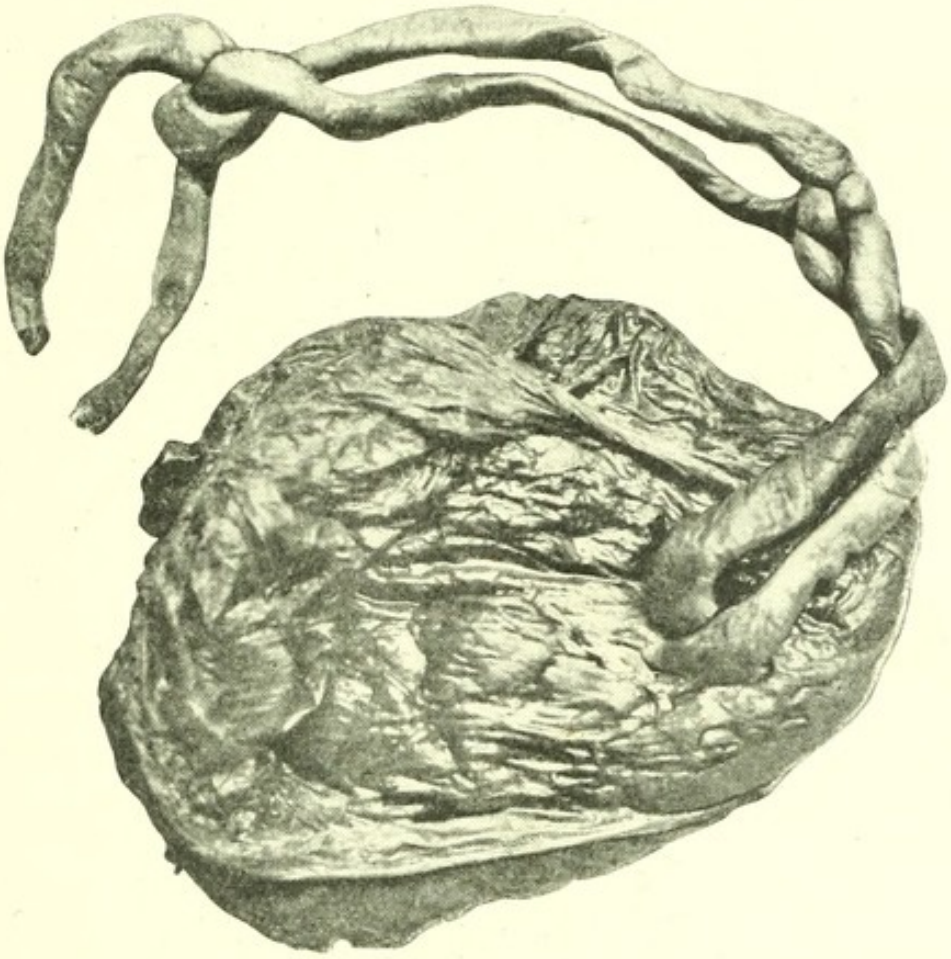


Fig. 78.—Placenta and Knotted Cords, from a Case of Twin Pregnancy. (Specimen kindly given the Author by Dr. Lindsay.)

The various anomalies in the number and relationship of the vessels in the umbilical cord cannot be considered here. It is otherwise, however, with the insertion of the cord to the placenta. The marginal insertion—often termed 'battledore' placenta—is an abnormality occurring in about 5 per cent. of cases. To a slight extent it is a source of danger to the child. Much more serious, however, is the 'velamentous insertion' (Fig. 79), for in such cases the circulation is very readily interfered with. Rupture of the vessels and death of the child from hæmorrhage have been noted on several occasions.

The etiology of the condition has been discussed by Schultz, Küstner, Ahlfeld, and others, but, as it has no practical bearing, those interested in the matter are referred to the monographs on the subject by the authors mentioned.

It is quite evident why the child should suffer in this condition,

Fig. 79.—Velamentous Insertion of Cord.

Fig. 80.—Very large Placenta from a Case of Twin Pregnancy; the Placenta was Prævia by reason of its Size.

especially if the placenta is situated low down and the vessels of the cord run on the part of the membranes which present.

Levret pointed out that in marginal insertion of the cord the attachment was always to the edge nearest the os uteri. Barnes verified this.[1]

Before rupture of the membranes, the pulsating vessels may be felt, and after rupture if the vessels are torn, free bleeding may

[1] Lond. Obstet. Trans., vol. xxiii., p. 254.

arouse suspicion of the condition. Generally, however, this abnormal insertion of the cord is not recognized until the placenta is born. Fortunately, although rupture of the vessels may occur, these often escape, because their walls are more resistant than the membranes. Should the condition be recognized during labour, it is of importance to preserve the membranes intact as long as possible, and, when the os is sufficiently dilated, to extract the child immediately, in order to prevent it bleeding to death.

Complications connected with the Placenta.

In connexion with the placenta, the chief abnormality affecting labour is placenta prævia, a complication which is considered in Chapter XXXIII. The various abnormalities in form, shape, and size (Fig. 80) have little bearing upon the subject of dystocia. I shall, however, have to point out in connexion with adherent and retained placenta, that occasionally a small *placenta succenturiata* may be overlooked, and may give rise to the complications which follow retained portions of placenta. One frequently meets with an abnormally large placenta in connexion with malformed and diseased fœtuses. In many cases it is œdematous and adherent, and has frequently to be removed manually.

An interesting complication is rupture of the circular sinus of the placenta, but as clinically it resembles placenta prævia, I shall consider it when the latter is under discussion.

Complications connected with the Membranes.

Speaking generally, abnormalities of the membranes are of pathological rather than practical interest. An exception might be made in the case of the hydatidiform mole, which, by reason of the dangers attending its removal and the risks of chorion epithelioma following, is a condition of great interest to the accoucheur. I do not, however, propose considering it here. What I have to say about the matter will be found in Chapter XXXI., where abortion is discussed.

Rupture of the bag of membranes which dilates the cervix should be the last event of the first stage of labour. Very frequently it gives way too soon or remains intact too long. Both occurrences retard labour.

The premature rupture of the membranes early in labour is familiar to every accoucheur, and is usually attributed to unusual friability of the membranes. This is probably the correct explanation in most cases, for Matthews Duncan[1] in his experiments

[1] 'Researches in Obstetrics,' p. 314.

found the resistance of the membranes to a bursting force very variable.

In this connexion I have observed a repetition of the occurrence in the same individual. One patient, whom I have attended on several occasions, always commences her labour with rupture of the membranes. It is difficult, however, to be satisfied with the explanation of friability in all cases, for I have tested the membranes, and not always found them unusually fragile.

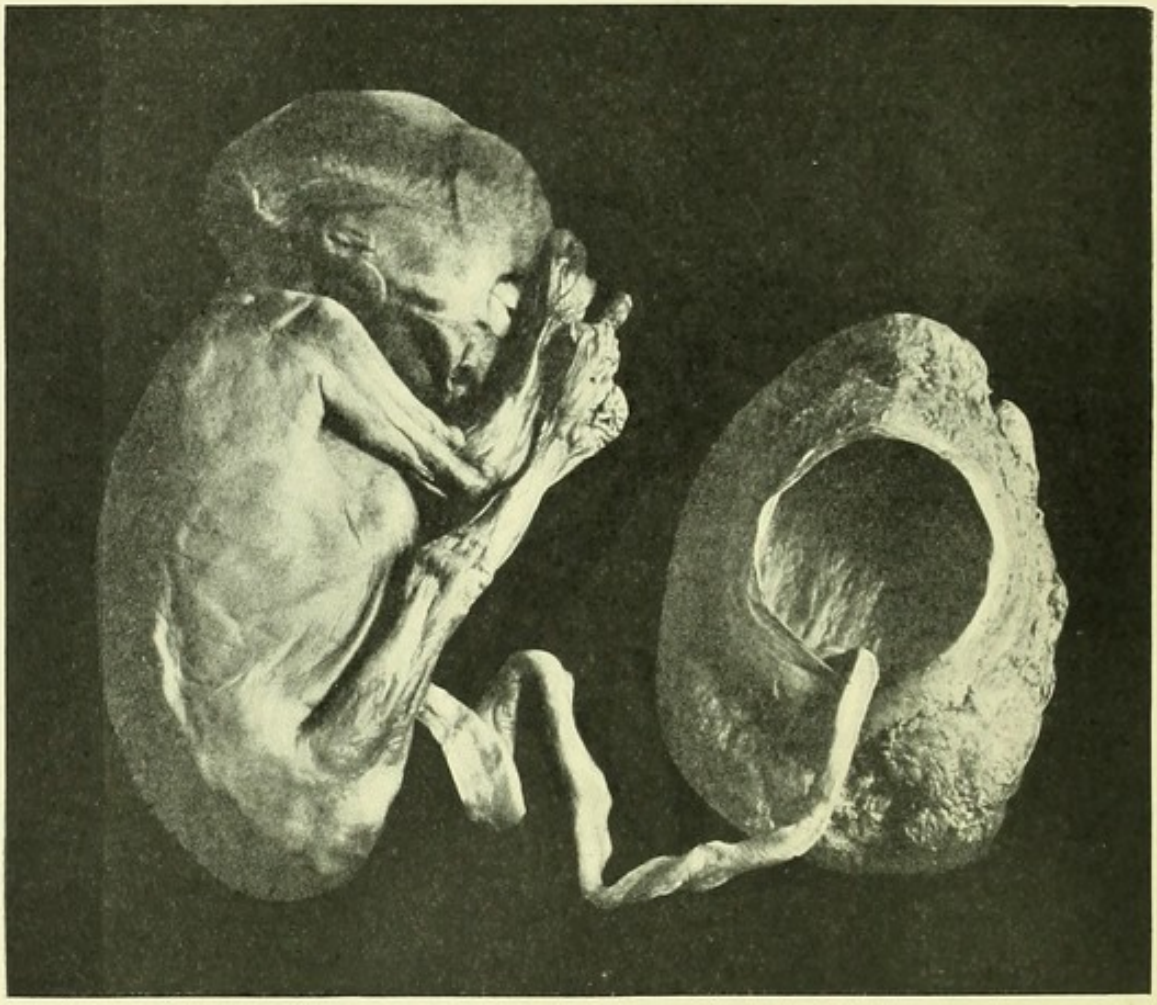


FIG. 81.—Holzapfel's Case of Complete Rupture of Membranes but Continuance of Pregnancy (*Grossesse extramembraneuse*).

Later in the first stage rupture of the membrane is favoured by malpresentations, deformity of pelvis, accidents, etc.

The early rupture of the membranes delays labour and increases appreciably the risks to the child. Dilatation is slower, and the uterine contractions often become irregular and feeble. Indeed, in some cases so marked does this become that the employment of a hydrostatic dilator is indicated.

A very unusual occurrence is for the membranes to give way

during pregnancy and yet the pregnancy to continue. In such cases, the general explanation given of the watery discharge is an inflammation of the decidua (endometritis decidualis), and the condition is spoken of as *hydrorrhœa gravidarum*. From several specimens, however, which have been examined in recent years it has become evident that rupture of the membranes may occur and yet the pregnancy continue. The French, who have given most attention to the condition, refer to it as *grossesse extramembraneuse*. A most complete paper on the subject is one by Meyer-Ruegg,[1] who describes two cases in addition to those recorded by others.

The feature of this condition, and the one which distinguishes it from the ordinary hydrorrhœa, is a sanguineous discharge which accompanies or follows the ordinary watery discharge common to both. The pregnancy usually terminates prematurely, and the children, although many of them are born alive, generally die shortly after their birth, for their growth in the uterus outside of the membranes is not conducive to favourable development. A case presenting all these features came under my notice recently through the kindness of a medical friend. That it occurs must be admitted from such observations as those of Tarnier, Bar, Bonnaire, Müller, and Holzapfel. Their cases have been carefully investigated. I give here a reproduction of Holzapfel's illustration, which exactly represents the specimen in my possession.

Bar, Olshausen, and a few others, have described cases in which the amnion has given way early in pregnancy, but the chorion has remained intact. The condition is recognized after delivery by the small retracted amnion. Bar's illustration (Fig. 82) reproduced here shows the condition very clearly.

The other condition of delayed rupture of the membranes is a simple one, and easily remedied. It may be overlooked, however, if there is little 'fore-water,' for then the membranes may be closely applied to the presenting part of the child. Occasionally a casual observer may mistake a large caput succedaneum for the intact membranes. More than once I have seen this mistake made by students, who have been trying in vain to push a pointed instrument through the œdematous swelling on the child's head. A macerated head, and in a breech presentation a very œdematous scrotum, and still more rarely, and with even less excuse, a cystocele, have also been mistaken for the unruptured bag of membranes.

The treatment of delayed rupture of the membranes is very simple, and consists in rupturing them during a uterine contraction with any pointed sterilized instrument, such as a knitting-needle, scissors, etc.

[1] *Zeit. f. Geb. u. Gyn.*, vol. li., Heft iii., 1904.

In doing this, every care must be taken not to injure the soft parts of the maternal canal. In cases where the presenting part is not engaged, it is well to make the opening in the membranes small, and

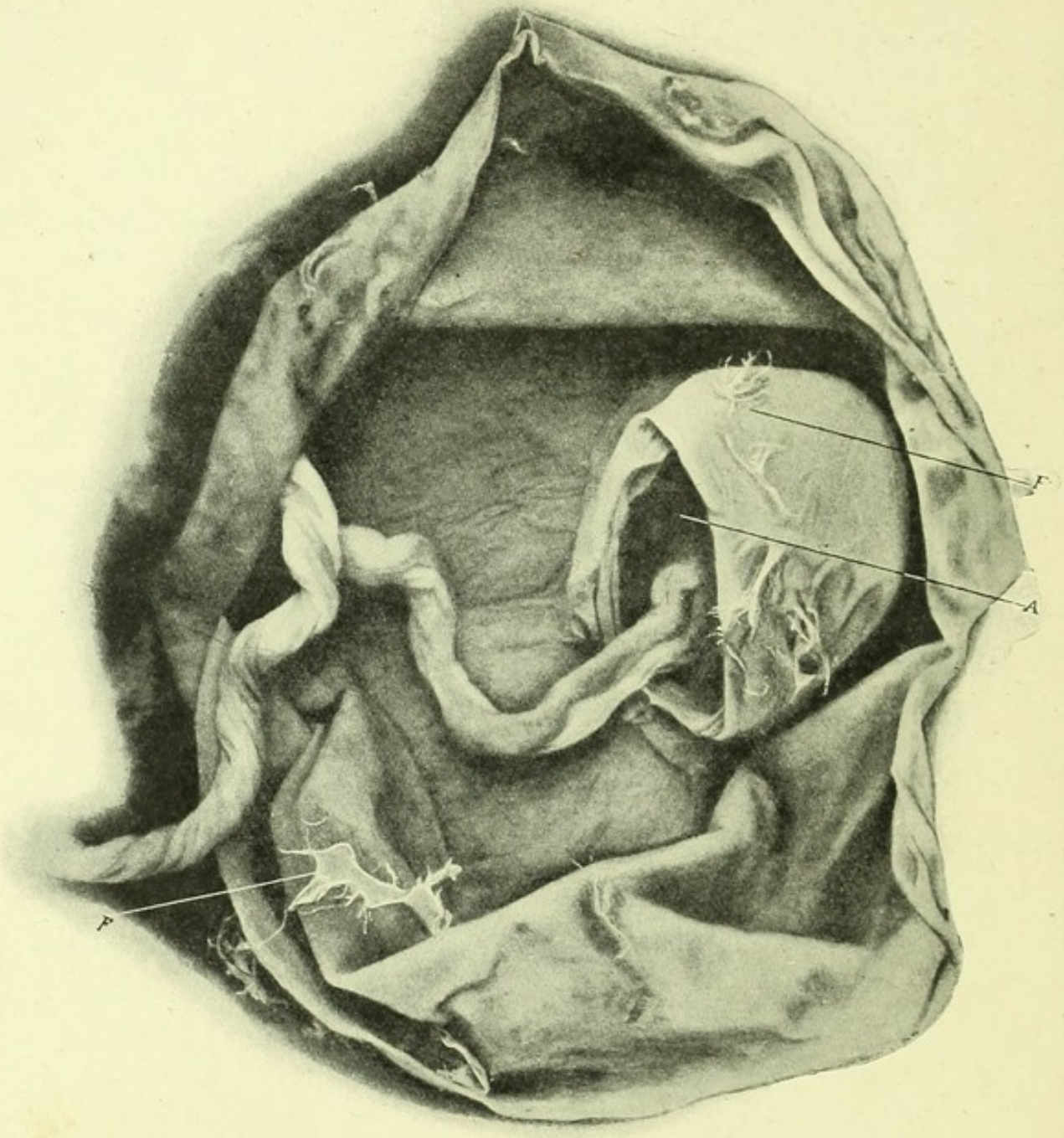


FIG. 82.—Early Rupture of the Amnion, the Chorion remaining Intact.
A, Cavity of amnion ; F, amnionic adhesions. (Bar.)

to keep one's fingers in the vagina until the presenting part becomes fixed, otherwise a limb or the cord may slip down, with the too rapid escape of the liquor amnii.

Early in labour quite another condition of the membranes may

retard dilatation. I refer to adhesion of the membranes to the lower part of the uterus. This condition, first carefully considered by Löhlein, is due to an inflammatory condition of the mucous membrane. In certain cases the os externum is completely closed, and has to be incised. In other cases dilatation proceeds to a certain extent, and then ceases; the uterine contractions are too feeble. In such cases an attempt should be made to separate the membranes by sweeping the fore-finger round them, for it is desirable to retain the membranes intact, if possible. The subject is fully considered in Chapter XIII.

In connexion with the cases at present under discussion, one must remember that sometimes the os externum remains patent for days with the membranes slightly projecting. The woman sometimes suffers a good deal of pain, but at other times experiences no discomfort. I have only seen the condition in multiparæ. It is often a feature of a protracted or prolonged pregnancy. The cases are very troublesome to patient and doctor, for both are kept in continual expectancy of labour coming on.

Should it be decided to bring on labour, the introduction of a metreurynter is probably the best treatment.

The mortality amongst post-mature fœtuses is very considerable. So unsatisfactory have been my results in two cases that I have determined in the future not to leave this condition to Nature, but to bring on labour whenever I am satisfied that pregnancy is certainly protracted.

CHAPTER XI

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL

Deformities of the Bony Canal—Classification of these Deformities and Consideration of the Different Varieties.

We come now to the third factor which affects parturition—viz., the passage.

The parturient canal consists of a bony framework surrounding a fibro-muscular tube, along which the child is driven, and mention need only be made of deformities of the bony pelvis and rigidity of the cervix to bring to mind examples of dystocia commonly encountered. But, besides these, there are other conditions of the canal which, although less frequently met, occasionally cause much trouble in labour. These are alterations in the axis of the canal, tumours of its wall or of the neighbouring parts, and malformations of uterus and vagina.

Dystocia, therefore, connected with abnormalities in the parturient canal may be classified as follows :

A. Deformities of the bony pelvis.
B. Pathological conditions of the cervix and vagina.
C. Tumours of uterus and neighbouring organs and tissues.
D. Alterations in the axis of the uterus and vagina.

Deformities of the Bony Pelvis.

Of all the conditions in the parturient canal which cause dystocia, deformities of the bony pelvis are by far the most important. Taking the cases in the Glasgow Maternity Hospital for the last five years, decided pelvic deformity has been found present in fully 30 per cent. of the indoor patients. This high proportion is to be accounted for by the prevalence of rickets in this city. In private practice, however, it is quite different : cases of extreme deformity are rare, and increasingly so as one ascends the social scale. They do, however, occasionally occur, while minor deformities are by no means uncommon, and may be encountered in all classes and grades of society.

It is quite unnecessary to compare our figures with those of other hospitals in this and other countries, for, speaking generally, although there are many varieties of pelvic deformity other than those produced by rickets, the prevalence of rickets in a city is an index of the amount of pelvic deformity to be expected. An exception might perhaps be made for the Rhine, North Italy, and some other areas in Europe, where osteomalacia is prevalent, and where deformities resulting from that disease are more commonly encountered than any other.

In considering the etiology and features of the various forms of pelvic deformity, it would be quite out of place to go into any detail in these pages. We are really concerned with the means of overcoming the difficulties. I can, therefore, only briefly refer to the general features and characteristics of the abnormalities.

The two principal factors which influence pelvic deformity are errors of development, and disease of the pelvic bones and joints. As, however, alterations in the spinal curves and set of the lower limbs may affect the direction of the forces transmitted through the pelvis while it is still growing, it is sometimes found that pelvic deformity is produced or aggravated by abnormalities in spine and lower limbs.

Various attempts have been made to classify pelvic deformities since Deventer's time. Michaelis and Litzmann[1] based their arrangement upon alterations in shape, and disregarded etiology altogether. Schauta[2] was the first to give a really simple classification based upon etiological factors. Breus and Kolisko[3] have slightly modified Schauta's arrangement, and, on the whole, improved it, especially if they had omitted the fifth group, which, with a little stretch, may be included in the second. With a view to making the classification as simple as possible, I would venture to suggest the following :

I. Deformities resulting from faulty development : (*a*) Justo-major pelvis (pelvis simpliciter seu equabiliter justo-major) ; (*b*) justo-minor pelvis (pelvis equabiliter justo-minor) or generally contracted pelvis ; (*c*) simple flat, non-rachitic pelvis ; (*d*) Naegele's pelvis, imperfect development of one sacral ala (Breus and Kolisko place this in the group where the deformity is the result of disease in the bones and joints ; but the ankylosis is secondary, as a rule, to the imperfect development of the alæ, and so I place it here, as Schauta does) ; (*e*) Roberts' pelvis, imperfect development of both sacral alæ ; (*f*) split pelvis, imperfect development of pubes ; (*g*) assimilation pelvis.

II. Deformities resulting from disease of the pelvic bones and joints : (*a*) Rickets ; (*b*) osteomalacia ; (*c*) new growths ; (*d*) fractures ;

[1] 'Das enge Becken,' p. 267, 1851.

[2] Müller's 'Handbuch der Geburtshülfe,' Bd. ii., 1889, p. 267.

[3] 'Die Pathologischen Beckenformen,' 1900.

(*e*) atrophy, caries, and necrosis; (*f*) disease of sacro-iliac, pubic, and sacro-coccygeal joints.

III. Deformities resulting from disease in spinal column: (*a*) Kyphosis; (*b*) scoliosis; (*c*) spondylolisthesis.

IV. Deformities resulting from disease of the lower extremities: (*a*) Coxitis; (*b*) dislocation of one or both femurs; (*c*) atrophy or loss of one or both limbs.

I. Deformities resulting from Faulty Development.

Justo-Major Pelvis.—This pelvis in its extreme form, which is very rare, is found in giants. Moderate degrees of the condition are occasionally encountered, and not always amongst those of unusual height or physique. A roomy pelvis renders the passage of the head more easy, and favours precipitate labour.

Justo-Minor or Generally Contracted Pelvis.—This is a variety of pelvic deformity which is by no means uncommon, and often occurs quite unexpectedly in private practice. The term implies that the pelvis is equally deformed in all its diameters, and in slight degrees it is so, but in the more marked there is usually a relatively greater diminution of the antero-posterior or of the transverse diameters.

It is commonly stated that the existence of the generally contracted pelvis should be suspected in women of very small stature in whom there is no evidence of rickets. Although this is correct on the whole, it is sometimes misleading, for the deformity is often present, and sometimes in quite a distinct degree, in women of ordinary height and physique.

By pelvimetry the interspinous, intercristal, external conjugata and oblique conjugata diameters are found decreased, but proportionately so. By vaginal examination the promontory can be reached, but it does not project as in flat pelvis. The deformity continues right down through the cavity.

On pushing the head into the pelvis, if the pregnancy has reached term, there is more or less overlapping of the head at the brim. At the commencement of labour, even in primiparæ, the head is still movable, unless the latter is unusually small.

The mechanism of labour is quite characteristic, the feature being a marked increase of flexion (Fig. 16), caused by the increased resistance offered to the head. The head invariably enters in the oblique diameter. As a result of this the posterior fontanelle can be reached with extreme ease. The labour is retarded in proportion to the deformity of the pelvis and the size of the fœtal head.

Uterine inertia not infrequently occurs, and delivery has often to be completed by forceps, or even by some of the major obstetric operations. In the non-rachitic generally contracted variety the de-

formity is not often so great that Cæsarean section, symphysiotomy, or craniotomy becomes necessary. With the generally contracted rachitic form it is quite otherwise—these operations are often called for. Walcher's position, so great a help in flat pelvis, is of no value in facilitating the passage of the head through the brim. Version is absolutely contra-indicated.

There are several subdivisions of the generally contracted pelvis. Of these, the most common is the 'masculine pelvis,' in which the

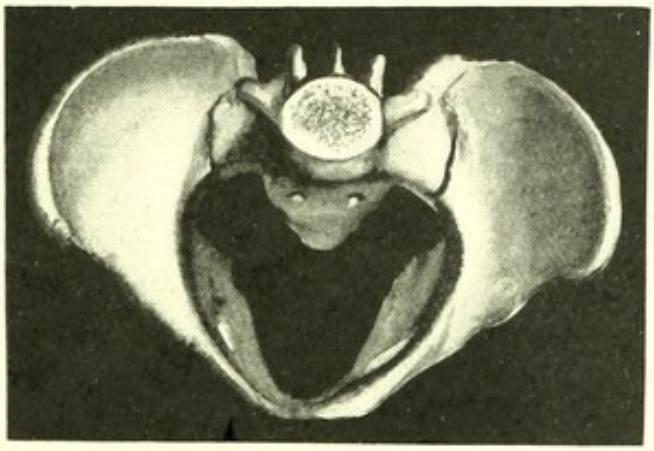


FIG. 83.—Funnel-shaped Pelvis.

bones are strong and thick. In addition to the deformity at the brim, there is a marked diminution in the capacity of the outlet, the subpubic angle being more acute. The pelvis becomes 'funnel'-shaped, and is often referred to under that name (Fig. 83). In such a pelvis the greatest difficulty in the delivery may be at the outlet. Another form is the 'true dwarf pelvis.' In this variety the general pelvic

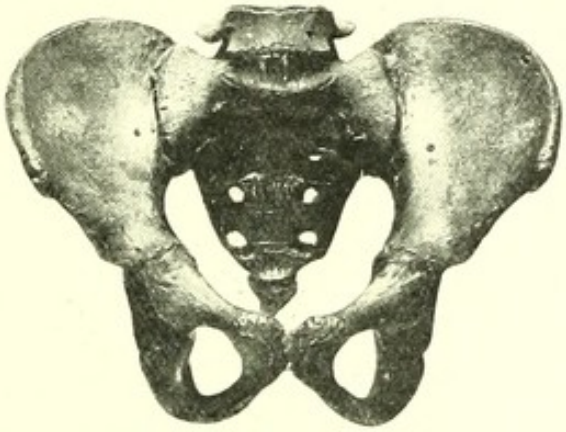


FIG. 84.—Infantile Pelvis.

development is much retarded, and in certain forms the epiphyseal cartilages are not ossified. Lastly, there is the 'infantile pelvis' (Fig. 84), in which the pelvis retains the infant form. The bones are small, the sacrum is narrow, and the antero-posterior diameter is

greater than the transverse. Pregnancy in the extreme degrees of the true dwarf and infantile pelvis rarely occurs.

Flat Non-Rachitic Pelvis.—In this pelvis the antero-posterior diameter is diminished down through the pelvis, the whole sacrum being placed further forward. The promontory does not project so markedly as in the rachitic form, and there is often a false promontory at the junction of the first and second sacral vertebræ. The transverse and oblique diameters remain the same, or may even be slightly increased.

Although referred to by many as being a comparatively common deformity, it is very questionable if it really is. I believe that most of the so-called flat pelves have had their origin in rickets, and this view is gradually being more favoured. The carrying of

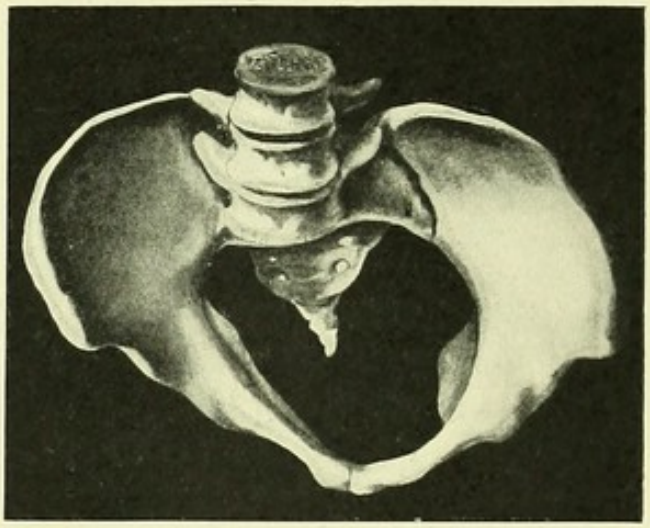


Fig. 85.—Obliquely Contracted Pelvis. (Naegele.)

heavy weights as a cause cannot be traced. This pelvis is found in individuals who apparently are perfectly normal and healthy, and have always been so. Fehling maintains that the deformity is congenital in many cases.

The diagnosis of this variety of pelvic deformity is not difficult. The promontory and whole sacrum is easily reached, and it is distinguished from the rachitic variety by the absence of the ordinary features of rickets, and by the flatness of the sacrum. The mechanism of birth is the same as in the flat rachitic pelvis.

Obliquely Contracted or Naegele Pelvis.—This somewhat rare variety of pelvic deformity (Fig. 85) is produced by an arrested development of one ala of the sacrum. There follows from this an alteration in the spinal and pelvic curves, and almost invariably an ankylosis of the sacro-iliac joint. From the increased weight thrown

upon the affected side, that side as a whole is raised and pushed backwards and inwards. But the most striking feature is the straightening of the ileo-pectineal line on the affected side. The symphysis is pushed an inch or more beyond the middle line. The transverse and longitudinal diameters are very little affected, but the oblique is very decidedly diminished.

The difficulty in labour arises from the sacral 'bay' on the affected side being of little value, as it can rarely accommodate any part of the fœtal head. Indeed, for all practical purposes the pelvis is extremely contracted.

As a rule the ordinary pelvic measurements throw little light upon the deformity, and the appearance of the patient is not characteristic, so that it is often not appreciated until labour is in progress. The

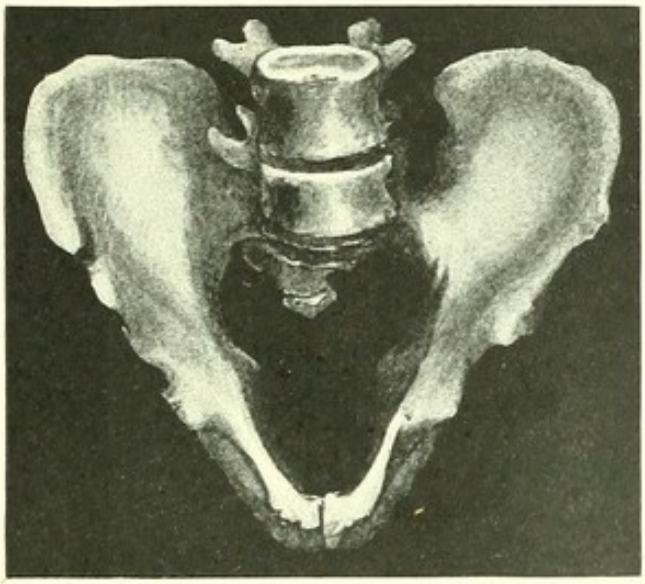


FIG. 86.—Transversely Contracted Pelvis. (Roberts.)

measurements which should be taken are oblique measurements between the symphysis and the posterior superior spines, the middle line and the posterior spines, the anterior superior spine and the opposite posterior superior spine. The measurement of the two sides should be compared, and, if a difference of more than $\frac{1}{3}$ inch be found, then an oblique deformity may be assumed. Cæsarean section or craniotomy are, as a rule, the only alternatives in the way of treatment, for the results from forceps delivery have been very unsatisfactory.

Transversely Contracted or Roberts' Pelvis.—This has sometimes been referred to as a double Naegele pelvis, for both alæ of the sacrum are more or less ill-developed. The deformity may be symmetrical or more accentuated on one side (Fig. 86). It is the rarest of all the pelvic deformities. As the cavity throughout is so very much narrowed transversely, it is impossible to deliver a living

child *per vias naturales;* consequently, Cæsarean section is the only treatment if the child is alive.

Split Pelvis.—This variety is extremely rare in obstetric practice, being commonly associated with ectopia of the bladder and other malformations of the generative and urinary organs. The pubic bones may be separated as much as 4 inches; they are united by fibrous tissue. The transverse diameters are increased. A most interesting case of labour in such a pelvis was recently described by Adam[1] of Hamilton (Figs. 87 and 88). There are not more than a dozen similar cases on record.

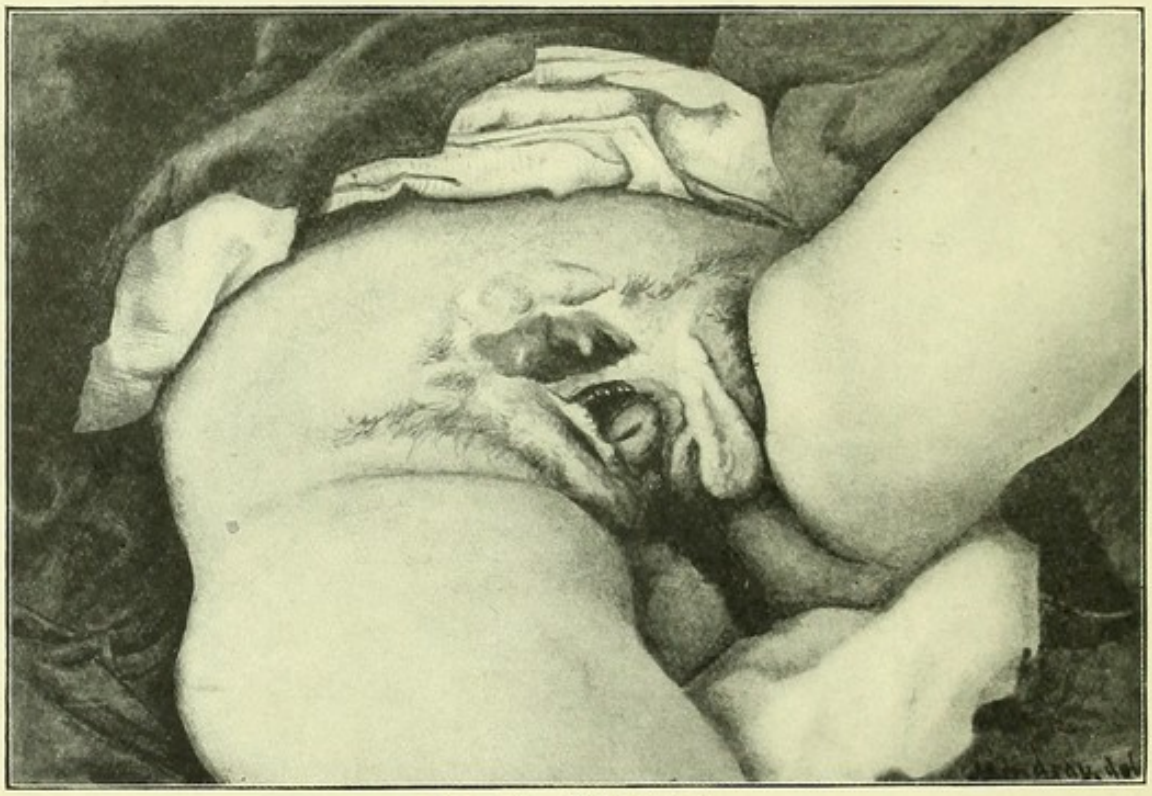


Fig. 87.—Split Pelvis.

(From a drawing by Dr. J. Lindsay of the case recorded by Dr. Adam of Hamilton, and kindly lent the Author.)

Assimilation Pelvis. — There are here figured two forms of assimilation pelvis. In one the sacrum consists of four (Fig. 89) and in the other of six fused vertebræ (Fig. 90). Such departures from the normal are rarely recognized during life, and are of no obstetric interest.

II. Deformities the Result of Disease of the Pelvic Bones and Joints.

In this country, and in temperate climates generally, rickets is the chief factor in the causation of pelvic deformities. But although

[1] *Jour. Obst. and Gyn. Brit. Empire*, vol. ii., October, 1902, p. 3771.

rickets is so generally distributed over the continents of both Europe and America, it is more prevalent in certain countries than in others, and, speaking generally, it is a disease of large towns and cities. Glasgow possesses the unenviable distinction of being one of the cities in which the disease is especially common. As giving some idea of the prevalence of the disease, I have already mentioned that of the women treated in the Glasgow Maternity Hospital over 30 per cent. have their pelves distinctly deformed.

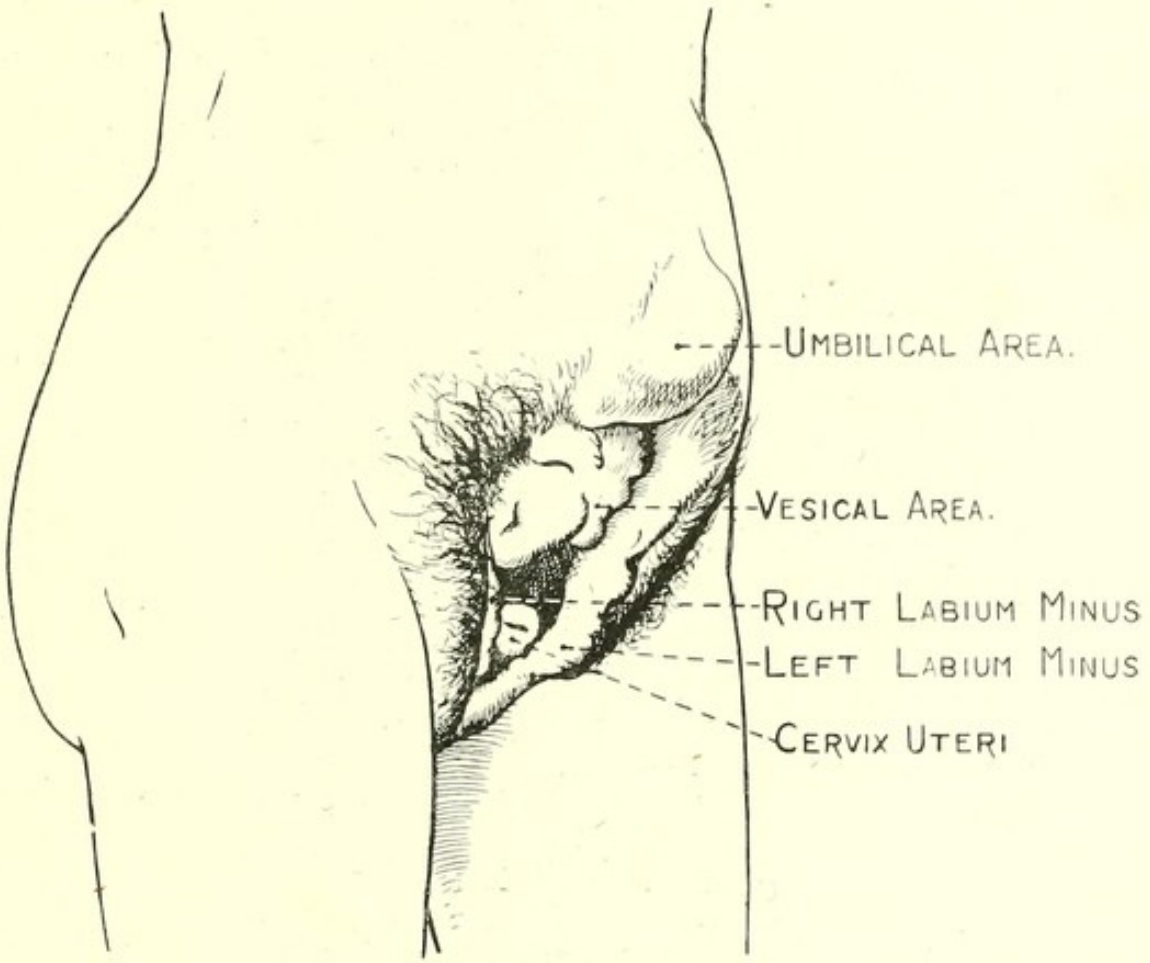


FIG. 88.—Outline Drawing of Same Case.

Deformities the Result of Rickets.—In obstetric practice one meets with three varieties of pelvic deformity the result of rickets: (*a*) Flat rachitic pelvis; (*b*) generally contracted rachitic pelvis, usually also flat; (*c*) pseudo-malacosteon pelvis.

THE FLAT RACHITIC PELVIS.—This is the commonest variety of pelvic deformity produced by rickets. In order to understand it properly, one must think of the time when the child was the subject of the disease. Rickets affects children most commonly during the second year, when the child is either sitting or attempting to walk, or, if very ill, is lying or sitting in bed. In the latter position the weight of the trunk is transmitted through the pelvis on to the ischial

tuberosities, and the pelvic bones, being softened by disease, are deformed as follows: The promontory of the sacrum, owing to the weight of the trunk, is displaced downwards and forwards, and the obliquity at the brim is frequently increased. This would naturally cause a tilting back of the lower part of the sacrum and coccyx, were

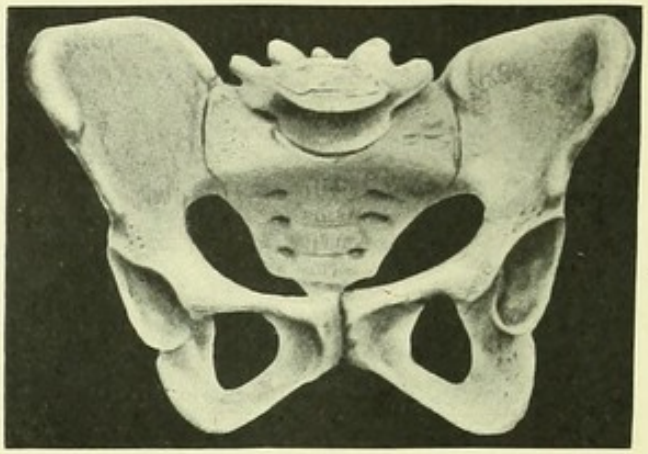


FIG. 89.—Low Assimilation Pelvis. (Breus and Kolisko.)

it not that the sacro-sciatic ligaments and muscles of the pelvic floor prevent it, causing a sharp bending of the sacrum at the level of the fourth and fifth sacral vertebræ. Only very occasionally the curve is obliterated, and the sacrum and coccyx are quite straight and flat. The upper part of the sacrum is usually flattened. With the sinking

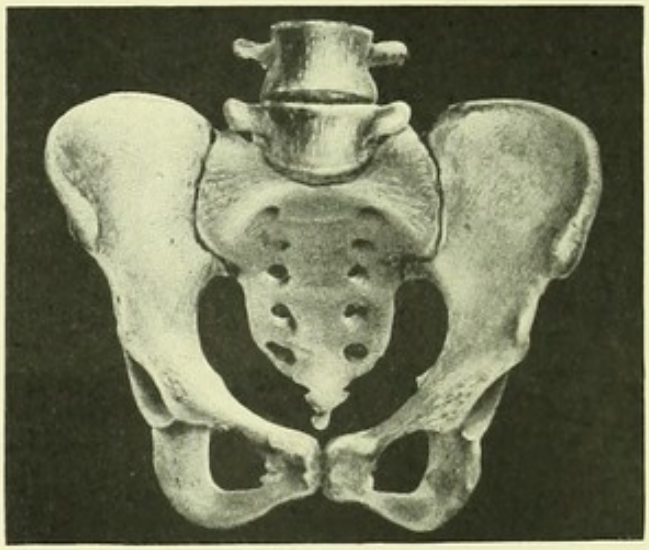


FIG. 90.—High Assimilation Pelvis. (Breus and Kolisko.)

of the promontory the posterior spinous processes are dragged closer by the sacro-iliac ligaments, and this and the dragging and flattening of the anterior pelvic wall causes a relative increase of the inter-spinous as compared with the intercristal diameter. The former, instead of being about $\frac{3}{4}$ inch less, may be the same or even greater than the latter. Further, as a result of the flattening of the anterior

wall, the acetabula come to look more forward, and if the bones are still soft when the child goes about, this may be increased. All this causes a sharp bending of the ileo-pectineal line. But there is still another striking feature. The tuberosities of the ischia, on which the child sits, yield, and are pressed further out, so that there is an

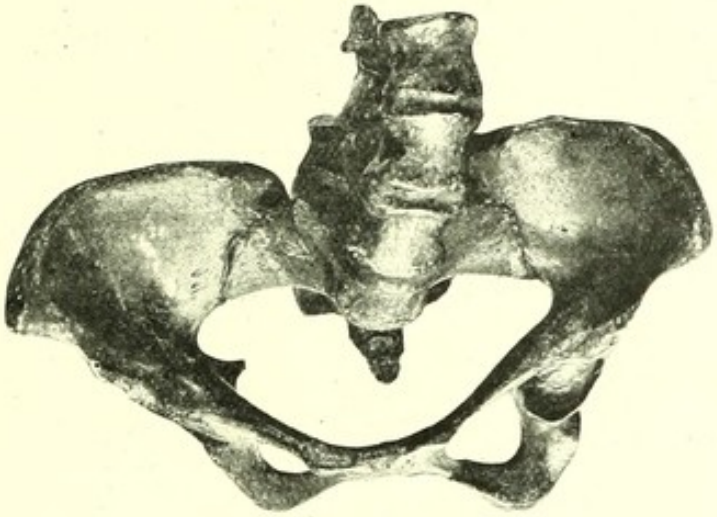


Fig. 91.—Flat Rachitic Pelvis.

increase of the distance between these two points and a widening of the subpubic angle, and, in consequence, increase of the transverse diameter of the outlet.

Looking at the pelvis from the inside, one finds the promontory of the sacrum unusually distinct, sometimes very pointed, at other times

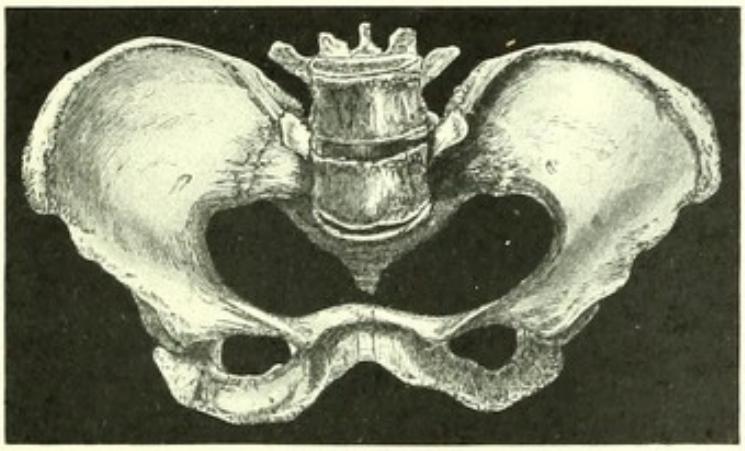


Fig. 92.—Flat Rachitic Pelvis—Brim showing an Outline resembling a Figure-of-Eight.

more blunt, and this gives to the brim a reniform outline (Fig. 91). In certain cases, however, if the anterior wall at the symphysis is dragged in by the action of the muscles on the softened brim—and these latter come into strong action if the child is sitting—the brim assumes a figure-of-eight form (Fig. 92).[1]

[1] According to Kehrer, the muscles acting on the soft bones play the most important part in producing the deformities described.

If there is any marked lateral spinal curvature, a further deformity results; the promontory is pushed over to the side, and one gets the scolio-rachitic pelvis (Fig. 93). This latter form I have found much more common than is usually stated, for frequently it is only slightly marked and difficult of recognition. In some cases it is very distinct, and interferes greatly with the passage of the fœtal head through the brim—indeed, in extreme cases one side may be so shut off as to be of no service.

This flattening of the pelvis produces a narrowing of the antero-posterior diameter, or conjugata vera. I have seen it as small as $1\frac{1}{4}$ inches (3 centimetres). The effect on the transverse diameter at the brim depends upon whether or not there has been any arrest of the general development of the pelvis. If the disease was only slight, the

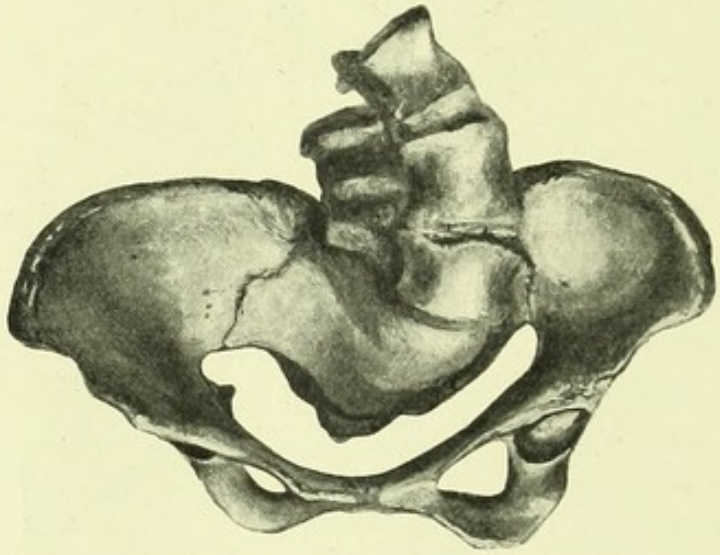


Fig. 93.—Scolio-Rachitic Pelvis.

transverse diameter remains about the same, although it is stated that there is sometimes an actual increase. I have seldom, however, found any distinct increase, and invariably when the flattening is decided the transverse diameter is also diminished.

A peculiarity not infrequently seen is a false promontory. There are two varieties of false promontory—one where the last lumbar vertebra is pushed downwards and forwards, and the other where the first and second sacral vertebræ project unduly. They are often termed 'high' and 'low' false promontories respectively. They are by no means uncommon, and are often overlooked or not recognized. Their importance is that the measurement from them to the symphysis may be less than the true conjugate, and so the real difficulty to the head passing through the brim may be above or below the true brim. I may say in passing, what is, of course, self-evident, that, other

things being equal, a high false promontory is more serious than a low one.

Passing from the brim to the cavity, one finds that the latter is usually shallow and roomy. In flat rachitic pelvis, therefore, it may be safely said that once the head gets through the brim it is seldom arrested in the cavity. At the outlet there may be sometimes a little difficulty, for, although the transverse diameter is increased, the dragging of the coccyx inwards may diminish the conjugate to a slight extent.

In the mechanism of labour in flat pelvis, either rachitic or non-rachitic, there are three characteristic features:

1. The head engages in the transverse diameter.
2. The head is less flexed.
3. The biparietal obliquity is more marked.

It is only natural that the head should pass through the brim in the transverse diameter, which is so much the largest. If examined at this stage, the anterior fontanelle can always be readily reached, and is usually lower, although occasionally it may be at the same level as the posterior. But the most striking alteration in attitude is the increased parietal obliquity. The head is tilted towards one or other shoulder, and we get the anterior or posterior parietal bone presenting.

In the anterior parietal presentation (asynclitismus anterior, Fig. 94) the parietal bone, directed posteriorly, is arrested by the promontory of the sacrum. It is an exaggerated degree of what is termed 'Naegele's obliquity.' The birth takes place by the anterior parietal bone becoming pressed against the anterior wall of the pelvis, and the posterior being driven down round the promontory. It is a very much more favourable position than the posterior; indeed, in a large number of cases one sees spontaneous delivery occur.

In the posterior parietal presentation (asynclitismus posterior, Fig. 95) Litzmann's obliquity is exaggerated, and it is the anterior parietal bone that is arrested, while the posterior engages at the brim. The mechanism, according to Litzmann, was for a gradual correction to take place, but Veit showed that the head might pass through the pelvis by the anterior parietal bone becoming much moulded and forced past the symphysis. Spontaneous delivery is difficult in such a presentation, unless the pelvis is only slightly deformed. A posterior parietal presentation should always arrest attention, for it indicates not only that there will be difficulty owing to the presentation, but also that there will probably be special difficulty because of the amount of pelvic deformity.

I have repeatedly tried to correct a posterior into an anterior parietal presentation after rupture of the membranes, but so far with little success; and this is the general experience. If the pelvic deformity is not too great, version is recommended by many, and certainly it has always appeared to me sound treatment. The only difficulty in pursuing such a course is that the position is often only recognized some time after the membranes have ruptured.

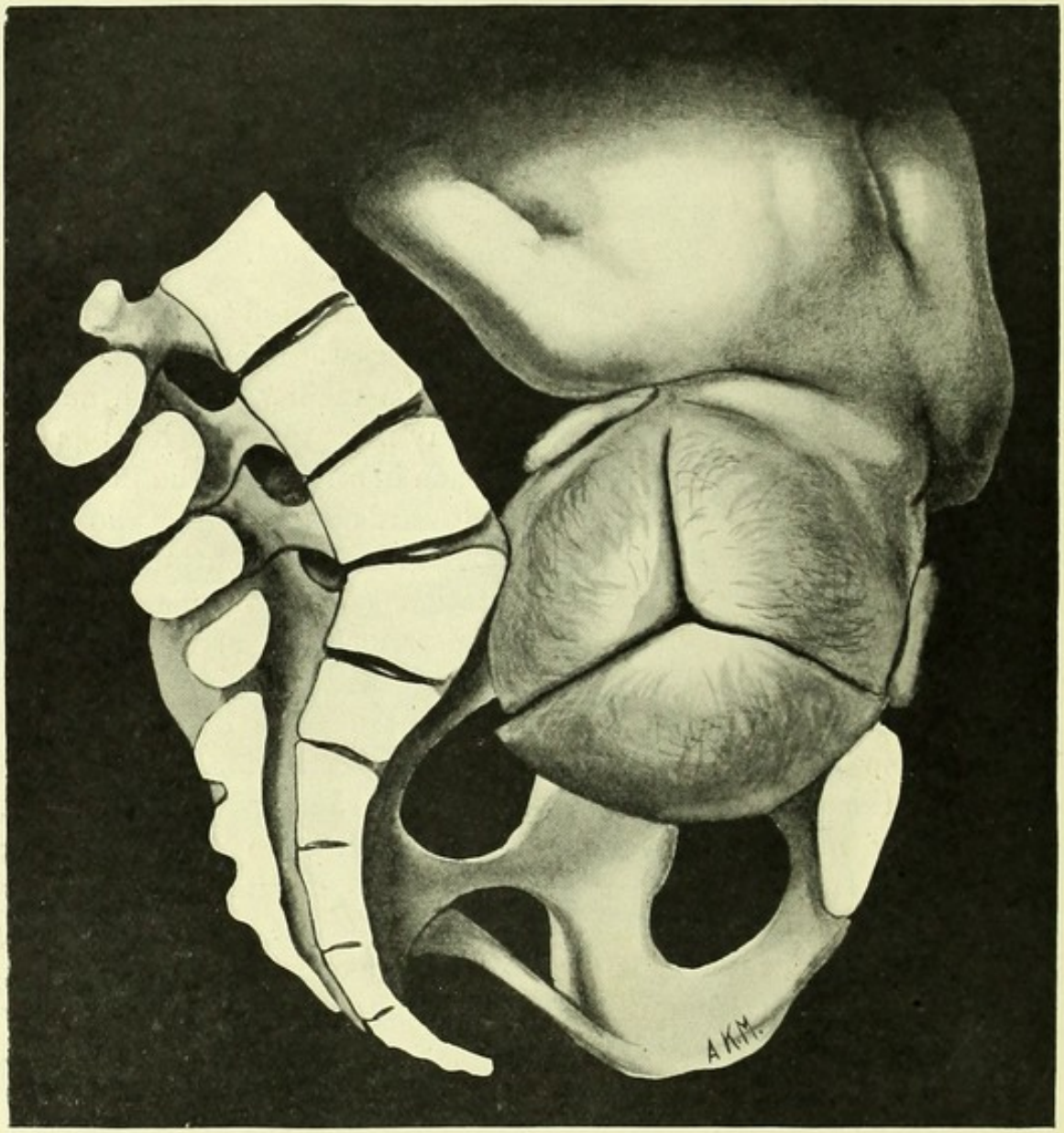


Fig. 94.—Anterior Parietal Presentation.

When version is impossible, and the natural forces fail to overcome the difficulty, the forceps is of little value unless the head is well fixed and the pelvis only very slightly deformed. Craniotomy is then the only course open if the child is dead, and symphysiotomy or Cæsarean section if it is alive.

Generally Contracted Rachitic Pelvis.—The majority of the cases of marked pelvic deformity come under this heading. The bones are small and hard. In an absolutely typical example flattening is absent, but in actual practice one invariably finds flattening, as well as general contraction. The explanation of the deformity is that the disease has arrested the pelvic development. The patients may be

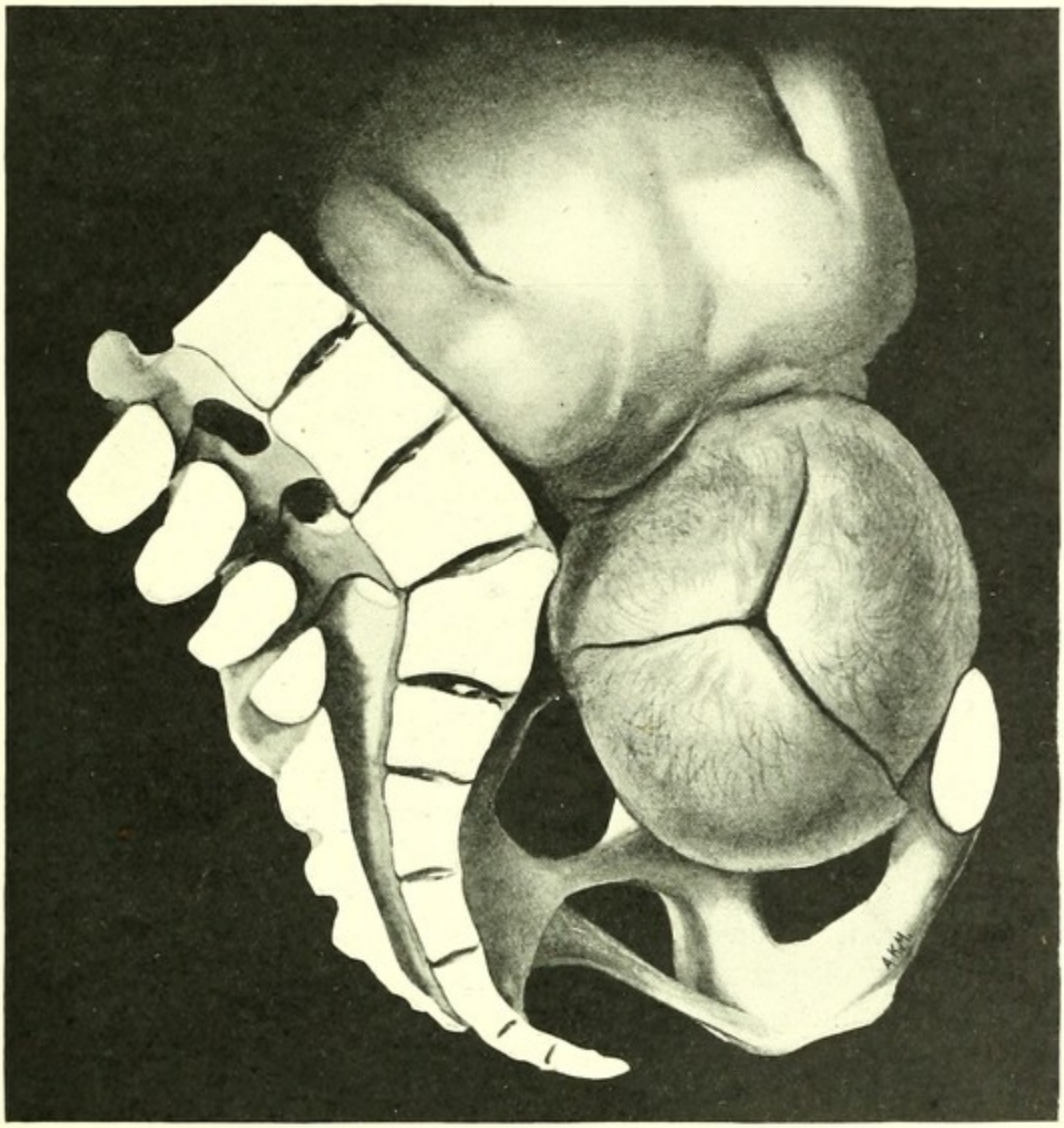


Fig. 95.—Posterior Parietal Presentation.

very small and much deformed in limbs, chest, etc. It has been already explained how a general contraction of the pelvis is a very much more serious condition than a simple flattening. Roughly, one calculates that a generally contracted pelvis of, say, $3\frac{1}{4}$ inches (8·1 centimetres) is equal to a flat pelvis of 3 inches (7·5 centimetres), and in generally contracted pelvis, when the conjugate falls below that figure, the proportional difference is even greater.

Pseudo-Malacosteon Rachitic Pelvis.— This variety of pelvic deformity is very rare. As far as I can remember, I have only seen one typical example. Its features will be understood from the illustration (Fig. 96). Presumably it occurs, when the disease has run a long course, and when it has attacked the walking child. As a natural consequence, the weight of the child being supported by the femora, instead of the ischial tuberosities, the sides of the pelvis are pushed in and the anterior wall projects in the form of a beak. A similar deformity is seen in the malacosteon pelvis, only to a more marked extent, and hence the term 'pseudo-malacosteon pelvis' given to this variety of rachitic deformity.

Osteomalacic Pelvis.— This is a deformity of the pelvis the result of the disease mollities ossium or malacosteon. The disease is

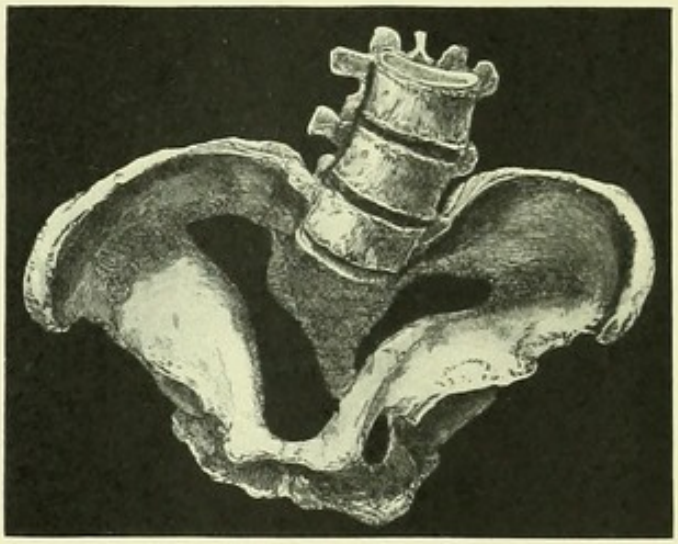


Fig. 96.—Pseudo-Malacosteon Pelvis.

one of adult life, and attacks both sexes, although women are affected ten or twelve times as often as men. In women it is confined almost entirely to multiparæ in the period of life when the reproductive organs are functionating. It is specially active during pregnancy and the puerperium. A most interesting feature of the disease is the fact that it is prevalent only in certain localities. In England, America, and France, for example, it is extremely seldom seen, while in such areas as the Rhine Valley, the North of Italy, and certain districts of Switzerland and Hungary, it may be said to be endemic. Almost certainly it is a disease of unsatisfactory housing and improper and defective feeding, but one would think that there must be something more than that, for similar unhealthy conditions exist in all countries.

The most important contribution in recent years to the etiology and treatment of the disease was made by Fehling in 1888, when he

pointed out the great benefit that follows oöphorectomy. To speak of the disease, however, as a 'trophoneurosis,' and caused by a pathological condition in the ovarian secretion, is somewhat premature, as our knowledge of the ovarian secretion is still very incomplete. At present only this fact is known—that oöphorectomy does, in many cases, very decidedly arrest the progress of the disease.

The onset of the disease is, as a rule, gradual. During the course of a pregnancy, usually after one or two normal pregnancies, pains are complained of in the back and limbs, and walking becomes irksome. These symptoms may disappear after labour and lactation, to return again with increased severity in a subsequent pregnancy. With each pregnancy locomotion becomes more awkward, the

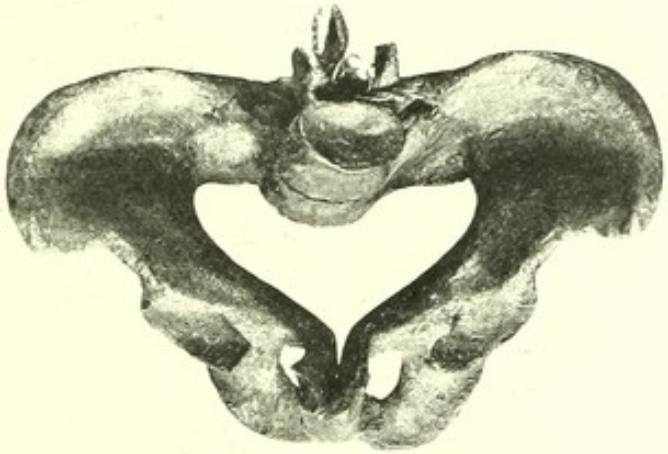


Fig. 97.—Osteomalacic Pelvis (Anterior View).

patient's stature becomes less, from sinking of the trunk, and the labours become more and more difficult, from the narrowing of the bony canal.

The bones, as a result of the softening, bend, according to the direction of the forces transmitted through them. The illustrations (Fig. 97 and 98) give a fairly good idea of the malformations that resul from the disease, and it may be remarked that in no pathological condition of the pelvis does one meet with such extreme deformity as in osteomalacia. The promontory being pushed downwards and forwards, and the lateral pelvic walls inwards, cause the anterior wall to be pushed out in the form of a beak, and the brim to assume a trifoliate shape. Hence the pelvis is often spoken of as the 'beaked,' 'rostrate,' or 'triradiate' pelvis. The subpubic arch is very mucl narrowed, from the approximation of the ischial tuberosities. The acetabula look more forward, and the legs are brought closer together, so that the subjects of the disease have a peculiar swinging gait. From the muscles and ligaments dragging on their attachments, a marked curving of the iliac crests, and posterior parts of the in-

nominate bones, results, so that the posterior spinous processes may almost touch (Fig. 98).

The diagnosis of this variety of pelvic deformity is not difficult. The history of the disease and the deformities produced are absolutely characteristic.

Prior to Fehling's discovery that oöphorectomy had such a beneficial effect upon the disease, the salts of lime and phosphorus in various forms were most strongly recommended. The results obtained from such drugs, however, were not very satisfactory.

As a result of Fehling's discoveries, Cæsarean section, with removal of uterus and ovaries, is the treatment to be adopted in all pronounced examples of the disease. In the slighter forms of the disease other simpler methods of treatment may prove sufficient, but owing to the

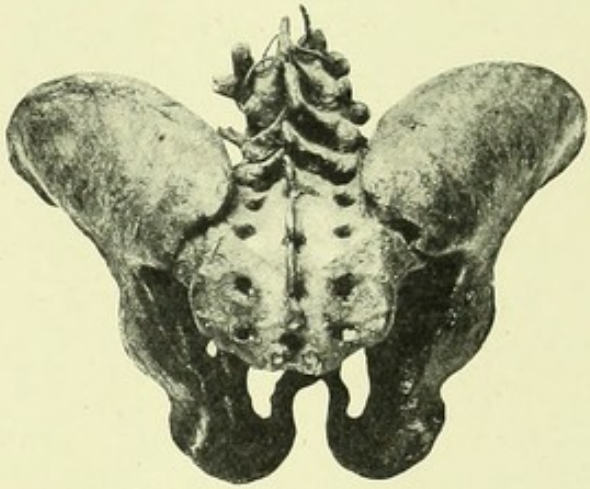


FIG. 98.—Osteomalacic Pelvis (Posterior View).

nature of the deformity it can be readily understood that it does not require any great malformation to render delivery *per vias naturales* impossible.

New Growths.—Small osteomata (pelvis spinosa), more especially about the symphysis, sacro-iliac synchondrosis, and the ileo-pectineal eminences, are not very uncommon. Such small growths, if the pelvis is contracted, may cause injuries to the fœtal head, such as gutter-shaped indentations and fractures (Chapter XXXVIII.), or lacerations of the uterus from the pressure of the head.

Larger tumours (Fig. 99)—osteomata, enchondromata, fibromata—are only very occasionally encountered. In the last six years, in the Maternity Hospital, we have only had one case, recorded by Jardine.[1] With the exception of the osteomata, they are frequently malignant, most commonly sarcomatous. They are usually situated on the posterior wall in the neighbourhood of the

[1] *Journ. Obst. and Gyn. Brit. Empire*, vol. ii., 1902, p. 147.

sacro-iliac synchondrosis. Naturally, such tumours prevent the passage of the child through the pelvis, and so Cæsarean section is invariably necessary.

Fractures of Pelvis.—As can be readily understood, fractures, either from the amount of callus, or from the irregular union of the fractured portions, may occasionally produce a deformity of the pelvis, and cases of this nature have been described by Gusserow,

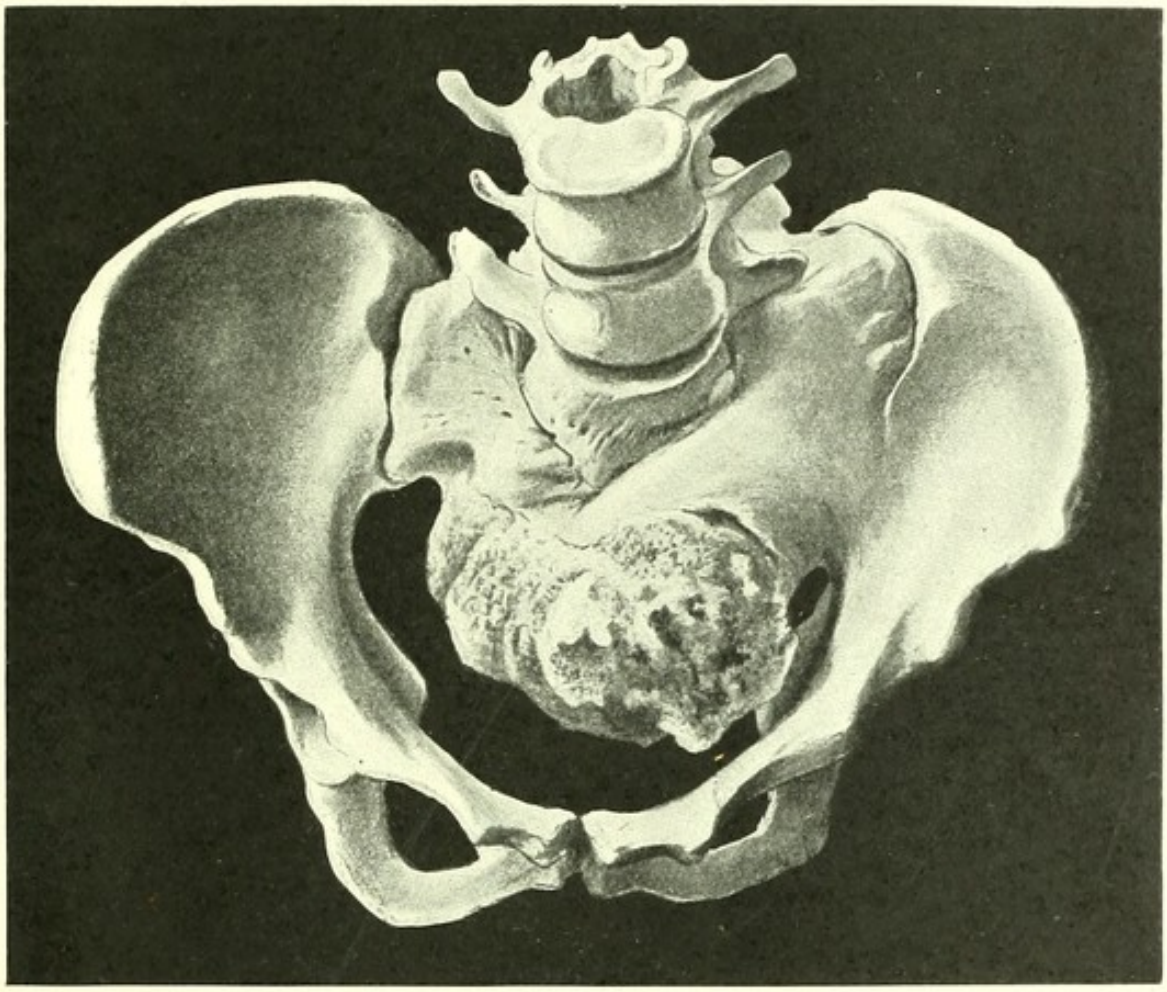


Fig. 99.—Sacral Tumours. (Bamm.)

Stephenson, Winckel, and others. Such malformations, however, are extremely rare, for fractures of the pelvis so generally result in the death of the individual.

Caries and Necrosis of the Pelvis.—In the rare cases in which the acetabulum becomes perforated in hip-joint disease, there may result an irregular bony formation, which may encroach upon the lateral pelvic wall. The effect of hip-joint disease on the pelvis we shall consider later. Caries of the sacro-iliac joint may result in an ankylosis of the joint, and the development of one sacral ala may be arrested in consequence. In such cases an obliquely contracted pelvis, resembling Naegele's, results.

Diseases of the Sacro-Iliac, Pubic, and Sacro-Coccygeal Joints.—I have referred already to the effect of disease and ankylosis of the sacro-iliac joint. Ankylosis of the pubic joint is by no means common, and some operators who have performed many symphysiotomies question its occurrence. Reference will be made to this when symphysiotomy is under discussion.

As regards the coccygeal joint, premature ankylosis, or ankylosis following fracture, may cause obstruction to the escape of the child's head. Removal of the coccyx is the correct and most scientific treatment, although with forceps one can usually pull the child past the obstruction or refracture the bone.

III. Deformities resulting from Disease in the Spinal Column.

Kyphosis.—The deformity of the pelvis found in kyphosis depends, in great part, upon the degree and situation of the curvature. It is, however, also influenced by the age of the individual, and the disease, tuberculosis or rickets, which causes the deformity. In cases where there is only a slight angular curvature little or no alteration in the pelvis is found. As regards situation, if the curvature is in the dorsal, especially the upper dorsal, region, a compensatory lordosis below develops, and again little deformity of the pelvis results. If, however, the curvature is situated in the lower part of the spinal column and the lumbar, and especially the lumbo-sacral, region is involved, then very decided deformity of the pelvis almost always exists. Age has the effect that the earlier the spinal deformity occurs, the more likely will pelvic malformation be produced.

The alteration in the pelvis (Fig. 100) consists in a tilting of the upper part of the sacrum backwards, and of the lower part and the coccyx forwards. As a result of this, the antero-posterior diameter at the brim is increased, and the same diameter at the outlet diminished. The inclination of the brim becomes lessened; indeed, it may become almost parallel to the horizon. The sacrum is often found narrow and straightened. The transverse diameter of the pelvis gradually diminishes from above downwards. At the superior straight it is little altered, but the distances between the ischial spines and ischial tuberosities are decidedly diminished. The striking feature of the kyphotic pelvis is a diminution of all the diameters of the pelvic outlet; therefore, one finds difficulty in labour when the fœtal head has reached the lower part of the cavity.

During pregnancy there is naturally a very pendulous abdomen, because the abdominal cavity is diminished so much in a vertical direction; this leads to abnormal presentations. It is very curious that the head should so generally engage in the oblique or transverse

diameter, for one would expect that it would engage in the conjugate, as that is the diameter which is increased. Another peculiarity is the frequency with which the occiput rotates backwards. Many writers have referred to this, and Klein's[1] investigations confirm those of such writers as Spiegelberg and Olshausen.

Until recently I had seen very little trouble in cases of kyphotic pelvis; but within the last three years I have had four cases of

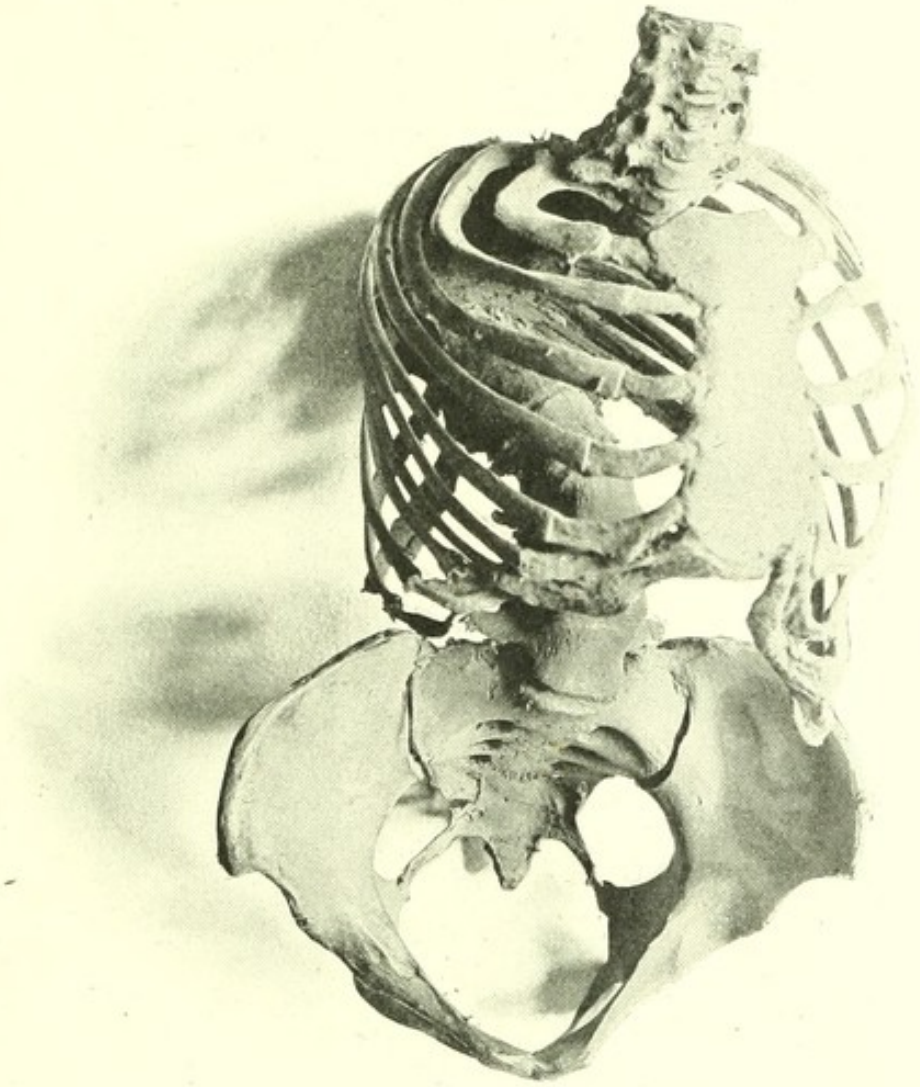


FIG. 100.—Kyphotic Pelvis.

extreme dystocia under my care. All who have collected a number of cases have had a similar experience. Chapneys[2] gives the maternal mortality as 28 per cent. and the fœtal as 40 per cent.; Klein's figures for the mother are much better, but exactly the same for the child. Allowing for the fact that there is always a tendency to report the graver cases, it must be admitted that the malformation

[1] *Archiv f. Gyn.*, 1896, Bd. l.

[2] Trans. Obstet. Soc. vol. xxv., 1888.

is serious when the deformity involves the lower part of the spinal column. One thing that may lead to the unsatisfactory results mentioned is the fact that, as the difficulty occurs late in parturition, the necessity for serious operative interference will only be appreciated after labour has been going on for some time—the importance of which is that with low kyphosis the size of the pelvic outlet should be very carefully estimated during pregnancy or early in labour.

The index for treatment in kyphotic pelvis is the size of the transverse diameter of the outlet, the distance between the tuberosities. If it is 3 inches (7·5 centimetres) delivery should not be difficult, but below that figure it becomes increasingly difficult, and at $2\frac{1}{2}$ inches Cæsarean section or symphysiotomy if the child is living, and craniotomy if it is dead, is the treatment indicated. Klein advocates symphysiotomy, and claims that a 2-inch separation at the symphysis gives an increase of fully $1\frac{1}{4}$ inches between the tuberosities.

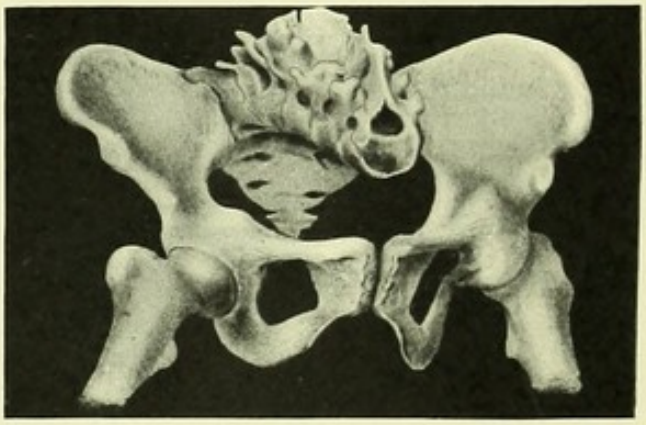


Fig. 101.—Pelvis Obtecta. (Fehling.)

Fehling has given the special name 'pelvis obtecta' (Fig. 101) to a form of kyphosis in which the lumbar vertebræ overhang the brim and prevent the child engaging.

Besides the ordinary kyphotic pelvis already described, one sometimes encounters mixed forms—for instance, a rickety kyphotic pelvis. If the rachitis has been at all severe, the deformity follows more that type; if, however, it has been slight and the curvature is situated high, then the one deformity may counteract the other. One cannot, however, generalize on such variations, nor upon the treatment.

Scoliosis.—Lateral curvature of the spinal column, to any very marked extent, is usually a rachitic manifestation, and if the scoliosis is of non-rachitic origin it is quite negligible from the obstetric standpoint.

The scolio-rachitic pelvis has been already mentioned (Fig. 93), and its importance as influencing the passage of the head through the brim has been referred to. A curvature of the spinal column high up will

not have the same effect as one situated low down, for a compensatory scoliosis occurs in the former. The malformation is similar to that found in rickets, only the promontory is pushed over to the affected side, so that the pelvic brim is of extremely irregular outline.

Spondylolisthesis.—By this term is meant a slipping down of the last lumbar vertebra in front of the promontory (Fig. 102). In slight cases it only projects a little way over the promontory, but in extreme

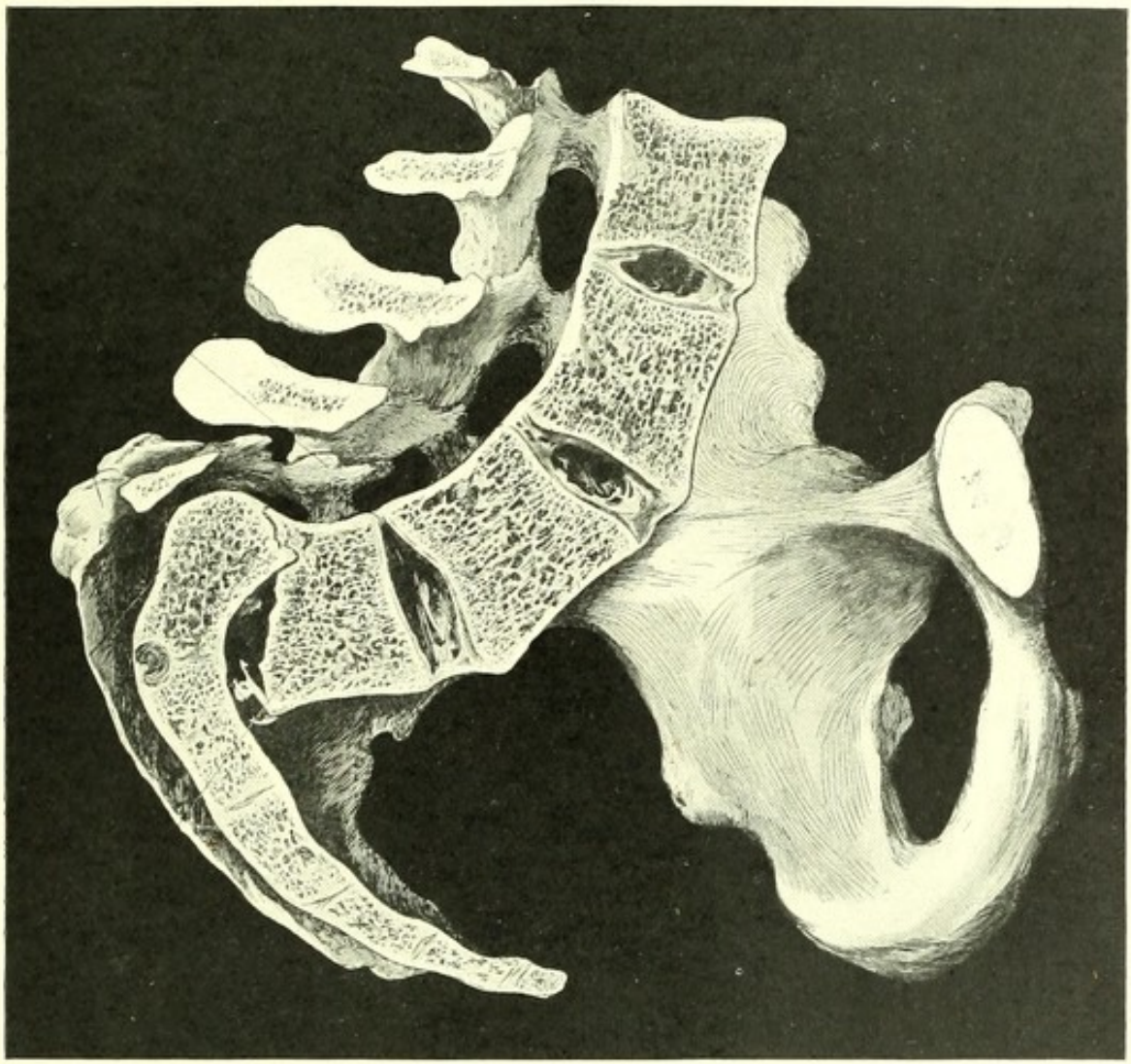


Fig. 102.—Spondylolisthetic Pelvis. (Bumm.)

cases it projects right down in front of the first sacral vertebra. The remaining lumbar vertebræ also sink down, and the fourth and third may actually project over the superior straight—not, however, to anything like the same extent as occurs in the 'pelvis obtecta.'

It can be readily understood that the deformity causes great alteration in the pelvic capacity. The promontory is displaced backwards, but the 'obstetrical conjugate,' the distance between the symphysis and the most projecting part of the vertebral column, is

very much lessened. The sacrum being pushed backwards and the lower lumbar vertebræ downwards, the superior straight becomes more and more nearly parallel with the horizon. The pelvic outlet becomes diminished antero-posteriorly.

The appearance of subjects with this deformity is quite characteristic; the trunk seems to have sunk down into the pelvis, while behind there is often to be seen the projecting spine of the last lumbar vertebra. The diagnosis, therefore, should seldom be difficult, although there are other conditions, such as mollities ossium and a low kyphosis, which produce a sinking down of the trunk. By internal examination the projecting vertebra will be readily felt.

The most generally accepted view of the etiology of this malformation is that it results from maldevelopment of the interarticular processes of the last lumbar vertebra. A history of accidents, falls, etc., and the carrying of heavy weights, can rarely be obtained. The frequency of the condition is variously stated. Lane considers it by no means uncommon; Olshausen and Veit[1] mention seventy anatomical recorded cases, but Breus and Kolisko maintain that in the various collections there exist only some twenty genuine specimens. The reason for this discrepancy is probably that Lane includes the slighter cases of projection of the last lumbar vertebra, while the others only accept extreme cases. As has been already stated, one sometimes finds the last lumbar vertebra pushed forwards and downwards in the rachitic pelvis, and if one were to include such cases the frequency would certainly be much higher than even Olshausen and Veit state.

However, these are matters of anatomical interest. What is of real practical importance is that the deformity is a very serious one indeed. Only in the very slight degrees of the deformity will it be possible to deliver the child *per vias naturales*, either by forceps or symphysiotomy. Cæsarean section if the child is alive and craniotomy if it is dead, are, therefore, the operations to be considered.

IV. Deformities from Diseases of the Lower Extremities.

The deformities resulting from disease of the lower limbs are usually unilateral. Coxalgia, dislocation, and shortening of the leg from any cause, of which, perhaps, infantile paralysis is the most striking, are the chief affections encountered. The deformity resulting from each of these conditions is much the same, although in coxalgia it is usually most marked.

In hip-joint disease, if the child is very young and the affected side

[1] 'Lehrbuch,' 1902.

is partly arrested in its development, an ankylosis of sacrum and ilium may result. As the child goes about, however, and most of the weight is thrown on the sound leg, an oblique distortion of that side of the pelvis follows.

The deformity is seldom so great as to cause extreme distortion, such as would necessitate any of the major operations, although on one occasion I saw a case of double coxitis where the deformity was so decided as to necessitate the induction of premature labour.

In the case of congenital dislocation of the femur, or a dislocation occurring in early life, the head of the bone is displaced on to the ilium, where a new joint forms. The affected leg being shortened, the greater part of the body-weight is borne by the sound leg, and consequently that side of the pelvis is pushed in. In congenital dislocation of both femurs both sides are pushed in, and so the brim is narrowed transversely. Similar, but less marked, deformities may follow shortening or absence of a limb from any cause, if it occurs in early life.

CHAPTER XII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Diagnosis, Prognosis, and Treatment of Pelvic Deformity, more especially of the Rachitic Varieties of Malformation.

In considering the rarer forms of pelvic deformity, I briefly referred to the diagnosis, prognosis, and treatment of the particular one under consideration. With rachitic pelvis, however, I did not do so, for, being the commonest variety of deformity, and the one on which all discussions of diagnosis and treatment are based, I felt it required to be treated in a special chapter. The following remarks, therefore, have reference to the rachitic pelvis. It will be found, however, that the methods of examination and the principles which guide one in the choice of treatment apply, with certain alterations and reservations, to the other deformities. I cannot commend too warmly, the subject which is now to be considered, for I know of no pathological condition which calls for greater judgment than the treatment of contracted pelvis.

Diagnosis.—A suspicion of pelvic deformity is aroused by smallness of a woman's stature, by a waddling gait, and by malformation of her limbs or spine; also, in the case of a primipara, by a pendulous abdomen and by the fœtal head not being fixed at the brim at the commencement of labour, and in a multipara by a history of previous tedious and instrumental labours. But while, undoubtedly, these features are commonly associated with pelvic deformity, one must not attach too much importance to their presence or absence. Cases occur in which all these peculiarities are distinct and yet the capacity of the pelvis is little diminished and parturition is but little disturbed; while, on the other hand, many women showing no external deformities have an extremely difficult parturition.

It is highly desirable, therefore, that all primagravidæ be examined during pregnancy. This is done with greatest advantage about the thirty-fifth week, when any operative treatment deemed necessary can be arranged. Should the patient's appearance or history suggest,

or should the vaginal examination indicate, any pelvic deformity, an exact measurement of the capacity of the pelvis must be made.

As regards the external measurements of the pelvis there is no difficulty. They are always taken with calipers, and it does not matter in the slightest which form is employed. The routine measurements taken are the interspinous, intercristal, and external conjugate diameters, which measure respectively $10\frac{3}{4}$, 10, and $7\frac{1}{2}$ inches (26·8, 25, and 18·7 centimetres). The exact terminal points of the inter-

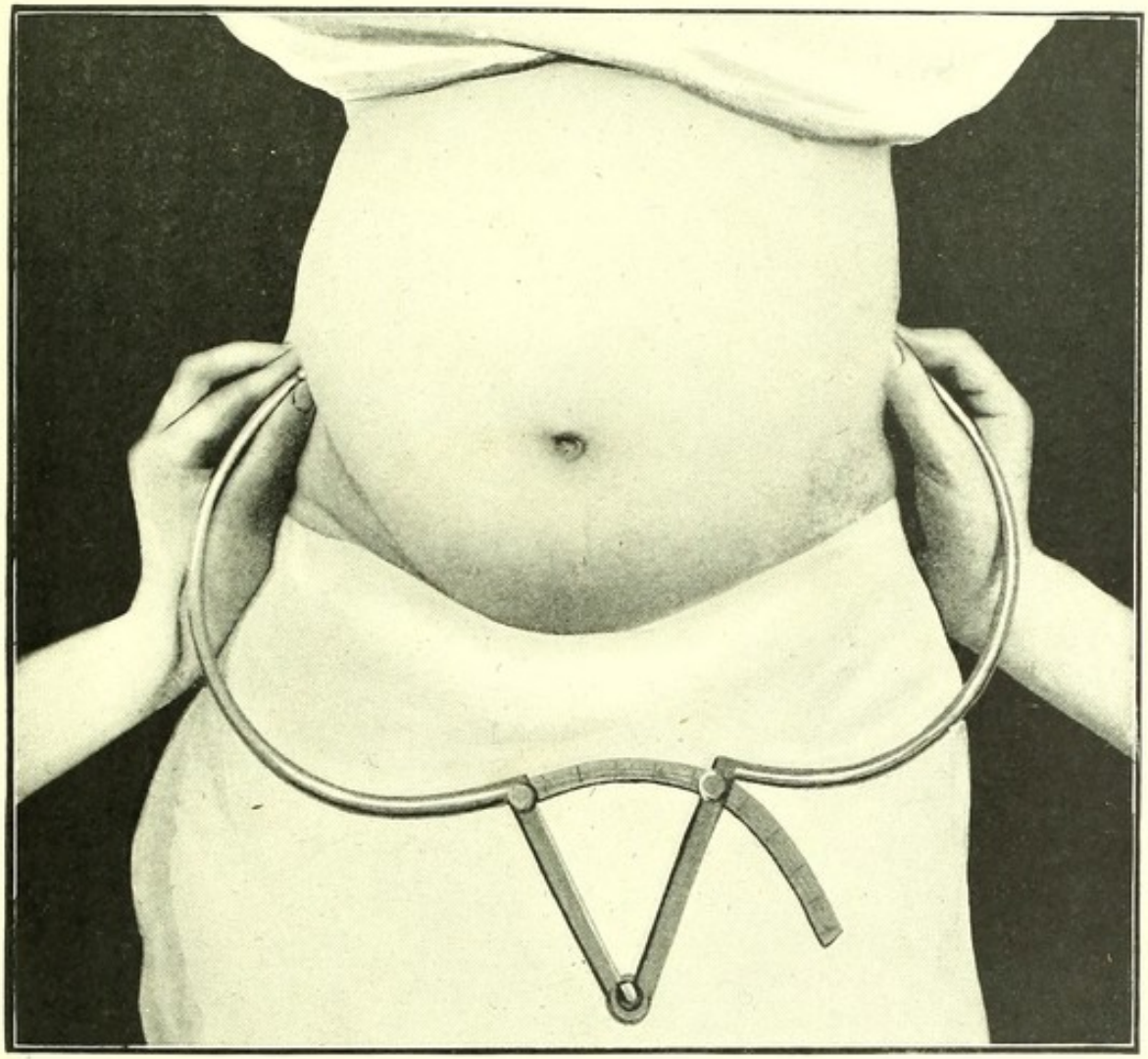


Fig. 103.—Measuring the Intercristal Diameter of the Pelvis.

spinous diameter are easily defined—viz., the anterior superior spinous processes. With the intercristal diameter it is rather different. The terminal points of that diameter are the widest points on the crests. But the crest is a bony ridge of some thickness, and it makes a considerable difference if one measures from the outside or the inside of the ridge. Personally, I always measure from the middle, getting my thumb and middle finger on the inside and outside edge respectively of the bony ridge, as seen in the illustration (Fig. 103).

The external conjugate, known as Baudelocque's diameter (Fig. 104)

—the distance between the points immediately below the projecting spine of the last lumbar vertebra and the symphysis pubis—is less easily determined because of the difficulty in marking off the posterior point. In certain individuals, however, it may be got over by taking the inferior angle of a small rhomboid found often at the lower part of the vertebral column, and known as Michaelis' rhomboid (Fig. 105). This latter point very nearly corresponds to the point desired. There

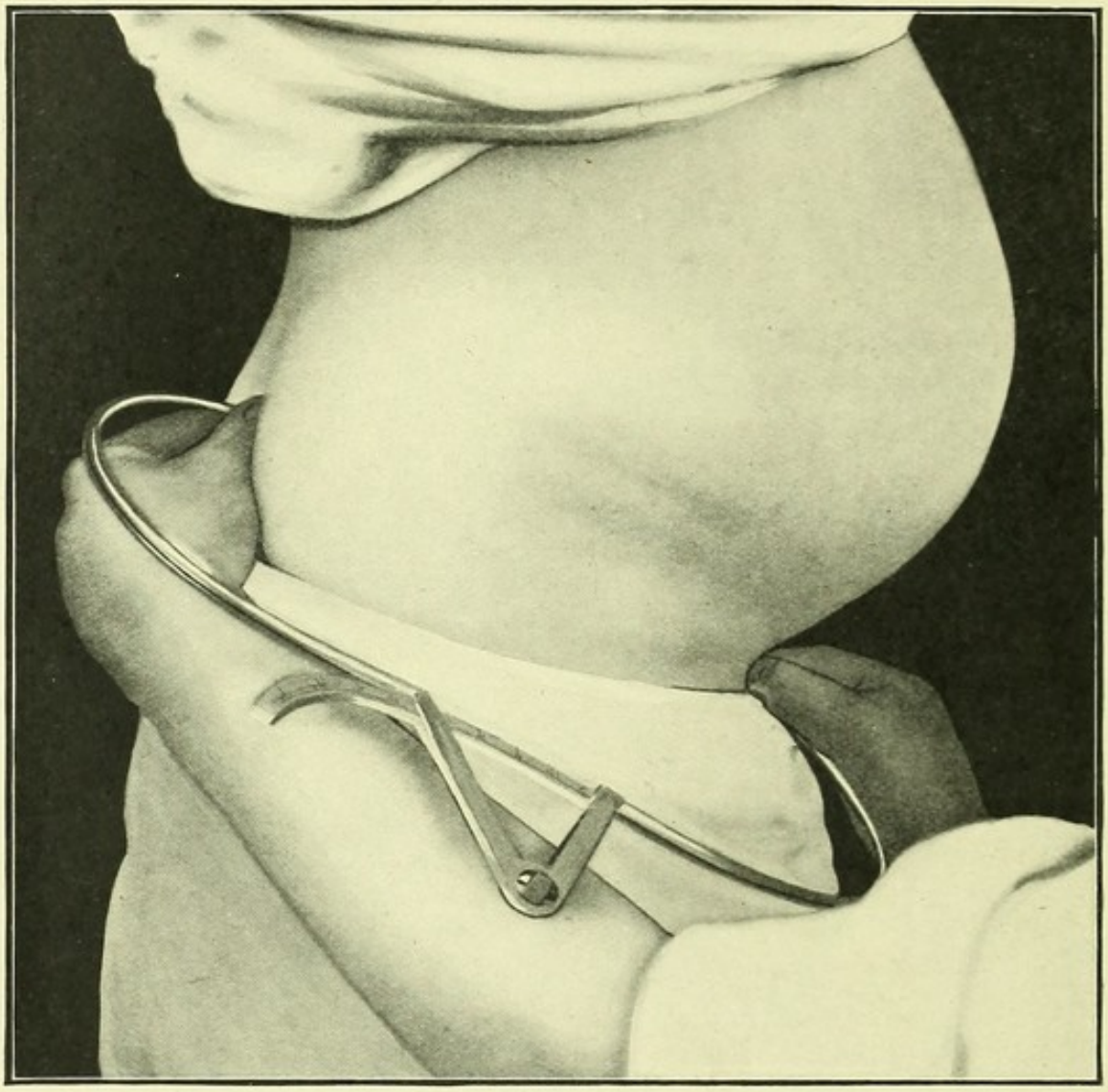


Fig. 104.—Measuring the External Conjugate, or Conjugate of Baudelocque.

is, however, no very constant relationship between the external conjugate and the internal or true conjugate of the brim, although, on an average, the difference is about $3\frac{1}{2}$ inches (8·7 centimetres). Pelvic deformity should, however, always be suspected if it measures 7 inches (17·5 centimetres) or under. Lastly, the transverse diameter of the outlet (Fig. 106), the distance between the ischial tuberosities, should be taken in all cases of kyphotic or funnel-shaped pelvis. On an average it measures $4\frac{1}{4}$ inches (11 centimetres).

From these external measurements one can only approximately estimate the formation of the true pelvis. If one finds all the diameters about equally diminished, a generally contracted pelvis is surmised, while if the external conjugate only is altered, a flat pelvis is suspected. The measurements which should be taken in the rarer forms of pelvic deformity are referred to in the previous chapter.

In order to arrive at the exact internal measurements of the pelvis, endless devices and many forms of pelvimeter have been suggested. Without exception, these instruments have proved of little practical value, although many of them have seemed from a

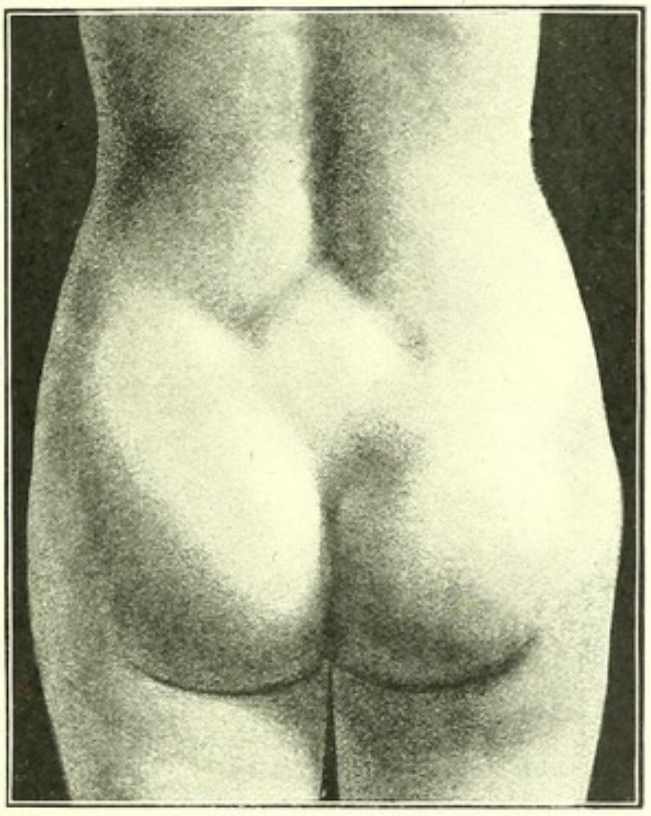


Fig. 105.—Michaelis Rhomboid.
The lowermost angle of which marks the posterior limit of the external conjugate diameter.

theoretical standpoint most ingenious. One of the best is that of Skutsch (Figs. 107 and 108), and fairly accurate measurements of both the conjugate and transverse diameters can be obtained by means of it.

The conjugate diameter at the brim, or conjugata vera, is arrived at by measuring first the distance between the promontory and the anterior surface of the symphysis pubis, and then deducting from that the thickness of the symphysis (Fig. 107). The manner of measuring the transverse is explained in Fig 108 *a* and *b*. But even with Skutsch's pelvimeter one cannot reckon on absolute accuracy, and it is evident that the results obtained are not satisfactory, for within the last two years new forms of pelvimeter have been described

by Zweifel[1] (Fig. 109) and Solowig.[2] These latter are to all intents and purposes old forms revived, and with absolute certainty will go the way of all others. From personal experience I believe Skutsch's pelvimeter is the best, although I have long ago given up attempting to measure the internal pelvic capacity with instruments.

Quite a new principle characterizes the ingenious invention of Neuman and Ehrenfest.[3] The principle involved in the pelvigraph is that of parallel rulers. One arm localizes the various points within

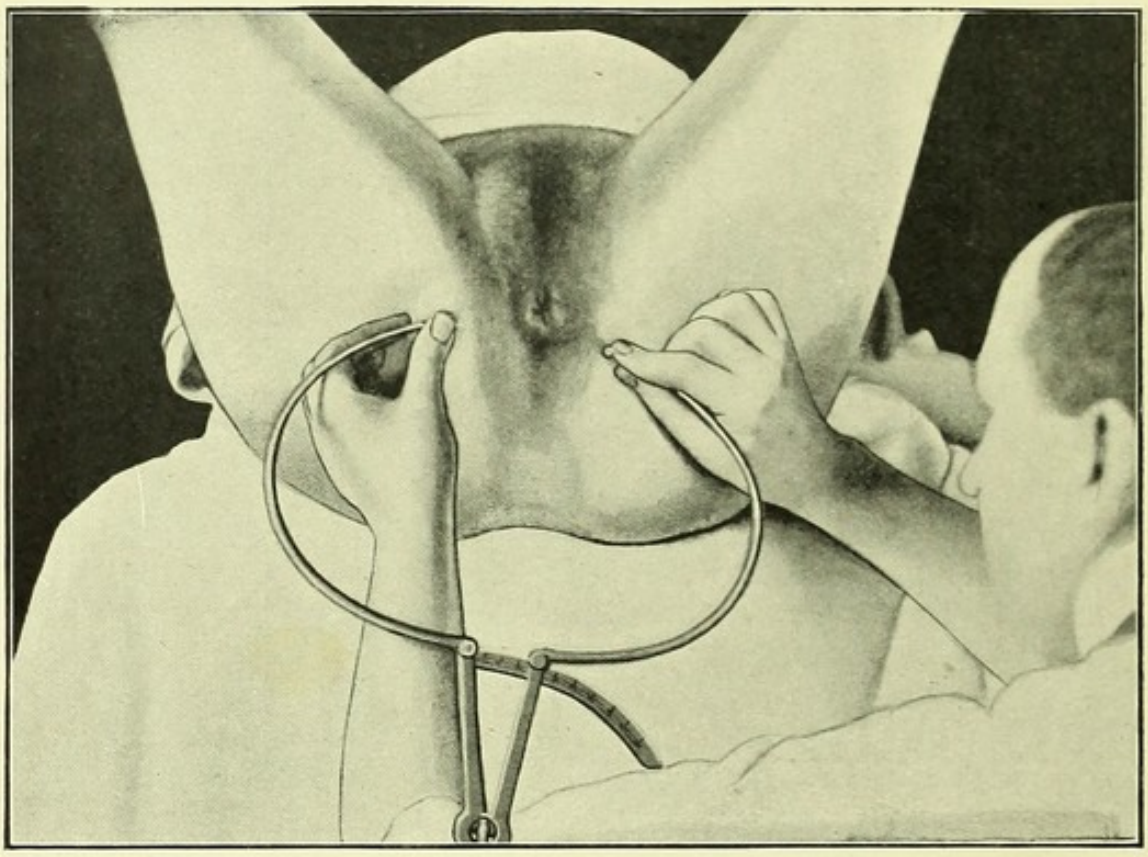


Fig. 106.—Measuring the Transverse Diameter of the Outlet.

the pelvis, while the other has attached to it a dial. The various points are mapped out on a piece of paper, and the general pelvic formation in sagittal section is constructed.

I understand that it has not come up to expectation. Certainly it is far too complicated for practical purposes, and this is the conclusion come to by Sonntag.[4]

Radiography has not proved of practical value; for although with X rays one can obtain an idea of the general pelvic formation, so far it has been impossible to make exact measurements of the

[1] *Zeit. f. Gyn.*, 1906, p. 763. [2] *Ibid.*, 1905, No. 24.
[3] *Monat. f. Geb. u. Gyn.*, vol. xi., p. 237.
[4] Winckel, 'Lehrbuch,' Bd. II., Teil, ii., 1905, p. 1858.

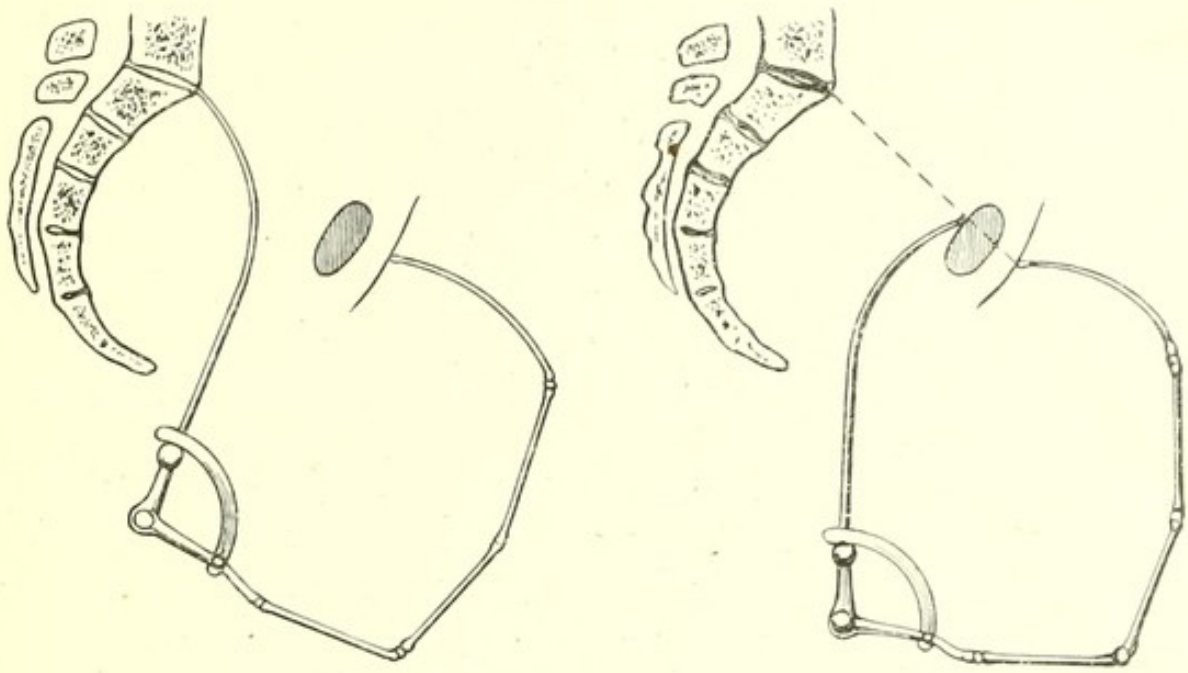


FIG. 107.—Measuring the Conjugata Vera with Skutsch's Pelvimeter.

First the distance between the promontory and the anterior surface of the symphysis pubis is taken, and then the distance between the posterior and anterior surface—viz., the thickness of the symphysis. The difference between these two measurements is naturally the true conjugate.

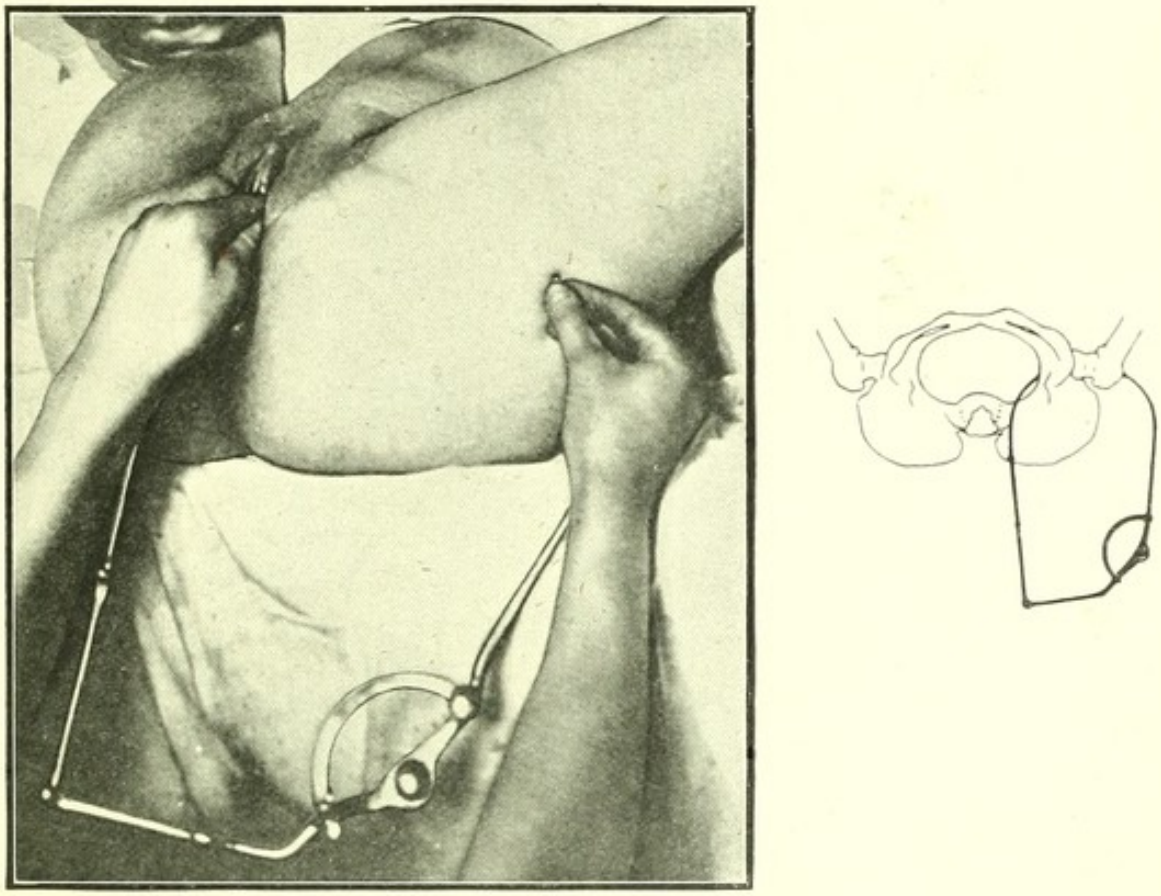


FIG. 108*a*.—Pelvimetry with Skutsch's Instrument.

Measuring the distance between the great trochanter and the nearest point of the pelvic brim of the same side.

pelvic diameters. This subject, however, is fully considered in an appendix very kindly furnished me by Dr. J. Riddell, Medical Electrician, Royal Infirmary, Glasgow.

Owing, therefore, to the unsatisfactory results obtained by pelvimeters, most obstetricians estimate the size of the pelvis manually. It need hardly be said that by such a method accuracy is also impossible. No doubt the skilled obstetrician, who has had an extensive experience of deformed pelves, can estimate fairly correctly the pelvic capacity by means of his hand, and certainly the

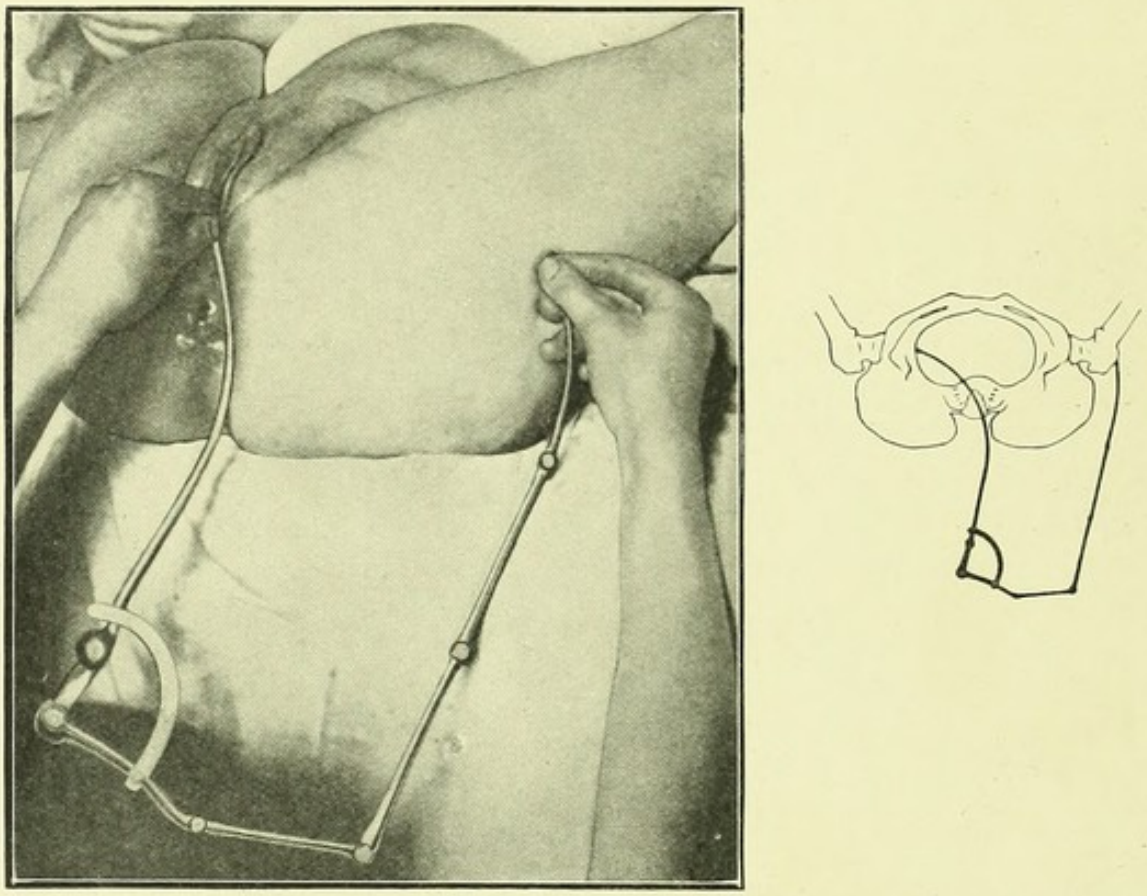


FIG. 108*b*.—Pelvimetry with Skutsch's Instrument: the Transverse Diameter of Brim. Measuring the distance between the great trochanter and the most distant point of the pelvic brim of the other side. The difference between the measurements made after this and the previous figures is naturally the transverse diameter of the pelvic brim.

chances which the fœtal head has of passing through, but he cannot tell the student, for example, nor can he put down on paper its exact measurements.

The manual method most generally employed in practice is the taking of the oblique conjugate by means of the fingers (Fig. 110), and from that measurement calculating the conjugata vera. To do this the middle and forefinger of the right hand are passed into the vagina until the middle finger impinges on the promontory and the forefinger is pressed against the subpubic ligament. The forefinger

of the other hand marks off the lower margin of the subpubic ligament. Both hands are then withdrawn, and the distance between the tip of the middle finger and point marked on the forefinger measured with a tape or calipers. In taking this measurement, it is hardly necessary to say that it should be done with the greatest care. It is most important that the finger be pressed against the true promontory, and not against a false one, and also that the lower margin of the subpubic ligament be marked off exactly.

But here, again, comes a difficulty, for the difference between the oblique and true conjugate is most variable. We commonly reckon the true conjugate as between $\frac{1}{2}$ and $\frac{3}{4}$ inch (1·2 and 1·9 centimetres) less than the oblique. But from measurements made post-mortem on

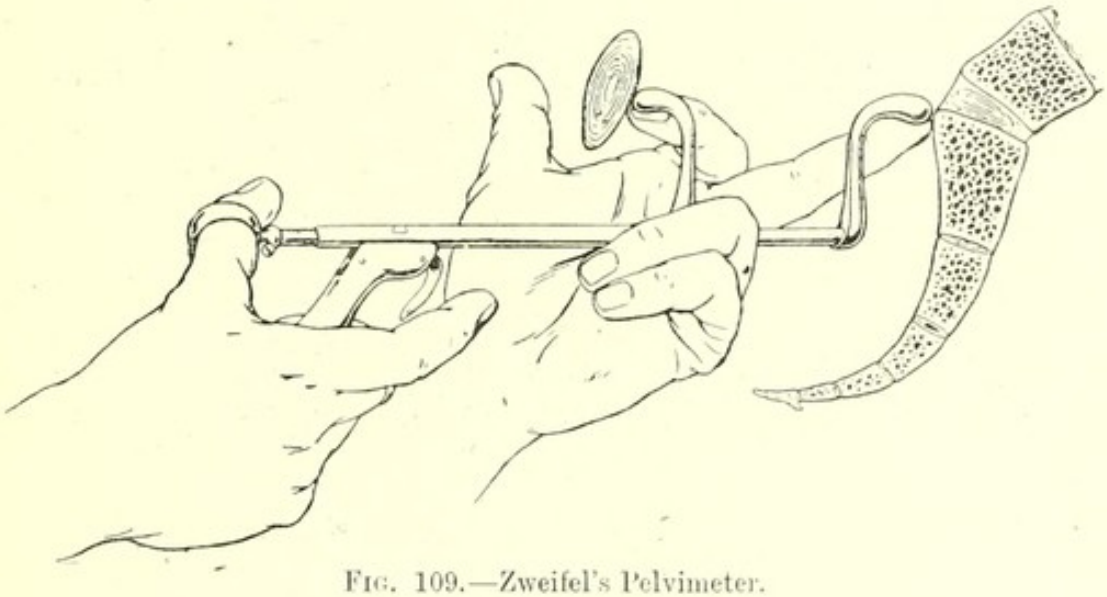


Fig. 109.—Zweifel's Pelvimeter.

women whose pelves were examined during life I have frequently found this estimate of the conjugata vera entirely wrong—I have found it as far wrong as $\frac{3}{4}$ inch (2 centimetres). The recent investigations of Sellheim[1] in this connexion are of great interest. He found that the difference between diagonal and true conjugate varied from 0 to 3 centimetres (0 to 1·2 inches). The older investigations of Skutsch were much the same—0·5 centimetre to 2·9 centimetres (0·2 to 1 inch).

For practical purposes, in estimating the true conjugate from the oblique, one must consider—

1. The height of the pubic symphysis. The higher it is, the more must be allowed.

2. The height of the promontory. The higher it is, the more must be allowed.

3. The angle of the pubic symphysis to the horizon. The more obtuse it is, the more must be allowed.

Other methods of employing the fingers for measuring the pelvis

[1] *Cent. f. Gyn.*, 1904, p. 349.

have been suggested. Ramsbotham's method (Fig. 111) is quite impracticable. The passing of the whole hand into the vagina, however,

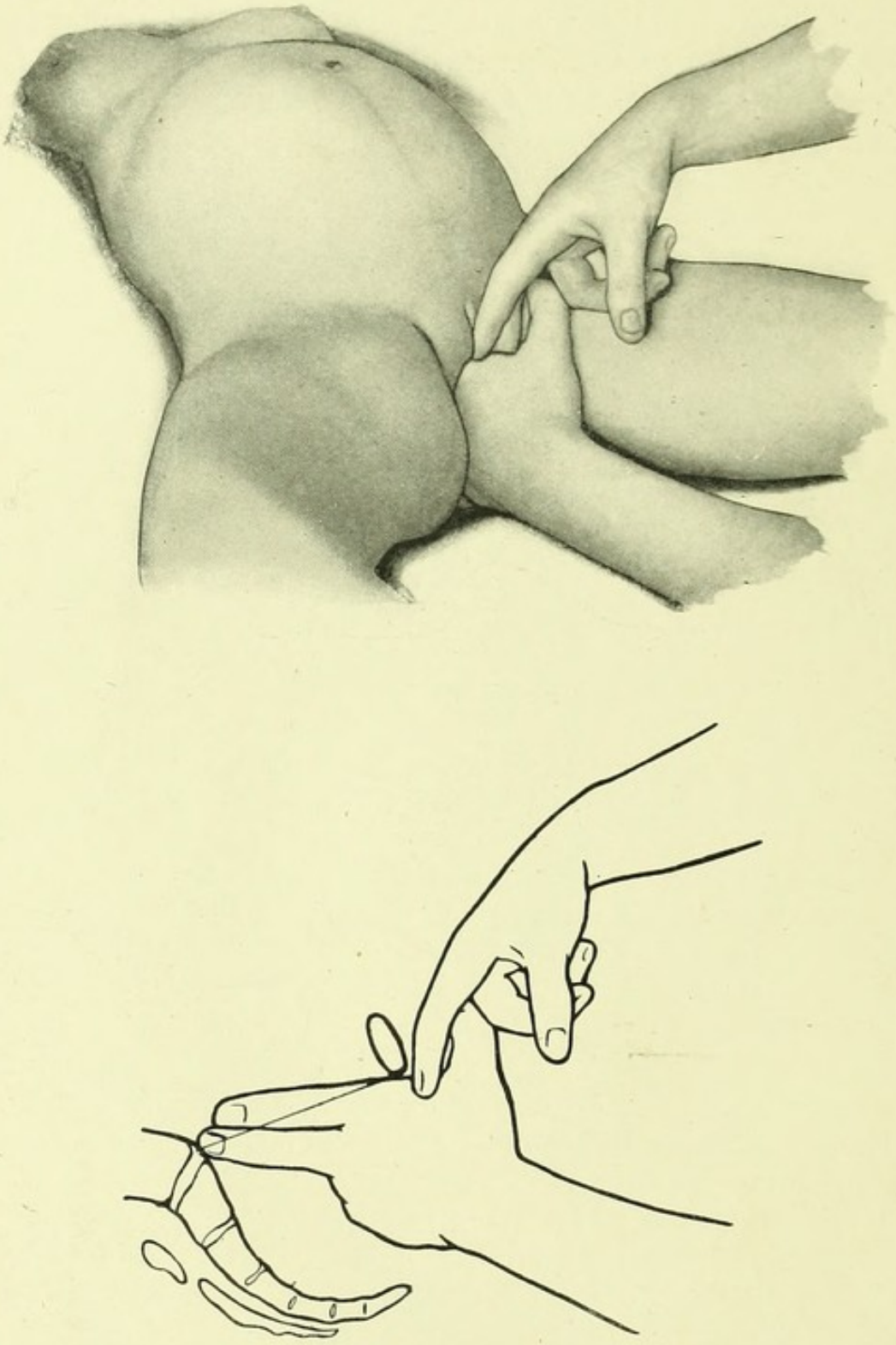


Fig. 110.—Measuring the Oblique or Diagonal Conjugate.

and employing the closed fist or fingers, as is indicated in the illustration (Fig. 112), gives the skilled accoucheur a very good idea indeed

of the general formation of the true pelvis, and I frequently make use of the method. It can always be employed with success both in primiparæ and multiparæ during labour, but only with difficulty and under anæsthesia in primagravidæ.

After delivery, when the abdominal wall is lax and the uterus can be pushed aside or has sunk down into the pelvis, the conjugata vera may be estimated externally by marking off with the fingers the

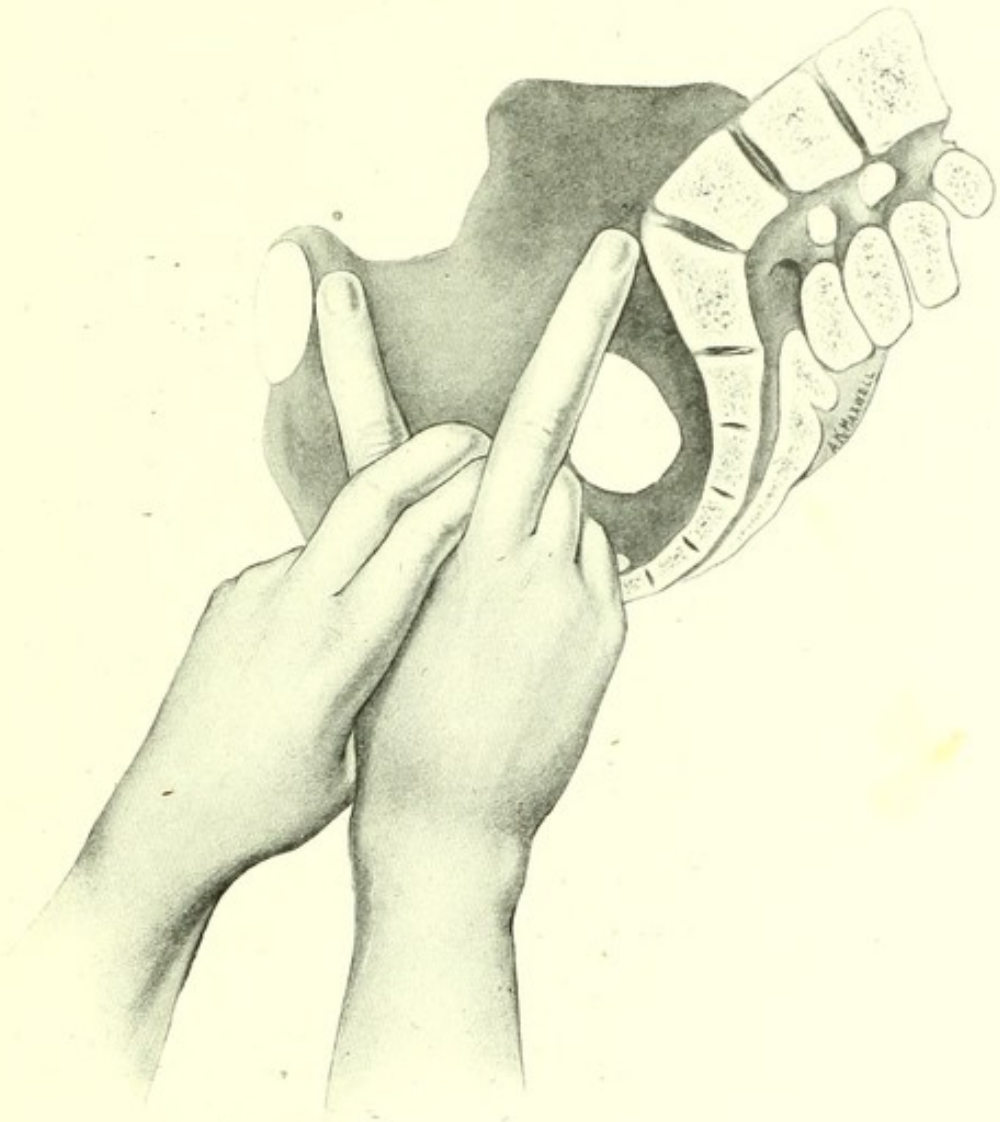


Fig. 111.—Ramsbotham's Method of measuring the Conjugata Vera.

distance between the internal surface of the symphysis pubis and the projecting promontory. Sometimes, even, by a similar manœuvre, it can be estimated before delivery by pulling up the uterus; but this is only possible in multiparæ with lax abdominal walls, and, as a rule, only up to the thirty-second week. Ahlfeld, a few years ago, showed me wooden bars of various sizes which he employed for estimating the true conjugate externally. Calipers have also been used. All these devices are employed in the same way—one end of the bar

or calipers is pressed against the promontory and the other against the symphysis.

It is perfectly evident, therefore, that neither by the hands nor by pelvimeters can one make an accurate measurement of the internal capacity of the pelvis, although with practice a fairly good idea, correct to about $\frac{1}{4}$ inch (0·6 centimetre), may be obtained. Generally such approximate accuracy is all that is necessary, but sometimes it is not so, as I shall have to point out later.

But with labour in contracted pelvis there is another very important factor influencing the parturition—viz., the size of the fœtal head. The fœtal head varies very much in size, but, what is

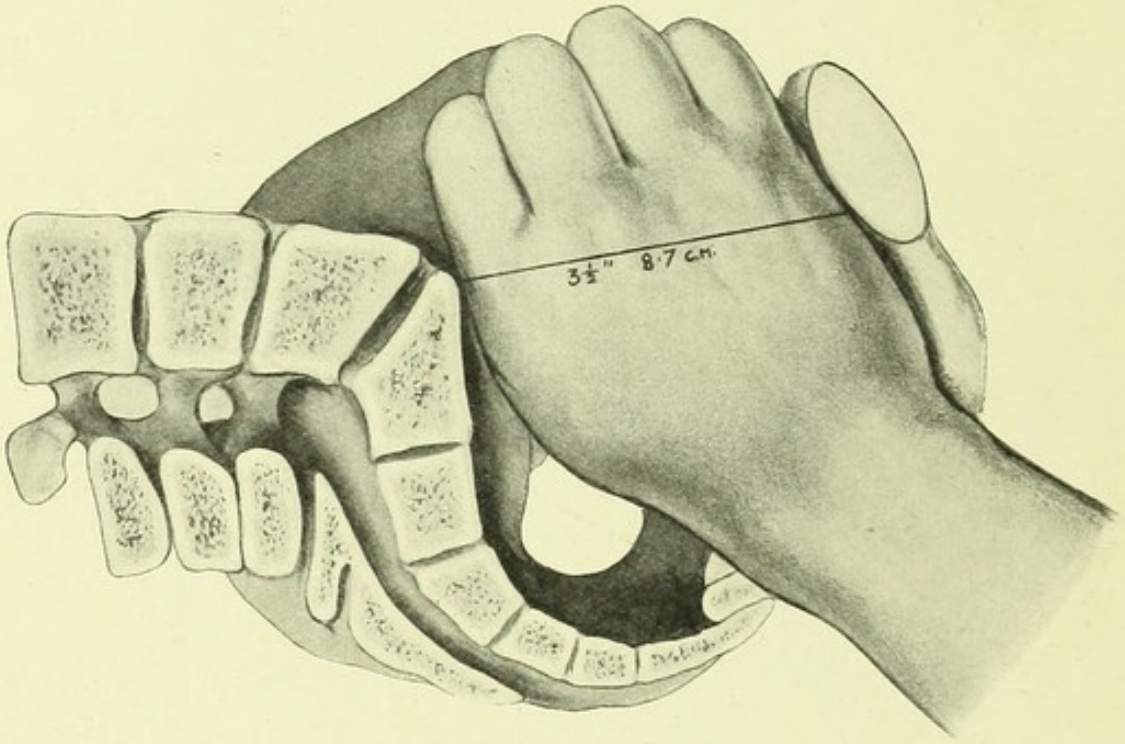


Fig. 112.—Johnson's Method of measuring the Conjugata Vera.

perhaps of even greater importance, it varies very much in consistency. It is at once evident that a large or much ossified head will pass through a contracted pelvis less easily than will a small and defectively ossified one. Attempts have been made to measure the fœtal head *in utero* (Fig. 113), but they have not proved very successful, while consistency is impossible to estimate until labour has advanced some way, for only then can the fontanelles and sutures be felt. Stone[1] has claimed great accuracy for his method, which consists in employing calipers applied to the head, whose position and attitude has been carefully palpated.

We have, therefore, in practice to deal with a canal, the pelvis, and a body which has to pass through that canal, the fœtal head, neither

[1] *Med. Rec.*, November 4, 1905.

of which can be accurately gauged as regards size. This has been recently appreciated by Müller, Pinard, and a few others, who have advocated that, after the pelvis is carefully measured, the relative size of the head and pelvis should be tested. Barbour stated this very succinctly when he said, 'The fœtal head is the best pelvimeter.'

There is here represented (Fig. 114) my method for estimating the relative size of head and pelvis. It is for the most part a combination of Müller's and Pinard's methods slightly modified, and I believe improved. It is a bimanual method—the external hand pushes the head into the pelvis, while the internal fingers of the other estimate the relative size of pelvis and head. It may be employed with or without anæs-

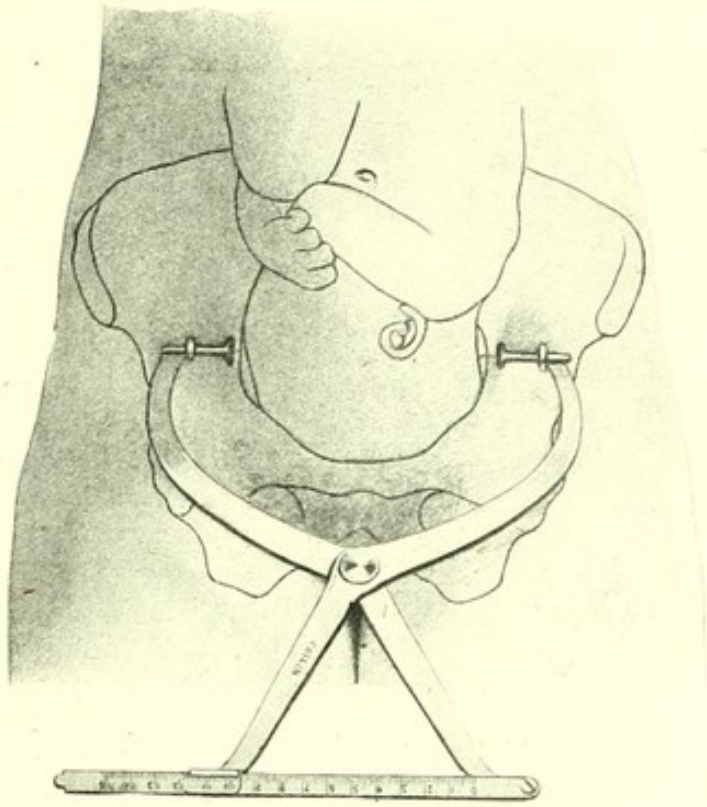


Fig. 113.—Cephalometer. (Perret.)

thesia, but greater accuracy is obtained if the woman is anæsthetized. The patient is placed in the ordinary position for a gynæcological examination, and the accoucheur stands at her side, facing her. The right hand seizes the head, and presses it into the superior straight. Two fingers of the left hand are passed into the vagina. These measure the consistency and manner of engagement of the head; also, if it has not been done already, the nature and extent of the pelvic deformity. Further information, however, is obtained by utilizing the thumb, which is passed along the brim, and estimates the degree of overlapping. By this method I find the relative size of the fœtal head and maternal pelvis can be very exactly estimated. There is only one detail which has to be watched—viz.,

the variety of parietal obliquity or asynclitism, which exists, or is produced by the external hand.

To sum up in a word, then, the manner in which one should approach a case of contracted pelvis is as follows: (1) The general appearance of the patient and the obstetric history, if she is a multipara, is noted. (2) The external and internal pelvic capacity is carefully measured. (3) Finally, the relative size of the fœtal head and the maternal pelvis is estimated. Having done all this—but not until then—one is in a position to consider the treatment.

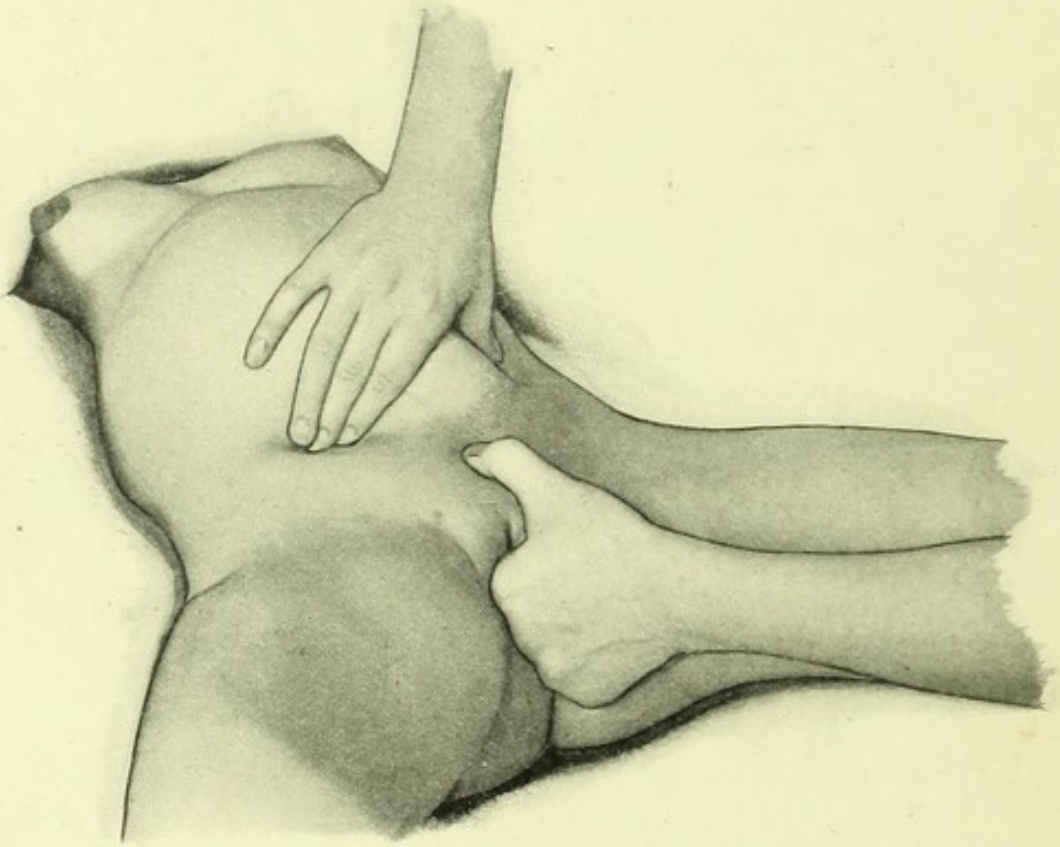


FIG. 114.—Author's Method for estimating Relative Size of Fœtal Head and Maternal Pelvis.

Prognosis and Treatment.

Every one is aware that deformity of the pelvis, except it be of a slight degree, is a dangerous condition for mother and child. To give figures which would represent exactly how dangerous it is is quite impossible, for so much depends upon the extent of the deformity and the treatment adopted. Many times, too, the mother's and child's interests are directly opposed to one another, for the more the mother's life is considered, the greater is the child's endangered, and *vice versa*. Take induction of labour and Cæsarean section. In the former the fœtal mortality is enormous, but the maternal almost negligible; in the latter the maternal is still considerable, but the fœtal is small.

It is not possible to consider here all the details of the treatment of contracted pelvis. These details will be found discussed elsewhere, chiefly in connexion with the various operations. My purpose at present is to treat the subject generally, and to point out the principles which should guide one in approaching a case of contracted pelvis and in coming to a decision regarding treatment.

Many students and practitioners think—and they are encouraged to do so by the general teaching in all but a few of the modern text-books—that the treatment to be adopted in cases of contracted pelvis should be based upon the size of the conjugate diameter of the brim of the pelvis.

No exception can be taken to such an attitude towards major and minor deformities, but it is an absolutely erroneous one to assume towards medium degrees of pelvic deformity, the class of deformity which is by far the most common.

But, first of all, let me define these different degrees.

By minor pelvic deformity I mean a conjugata vera of over $3\frac{3}{4}$ inches (9·3 centimetres), by major deformity where it is below 3 inches (7·5 centimetres), and by medium deformity where it is between $3\frac{3}{4}$ and 3 inches.

In major and minor deformities the size of the pelvis alone determines the treatment, for in the latter spontaneous delivery or forceps always results in a satisfactory termination, while in the former, the major degrees of pelvic deformity, Cæsarean section and craniotomy are practically the only alternatives.

With medium degrees of pelvic deformity, however—that is to say, the deformities where the conjugate is from $3\frac{3}{4}$ to 3 inches (9·3 to 7·5 centimetres)—it is quite otherwise, for in such cases there are several alternative treatments which have to be considered if the child is living. They are, leaving the case to Nature, version, forceps, induction of premature labour, symphysiotomy, and Cæsarean section. No hard-and-fast rules can be laid down for cases of this group. Experience alone can teach one how to deal with these cases, which, more than all others, tax the obstetrician's skill and judgment. This I would say, however—*it is absolutely essential to base the treatment upon the relative size of the fœtal head and the maternal pelvis, for in cases in which by pelvimetry the pelves are the same sometimes one operation, sometimes another, will be found best.*

From 1901 to 1906, inclusive, while I have been Visiting Physician to the Glasgow Maternity Hospital, I have had under my care in hospital and private practice 230 cases in which the conjugata vera was $3\frac{1}{2}$ inches (8·7 centimetres) and under. Cases in which it was

more than that figure are not included. In these cases the following are the results as regards mothers and children :

AUTHOR'S CASES OF CONTRACTED PELVIS 3½ INCHES (8·7 CENTIMETRES) AND UNDER (1901-1906).

Operation.	Total Cases.	Maternal Mortality.	Immediate and Late Fœtal Mortality.[1]
		Per Cent.	Per Cent.
Spontaneous delivery	7	0	0
Forceps	76	1·4	30
Induction of labour	23	0	37
Craniotomy	63	12·6	100
Symphysiotomy	8	0	0
Cæsarean section...	53	9·4	1·8

Spontaneous Delivery.—Naturally, up to a certain point, spontaneous delivery gives the best results for mother and child. From that point, however, the prognosis becomes less favourable. The point, as far as I can judge, is 3½ inches (8·7 centimetres) for flat and 3¾ inches (9·3 centimetres) for generally contracted pelvis. During the last six years in the Glasgow Maternity Hospital we have had quite a number of women delivering themselves spontaneously whose pelvis were of the size I mention ; but only once or twice has a full-time child been driven through a pelvis of 3 inches (7·5 centimetres). In the Queen Charlotte Hospital Report for 1905 a case is recorded of a primipara who delivered herself of a child weighing 5 pounds 12¾ ounces in ten hours, although she had a flat rachitic pelvis in which the C.V. was only 2⅞ inches (7·1 centimetres).

Here is an interesting table made up by Krönig for the Leipzig Klinik of Zweifel :

	Generally Contracted Pelvis.						Flat Pelvis.					
	C.V. 10–9 cm. (4″–3½″).		C.V. 8·9–7·5 cm. (3½″–3″).		C.V. 7·4 cm. and under (3″ and under).		C.V. 9·5–8·5 cm. (3¾″–3⅜″).		C.V. 8·4–7 cm. (3⅜″–2¾″).		C.V. 6·9 cm. and under (2¾″ and under).	
	Total Cases.	Spontaneous or Little Help at Outlet.	Total Cases.	Spontaneous or Little Help at Outlet.	Total Cases.	Littl Help at Outlet.	Total Cases.	Little Help at Outlet.	Total Cases.	Littl Help at Outlet.	Total Cases.	Little Help at Outlet.
Primipara	48	45	43	35	8	none	127	120	36	28	8	none
Multipara	88	84	57	39	10	none	228	209	84	46	7	none

From these figures it is perfectly evident that the possibility of spontaneous delivery through a narrow brim is greater than is

[1] By 'immediate' mortality is meant that the children are born dead, and by 'late' mortality that the children have died while the mothers have been in hospital or under supervision in their homes.

generally supposed, and as my experience increases I am more and more convinced of this; but I find it very difficult to persuade others of the fact. They become impatient and uneasy about the woman's sufferings, and think they should interfere. It is certainly distressing to see a woman suffering, but anxiety regarding the child is unnecessary. Quite recently I had three cases of spontaneous delivery through pelves of 3½ inches (8·7 centimetres) where the second stage lasted five, seven, and eleven hours respectively, yet all the children were living, and none of the mothers were any the worse. It is hardly necessary to repeat here that in all cases of prolonged labour the condition of both mother and fœtus must be carefully watched.

But another great advantage of spontaneous delivery is the low fœtal mortality. Boenninghausen gives the fœtal mortality for spontaneous delivery in generally contracted pelvis as 2·2 per cent., and for flat rachitic pelvis 2·7 per cent., while in artificially terminated labours the mortality was 41 per cent. and 47 per cent., according as the pelvis was generally contracted or flat. Kissenger's and Krönig's[1] figures are much the same.

In none of my recent cases has there been a fœtal death. Equally good results will be found in the recent reports of Queen Charlotte Hospital, London, and the Rotunda Hospital, Dublin. One naturally expects a much higher fœtal mortality where operative interference is had recourse to; but few, I feel convinced, are aware of how small the fœtal mortality is in suitable cases left to Nature.

In medium degrees of pelvic deformity the following factors influence the passage of the head through the pelvis: (*a*) The extent and nature of the deformity; (*b*) the size and consistency of the head; (*c*) the variety of biparietal obliquity present; (*d*) the position of the occiput; (*e*) the strength of the expulsive forces. I have already said sufficient regarding the degree of deformity. Without doubt it is the most important factor, although the two following have more influence than is generally admitted.

It is perfectly obvious that the size and consistency of the head, being a very variable quantity, must be a factor of considerable importance, especially in cases where the deformity is just on the border-line of being too much for the forces to overcome. Probably consistency is even more important than size, unless the latter is extreme. Personally, I have found the average weight and size of head of the children born of rachitic parents slightly higher than that of ordinary children. Pinard[2] has remarked upon this also. The subject is fully discussed by Wilcke.[3]

Of very great importance indeed in flat pelvis is the next factor, the

[1] 'Die Therapie beim engen Becken,' Leipzig, 1901.
[2] *Ann. de Gyn.*, 1898, p. 81. [3] Hegar, *Beitr. Geb. u. Gyn.*, 1901, Bd. iv., p. 291.

variety of biparietal obliquity present. The posterior parietal presentation is extremely unfavourable both as regards spontaneous and forceps deliveries. It is quite unnecessary to mention other writers in support of this view, for all are agreed that the posterior parietal presentation is infinitely less favourable than the anterior. One need not consider the subject again—it is fully discussed in the previous chapter.

In cases of scolio-rachitic pelvis—a variety of rachitic deformity which I have found not uncommon—the position of the occiput may influence the passage of the head through the brim, for it is at once apparent that the head will pass more readily if the occiput is directed towards the more roomy side.

As regards the expulsive forces, the last important factor influencing the labour, little need be said. Naturally, the stronger they are, the greater is the probability of the labour terminating spontaneously. In flat pelvis one usually finds them quite up to, and often even above the normal, but in generally contracted pelvis of the non-rachitic variety they are not infrequently rather feeble. This has been already referred to, however, in speaking of the expulsive forces as a cause of delay in labour.

Turning now to the artificial methods of delivery in contracted pelvis, version and forceps are the only two I intend considering at present. The results from the other operations, induction of labour, symphysiotomy, craniotomy, and Cæsarean section, will be considered when these operations are under review. For the sake of continuity, however, I would merely say, in regard to symphysiotomy, that my present attitude towards it is to employ it only in cases where after two attempts with forceps I fail to extract the child—where, in other words, I feel that a little more room in the pelvis is all that is necessary to permit of delivery *per vias naturales*. As regards induction of labour, my results have been so unsatisfactory that at present I perform this operation very seldom.

Version.—Podalic version, early or late, was abandoned by us in the Glasgow Maternity Hospital some years ago, because we found the results to both mother and child were less satisfactory than when forceps was employed. So much was I impressed with the unsatisfactory results from podalic version that, in presentations of the breech, it has been my practice during the last six years, to perform external cephalic version during pregnancy whenever that was possible, and the pelvis was only moderately deformed. Such a procedure has this great advantage, that it permits the accoucheur testing the relative size of head and pelvis, so important a guide to treatment, and which otherwise he could not do if the presentation remained pelvic.

The arguments advanced in favour of version as against forceps in

flat pelvis are familiar. The most important are that the wedge-shaped head passes through more easily base first; that the parietal bones overlap better with the after-coming than with the fore-coming head; and that, as forceps must compress the head in the longitudinal diameter, it produces a compensatory increase in the biparietal diameter—the fœtal diameter which is engaging in the narrowest diameter of the pelvis, and which, in consequence, one wishes to remain as small as possible. Simpson usually gets the credit for having advanced the first of these three arguments in favour of version, although long before his time it was appreciated and taught.

The last argument, however, was the one to which most weight was attached until Budin and Milne Murray disproved the truth of the statement.

Long ago Baudelocque[1] proved by experiment that longitudinal compression of the head did not produce a compensatory increase of the biparietal diameter; but he left the matter there, and his experiments were forgotten until Budin, and later Milne Murray,[2] repeated them. These latter observers found that Baudelocque was correct in his observations, but they went a step further, and found in their experiments that the compensatory increase occurred in the vertical diameter of the head, a measurement Baudelocque neglected to take. I have repeated the experiments of Budin and Murray, and have obtained similar results.

Neither from practical experience nor on theoretical grounds, therefore, is version better than forceps, and this is the opinion of British obstetricians. Several obstetricians in France, Germany, Italy, and America still favour prophylactic version. There is, however, not the same enthusiasm about the treatment now as formerly, and even those who approve of it only do so for the slighter forms of contracted pelvis. But having condemned version in general in flat pelvis, I will make three exceptions—viz., cases of posterior parietal presentation, cases in which in scolio-rachitic pelvis the occiput is directed to the narrow side, and cases in which other complications requiring version, such as placenta prævia, coexist. It is quite evident from what has been said why these exceptions should be admitted.

I have said that for many years the British school, in general, have been opposed to version. It is no small satisfaction, therefore, to find evidence that other schools are coming to a like opinion, but, be it noted, they are not coming to our opinion, because they favour forceps. Don't for a moment let us imagine that is the reason.

[1] 'A System of Midwifery,' translated by Heath, 1790, vol. ii., p. 377.

[2] *Edin. Med. Journ.*, 1888, vol. xxxiv., p. 417.

They are opposed to version, because spontaneous delivery occurs more often than was supposed. Krönig writes as follows:[1] 'Version on account of contracted pelvis, the so-called prophylactic version, cannot be recommended, for the prognosis for mother and child is less favourable than birth of the child by a head presentation.' Baisch[2] gives the results for the Tubingen Klinik, and his opinion regarding version is the same. In France neither forceps nor version is favoured by Pinard and his many followers. They hold that if spontaneous delivery does not occur, symphysiotomy should be had recourse to. The theory is quite logical—indeed, like so many other views of this great obstetrician, it is too logical. It appears to me too extreme, for there must be some cases in which the head requires just a little help through the brim, and surely this may be safely given with forceps. There is, however, another school in France which still favours version.

Forceps.—Turning now to forceps it is apparent from my table (p. 190) that the fœtal mortality with it is very high—30 per cent. It must not be forgotten, however, that I only include pelvic deformity when the vera is $3\frac{1}{2}$ inches and under (8·7 to 7·5 centimetres), and that I include both the early and late mortality. But even allowing for that, the fœtal mortality is greater than it should be. During the last year, however, I have improved this by giving the head a much longer time to mould.

As with spontaneous delivery, so with forceps, the results up to a certain point are quite satisfactory, the turning-point seeming to be $3\frac{1}{2}$ inches. With a vera down to and including $3\frac{1}{2}$ inches (8·7 centimetres) the fœtal mortality is 10 per cent., with a vera of $3\frac{1}{4}$ inches (8·1 centimetres) 25 per cent., with a vera of 3 inches (7·5 centimetres) 40 per cent. But apart from the fœtal mortality, there is the fœtal morbidity to be considered. Whenever one passes below $3\frac{1}{2}$ inches the fœtal morbidity becomes greatly increased—in my cases by as much as four times. Indeed, indentation, severe bruising, and deep asphyxia, become comparatively common. *It appears to me, therefore, that forceps should only be employed in exceptional cases when the conjugata vera is below* $3\frac{1}{2}$ *inches* (8·7 *centimetres*), *and seldom, if ever, when it is under* $3\frac{1}{4}$ *inches, and that the instrument should be had recourse to only when the head is well fixed at the brim and does not overlap, and only after considerable time has been given the head to mould. Finally, that only very moderate traction should be employed.*

The same factors influence forceps delivery as we have seen influence spontaneous delivery. Posterior parietal presentations are extremely unfavourable.

With few exceptions, obstetricians outside of Britain are opposed

[1] *Op. cit.*, p. 100. [2] *Monat. f. Geb. u. Gyn.*, 1905, vol. xx., p. 174.

to the employment of forceps to pull the head past the obstruction. They only countenance forceps after the greatest circumference of the head has passed the contraction. This is becoming the teaching also of a few in this country. With such a united opinion against the operation, it is at once evident that forceps, if employed at all, must be used with great caution. The promiscuous employment of the instrument for pulling the head through the brim and the use of brute force—a practice so common in this country—cannot be too strongly condemned. It is simply deplorable to see cases brought into hospital where for hours the medical attendant and his confrères have been making attempts to deliver with forceps, when such an operation should never have been contemplated.

But having said so much against the employment of ill-advised force and the dragging of the child past an obstruction, the one extreme, I am not prepared to go to the other extreme and say that forceps should only be employed after the child has passed the obstruction, and never to help it past the obstruction. Personally, I still practise and teach that in carefully selected cases forceps may be employed with most satisfactory results, even although the greatest circumference of the head has not passed the brim; but the head must be fixed, and there must not be any appreciable overlapping at the brim, nor must the presentation be a posterior parietal one. Besides, only one or two attempts with moderate force are to be made. If they fail, then some other treatment must be had recourse to. For such cases axis traction forceps is peculiarly suitable, and is much better than the ordinary double curved instrument. It must not be forgotten, also, that in flat pelvis the Walcher position is often of great assistance. This subject, however, is referred to under Forceps Delivery in Contracted Pelvis (Chapter XXIV.).

So far I have discussed the use of forceps from the standpoint of the child—at least, the figures given had reference to fœtal mortality and morbidity. I have done this purposely, because the maternal morbidity and mortality should, theoretically, be nil. As far as mortality goes, this is nearly the case. In my list there is one death, but the patient had been handled for long by a midwife before she was admitted to hospital. But what about morbidity? Amongst the cases of contracted pelvis which have been delivered by forceps in hospital during the last ten years, I know of three in which the uterus was ruptured in that part of the posterior wall situated over the promontory, and I know of several cases of severe bruisings and tears of the cervix and vagina. Amongst my own cases is one in which the cervix was extensively torn. Altogether there is a morbidity of 18 per cent. In my cases of spontaneous delivery the morbidity

nil. No doubt the morbidity in the forceps cases is due in great part to the fact that many of the patients were examined by midwives or careless practitioners before admission to hospital; but, even allowing for that, it is too large.

Let me now summarize the treatment I have sketched under the two following headings:

1. Cases in which the deformity is recognized during pregnancy.
2. Cases in which the deformity is recognized during labour.

1. Cases in which the Deformity is recognized during Pregnancy.—It is of the very greatest importance to bring as many cases as possible into this group. Medical practitioners, therefore, whenever they have the opportunity, should make a point of satisfying themselves of the pelvic capacity of all primagravidæ, and of multigravidæ who have had previous difficulty at their confinements. It is well that all pregnant women should appreciate this also, especially in cities such as Glasgow where pelvic deformities are common, and should go to their medical attendants during the later weeks of pregnancy. I need not enlarge upon this; it is admitted by every one.

The accoucheur in a case of suspected deformity should measure the pelvis and estimate its capacity. He should then place the woman amongst those of slight, extreme, or moderate pelvic deformity. The exact limits of these different groups have been already given. Should the pelvis be of slight or extreme deformity, pregnancy is allowed to continue until near term. In the case of slight deformity labour is allowed to come on, as the delivery will be spontaneous, or at worst will be terminated by forceps. Should the deformity be extreme, however, preparations must be made so that the patient is prepared for either Cæsarean section or craniotomy, should the child happen to be dead.

If, however, the deformity of the pelvis is only moderate, a most careful examination of the relative size of the head and pelvis should be made under an anæsthetic in the thirty-fifth or thirty-sixth week of pregnancy. The object of this is, to give an opportunity of judging if induction of labour should be had recourse to. If this operation is decided upon, it may be done at the time, or delayed a week to ten days if deemed advisable. Should the case be considered unsuitable for induction of labour, pregnancy is allowed to continue. In most cases the examination will have shown the degree of disproportion between the head and pelvis, and, consequently, whether labour is likely to terminate spontaneously, with forceps or with Cæsarean section. If there is any doubt about this, it is well to examine again under an anæsthetic at the very beginning of labour, for if

Cæsarean section is to be performed, it is undesirable that labour should be allowed to continue for any length of time. It will be

Fig. 115.—The Walcher Position.

observed that I have said nothing about symphysiotomy, and for the reason that I consider its place is when forceps just fails to effect delivery.

When Cæsarean section is deemed unnecessary, the patient must be allowed to continue in labour, and every opportunity given for spontaneous delivery. If that should fail, the accoucheur must be prepared for either forceps in the Walcher position (Fig. 115) or symphysiotomy if the child is living, and craniotomy if the child is dead. No rule can be laid down as to when one should chose Cæsarean section and when one should allow labour to pursue its course; only experience can teach one. I have found that, with only a slight degree of overlapping, the head usually moulds sufficiently to allow of delivery *per vias naturales*. If, however, by pushing the head into the pelvis the latter cannot be made to catch, then there will seldom be sufficient moulding.

2. **Cases in which the Deformity is recognized during Labour.**—In hospital and in the poorer districts of cities a large number of cases belong to this group. Here, again, the exact amount of deformity should be estimated, for in cases of extreme and slight deformity it will always guide one to the right treatment. Any difficulty in deciding will again be found amongst those cases in which the pelvis is only moderately deformed. But I have said enough on this subject.

There is only one other point. A first labour is a trial labour, so with moderate pelvic deformity it is well to have recourse to any major operation only if Nature fails after she has been given a long trial. One takes a great many risks for the child. Induction of labour and symphysiotomy are seldom suitable operations, while, naturally, craniotomy is relatively more often necessary.

In cases which come under one's care for the first time during labour two other factors influence one's decision regarding treatment—viz., the time labour has been in progress and the possibility of any infection of the parturient canal having occurred. The longer labour is in progress, the less is one inclined to risk the mother's life by such major operations as Cæsarean section and symphysiotomy. The same applies to cases in which there is a possibility that infecting organisms have been introduced, as when the woman has been examined by a dirty midwife or careless practitioner.

As I have described it, the treatment of contracted pelvis is simplicity itself. It is the course I have followed in hospital and private practice for many years, and it has given me great satisfaction. The only results which have not pleased me have been those from forceps: but during the last eighteen months, since I have insisted that my assistants must never employ forceps unless they are absolutely sure that interference is indicated, and that they must give the second stage endless time, my results have been infinitely better.

CHAPTER XIII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL *(continued)*

Abnormalities in the Soft Parts—Cervix—Vagina—Perineum.

Pathological conditions of the cervical and vaginal canals are comparatively rare. Doubtless their resistance to dilatation varies greatly, and imperceptibly influences the course of labour, but gross abnormalities which one can appreciate are not common.

Taking the cervical canal first, the commonest causes of dystocia are rigidity, stenosis, and atresia.

Rigidity.—It is very general to classify rigidity of the cervix as follows:

1. Organic	(*a*) Inflammatory. (*b*) New growths.
2. Functional	(*a*) Spasmodic (trismus uteri). (*b*) Constitutional.

The classification, on the whole, is good, although I am inclined to take exception to the group termed 'constitutional,' as will be seen later.

Inflammatory affections of the cervix, resulting in great thickening and elongation of the canal, one would expect might readily cause rigidity and retard dilatation, yet in practice it is surprising how hypertrophied and elongated cervices yield. Even hard cicatrices soften to a wonderful extent during pregnancy and parturition. As far as my experience goes, the only interference called for has been pressing the lips of the cervix back over the presenting part, or making slight incisions into them. I have never required to amputate a hypertrophied cervix, nor do I know of any colleague having required to do so, but it has sometimes been necessary, and I cannot see any objection to doing it during labour. Even Cæsarean section has been performed for this condition, as, for example, in the cases recorded by Ribemont-Dessaignes[1] and Rudaux.[2] Hansson[3] recom-

[1] *Anal. de Gyn.*, 1905, p. 121.
[2] *Ibid.*, p. 124.
[3] 'Festschrift,' Otto Engstrom, Berlin, 1903.

mends the amputation of the hypertrophied cervix during pregnancy, and gives three cases in which this was performed; the pregnancy was interrupted in one, but in the other two continued undisturbed. Potocki[1] has also recorded a case which proved successful, and in which the pregnancy was not disturbed. It is interesting to know that this operation on the gravid uterus, in common with so many others, can be performed without the pregnancy being interfered with. I question, however, if such treatment is indicated, for it is surprising how the cervix yields, and, even at the worst, the operation could be performed during labour.

A very troublesome rigidity occasionally follows the use of caustics and the amputation of the cervix. Boissard and Coudert[2] and Pinard, Segond, and Couvelaire[3] have described cases. In such if, after a reasonable amount of time, dilatation does not occur, then forcible stretching, or, better still, deep incisions of the cervix, become necessary. Indeed, vaginal Cæsarean section might even be called for.

The two other forms of rigidity described as functional are the most common which one encounters. The spasmodic, which in its most marked form is known as trismus uteri, is found in nervous primiparæ often when there has been premature rupture of the membranes, or as a result of some reflex irritation—for example, overdistension of bowel or bladder. It occurs especially during the early stages of dilatation. No operative treatment is necessary, and manual dilatation, unless the patient is anæsthetized, only aggravates the condition. Any reflex irritation should be removed, and a full dose of opium given. I prefer Battley's solution (liquor opii sedativus) given by the mouth, but tincture of opium, by mouth or rectum, or a morphia suppository, may be substituted. Chloral may also be employed, and often acts very well, although, in my experience, not so well as opium. Hot douches also often relieve this form of rigidity. The application of cocaine to the cervix sometimes acts well. The cervical surface may be painted over with a 10 per cent. solution of the chloride, or, better still, a plug of gauze soaked in 7 per cent. solution of the chloride may be inserted into the vagina. The injection of a 5 per cent. solution directly into the cervix by means of a long needle has also been recommended. I have never employed extract of belladonna as a substitute.

But there is another form of rigidity very occasionally encountered which yields to no treatment. Cocaine may be applied locally, opium, chloral, or any other drug may be administered internally, hot douches and baths may be given, without producing the slightest effect upon the cervix. To this form the name of 'constitutional rigidity' is generally

[1] *Annal. de Gyn.*, December, 1906, p. 709. [2] *L'Obstétrique*, January, 1904.
[3] *Annal. de Gyn.*, December, 1906, p. 705.

given. The term has always appeared to me a misnomer, however, as I do not believe it is functional, but rather the result of some pathological condition of the cervix. It is not peculiar to old primiparæ, as is sometimes stated; indeed, the two worst cases I have seen were in primiparæ of only twenty-five years of age. Nor is it found associated with any particular habit. The delay in dilatation in this form is sometimes extreme. In one case recently seen the patient was three days in labour, with strong uterine contractions coming on every ten minutes; finally, the labour had to be terminated by making incisions into the cervix.

In such cases no medicinal treatment does any good. A sufficient time having been given, incisions or forcible dilatation of the cervix with the hands or a dilator, or, better still, the introduction of a hydrostatic bag, are the only means at one's disposal, and in such cases I would advise against too long delay. If the patient's temperature or pulse begins to rise, or if the fœtal heart becomes affected, interfere immediately; but even before that I would be inclined, from past experience, to interfere, and would not allow a patient having strong pains to continue in labour with such a condition of cervix as I am considering for more than thirty-six hours. Personally, in such cases I believe incisions are better than forcible dilatation. Both methods of treatment are discussed under Accouchement Forcé (Chapter XXVIII.).

Œdema.—A very simple form of obstruction connected with the cervix is œdema of the anterior lip, which is produced by pressure of the lip between the presenting head and symphysis. I have occasionally seen a swelling nearly as large as a Tangerine orange result. It is very seldom necessary to puncture the œdematous lip, for it is nearly always possible to push it back over the head. This latter device should always be given a fair trial, and it very seldom fails if carried out during a uterine contraction, and if two fingers are employed.

An acute œdema of the cervix and surrounding parts has been occasionally referred to. Geyl[1] considers the subject very fully, and Jolly[2] has discussed it recently. It is a condition which was first described by Gueniot. But it is a complication really of pregnancy, and generally where there is some prolapse of the uterus. An interesting case is described by Seitz[3] where the condition appears to have been produced by obstinate constipation. Sometimes an œdema affecting the whole cervix follows a prolonged labour. Especially is this seen in cases of contracted pelvis.

[1] Volkmann's *Samml. Klin. Vorträge*, 1895, No. 128.

[2] *Zeit. f. Geb. u. Gyn.*, Bd. lii., Heft iii. [3] *Cent. f. Gyn.*, 1905, p. 289.

Œdema, which so often occurs in the pregnant, may occasionally be specially pronounced in the parts about the vulva, more particularly the labium. Such a condition may occasionally interfere with parturition. If pressure does not remove it, the parts should be punctured.

New growths of the cervix are rarely found complicating labour, and practically the only two varieties met are myomata and carcinomata. The whole subject of tumours complicating labour is considered elsewhere, however. An extremely rare occurrence is hæmatoma of the cervix. Barnes[1] describes a case in which he mistook such a tumour for an inverted uterus. The subject of hæmatoma is considered later in this chapter.

Atresia.—Atresia of the whole cervix complicating labour must be extremely rare. Adhesion of the membranes to the lower part of the uterus, preventing dilatation of the internal os, is probably the commonest cause of atresia. In passing, let me remark that this condition has often appeared to me to be a cause of rupture of the membranes before or early in labour.

Atresia of the external os (conglutinatio orificii externi) is not uncommon, and several cases have occurred in the Glasgow Maternity Hospital, some of which have been described by Jardine. In the simpler forms only the mucous membrane is agglutinated, although in some cases fibrous tissue is actually found present. The cause must, of course, have been some slight catarrhal or inflammatory mischief during the pregnancy, although, as a rule, no history of such a condition can be elicited from the patient. Usually one can make out a slight dimple, which indicates the position of the os, but sometimes no trace of the latter can be detected.

The obstruction may be so slight that the uterine contractions overcome the obstruction; on the other hand, it may be so persistent that the thinned-out vaginal portion may be carried away by the presenting part. The condition is readily recognized if a careful examination is made. If, however, the examination is made casually, the thinned-out cervix may be overlooked, and, the landmarks of the head being so distinctly felt through the thinned cervix, the condition may be taken for a full dilatation of the os. Not very long ago a case was reported where that mistake was made, and forceps were applied, with great laceration to the vaginal vault, followed by the death of the patient. Only the other day a colleague informed me that he was about to introduce the blades of the forceps in a case of the kind, when, finding that he could not feel the lips of the os, he made a more careful examination and discovered that the os was not dilated. In

[1] 'Obstetric Operations,' p. 472.

such cases one can trace the smooth vaginal surface over the head, and the fingers become arrested in the fornices.

In treating this condition, all that is necessary is to make a crucial incision, and I prefer to do this after labour has been in progress and during a uterine contraction, when the part is on the stretch. If recognized during pregnancy, it is better not to interfere. It is sometimes not even necessary to make incisions; the tips of the fingers or the point of a dilator is sufficient to remove the obstruction, after

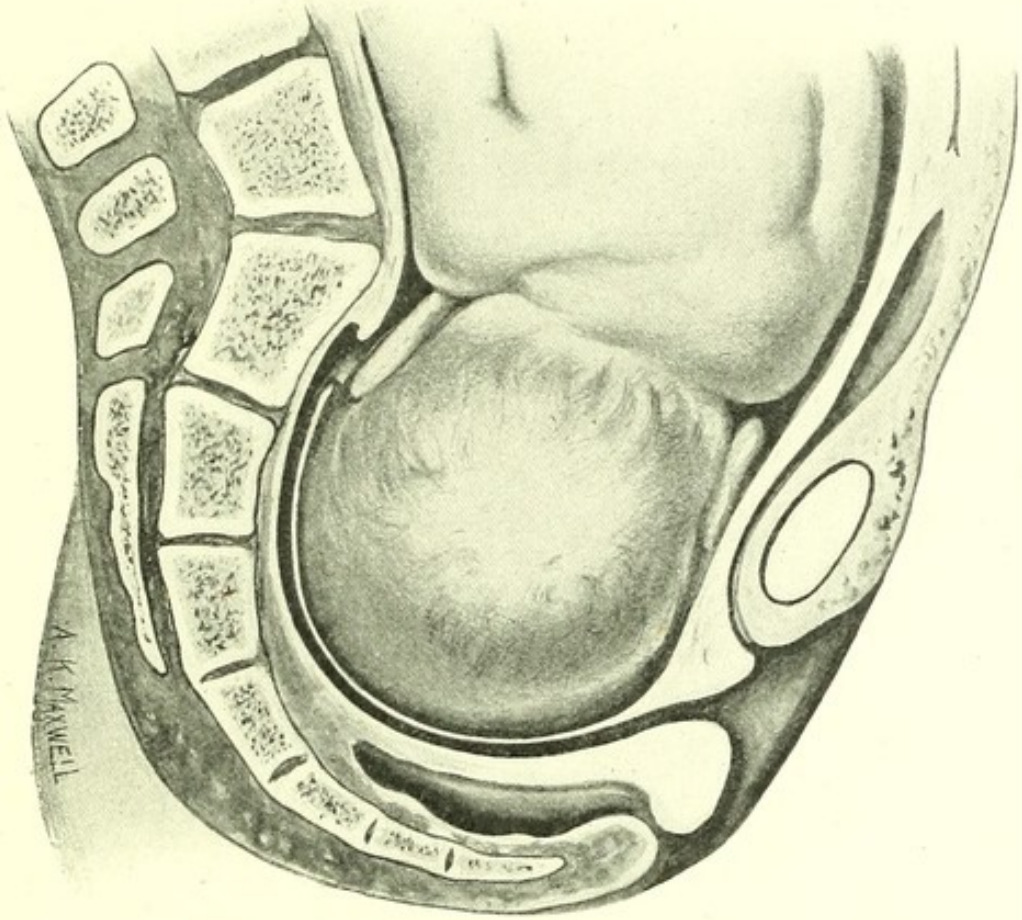


FIG. 116.—The Anterior Lip of the Cervix, very much thinned out, with the Os Externum but little dilated high up in the Posterior Fornix.

which Nature completes the dilatation herself. It is surprising in these cases where incisions are made that there should be so little tearing of the cervix. In several cases I have carefully examined the cervix after delivery, and found wonderfully little laceration. Of course, if extensive tearing does result, the laceration must be carefully stitched.

A condition somewhat similar is where the anterior lip becomes very thinned out, and where at first no os can be detected. On more careful examination it is found away up behind (Fig. 116). This condition is sometimes referred to as a backward displacement of the

os, but the description is not correct, for it is really an undue stretching of the anterior wall. A corresponding condition of the posterior wall with the os high up in front I have never seen; it is, however, described.

Upon three occasions I have observed a cervix in which there was neither rigidity nor atresia of the os, and yet the cervix would not dilate. The curious feature in such cases (the women were all primagravidæ) was that the os could be stretched with the greatest ease. It felt as if there was a circular thread preventing dilatation. It appeared to me like the open mouth of a muslin bag drawn in by a fine thread, which, if broken, allows the bag to be immediately opened. I was interested to find that Von Bardeleben[1] refers to two similar cases where the os, from being very small, was dilated by the finger 'wie eine Irisblende' in two and one and a half minutes respectively.

Vaginal and Vulvar Obstruction.—Less common than obstruction in connexion with the cervix is obstruction in the vagina. Occasionally rigidity of the canal is encountered—more commonly, it is said, in old primiparæ, but I have found it not infrequently an individual peculiarity, and quite independent of the age of the parturient. A localized atresia, and still more a stenosis, is very rare. I have occasionally encountered the former where there had been severe laceration at a previous confinement; and I had in hospital quite recently a case where there was only a small opening through a diaphragm situated about the junction of the middle and upper third of the vagina. Sometimes, as in a case reported by Heywood Smith,[2] no opening can be discovered, although a small opening must, of course, have existed prior to conception.

Cicatrices and adhesions between the anterior and posterior walls of the vagina occasionally result from the application of caustics, from specific fevers, more especially diphtheria and scarlet fever, and syphilitic affections, and from previous injuries. Fournier[3] and Montini[4] record cases of extreme vaginal obstruction following vesical fistulæ; in both hysterectomy was necessary. Neugebauer[5] gives very complete summaries of the cases recorded to date. In a few the obstruction was congenital, and in them the atresia was very localized.

Quite recently I saw a case in consultation where a band obstructed labour. It proved to be the remains of the vaginal septum of a uterus

[1] *Archiv f. Gyn.*, 1905, Bd. lxxvi., Heft i., p. 159.

[2] *Obstet. Trans.*, vol. xxiii., p. 117. [3] *L'Obstétrique*, 1904, No. 2.

[4] 'La Ginecologia,' Ref. *Journ. Obstet. and Gyn. Brit. Empire*, April, 1906, p. 291.

[5] 'Zur Lehre von den angeborenen und erworbenen Verwachsungen und Verengerungen der Scheide,' Berlin, 1895.

didelphys. The fœtal head had passed through the septum, but further progress was arrested by the shoulders being caught by it. After division of the band, delivery of the child was easily accomplished. Similar cases have been recorded by Budin, Jacobs, and others. Extremely rare are the cases where the error of development is such that the vagina opens into the rectum or urethra.

It has sometimes happened that the hymen has not become lacerated during intercourse, and has remained more or less intact and caused obstruction to the escape of the child. Obstruction resulting from this is quite distinct from that caused by rigidity of the vulva. In one or two cases the hymen has been completely imperforate, the small opening which previously existed having become closed during pregnancy.

Hard-and-fast rules cannot be laid down as regards treatment. In most cases cicatrices yield sufficiently, and, consequently, it is not advisable to interfere during pregnancy. When they are very extensive, or when bands or a diaphragm exist, incisions may be necessary. If the obstruction is very localized, incisions may be easily and safely made, but if extensive, and especially if cicatricial, they must be made very cautiously, and with due regard to the danger of injuring bladder or rectum. The incisions may be made on either the anterior or posterior walls, but those on the anterior must not be deep. Those on the posterior wall may be made much deeper, and it is well to pass two fingers high up into the rectum and cut to the side, in order to avoid the bladder and rectum as far as possible. Speaking generally, one should delay making incisions until the obstructing band or diaphragm is put on the stretch by the presenting part. As I have said already, it is surprising how even extensive cicatrices yield.

Where the obstruction is so extreme as to render the extraction of the child impossible without extensive tearing occurring, Cæsarean section is the only alternative, as in Fournier's case already referred to. Where the hymen remains intact, incisions must be made, after which it will often be found necessary to deliver the child with forceps.

The most common site of obstruction in the soft parts, at least of primiparæ, is the perineum and vulvar orifice. Where this is due to special development of the muscles of the pelvic floor, the obstruction is readily removed by opium or disappears under chloroform anæsthesia, for it is only spasmodic rigidity. Where, however, the tissues are at fault, nothing is of any service. Fomenting the perineum by the application of hot cloths I have not found do any good. Indeed, I sometimes think it does harm, and renders the tissues more liable to tear. Nor do I think that manual dilatation of the vulvar orifice, although a method of great antiquity, is desirable or of any great service. As much time as possible should be given the head to

distend the perineum. But if that is insufficient, a lateral incision of the perineum should be made (episiotomy).

In some few cases I have seen the other extreme of the perineum relaxing too much and sagging, with the result that the head is not directed upwards round the symphysis. The trouble in such cases is at the vulvar orifice, which does not sufficiently dilate. 'Central' perineal laceration is liable to occur. In such cases, if pressure on the

FIG. 117.—Small Cyst of Vulva, which obstructed the Parturient Canal and had to be enucleated before the Child could be delivered.

perineum is not sufficient, incision is the only thing which will prevent an extensive perineal laceration.

Tumours of Vagina and Vulva.—Although I have seen many cases of cysts of the vagina and vulva, and a few solid tumours of the vagina, only upon two occasions have I encountered them in pregnant women. Fig. 117 is an illustration of one case. In the other the tumour was smaller. In both the cysts were enucleated prior to the application of forceps. Solid tumours are easily shelled out, but cysts, as they have such thin walls, are more difficult to enucleate,

and often rupture during the process. The tumours should always be removed prior to the extraction of the child.

A very unfavourable condition is an abscess of the vulvar orifice, most commonly of Bartholin's glands. I have only had one case of the kind, and upon that occasion I excised the whole gland. In such cases there is a very great danger of the parturient canal being infected, as occurred upon two occasions in the Glasgow Maternity Hospital in recent years.

I am not aware of any cases of dystocia from vesical calculus having occurred in the Hospital. The older writers frequently refer to it. One of the most interesting cases is recorded by Smellie,[1] where a large vesical calculus was discharged during labour. A permanent fistula followed. The subject of vesical calculus and other pathological conditions of the bladder, causing dystocia, are referred to elsewhere.

The diagnosis of these different conditions is not difficult as a rule, and the determining as to whether a tumour is situated in the vaginal wall itself or in bladder or rectum should not cause much trouble. Occasionally, however, tumours situated posterior to the vaginal canal may really be intraperitoneal tumours of ovary or uterus pushed down into Douglas's pouch between vagina and rectum; such cases are referred to in Chapter XV.

Hæmatoma of the Parturient Canal.

All who have had an extensive experience of obstetric practice must have encountered hæmatoma of the vulva as a complication of pregnancy, labour, or the puerperium, for although not common, it occurs about once in 1,500 or 2,000 cases. But what is not fully appreciated is that sometimes the effusion of blood occurs higher up into the loose cellular tissue about the vagina and uterus, and gives rise to a condition serious by reason of the amount of blood effused and difficult of recognition.

The extent of the effusion varies greatly, and does not always depend upon the disposition of the various layers of fascia. Certainly, if the hæmorrhage occurs below the pelvic fascia, as it does in most cases, the amount will be comparatively small and localized to the vulva, lower part of the vagina, and rectum. On the other hand, if the effusion takes place above the pelvic fascia, it usually remains localized to the lower part of the broad ligament and surrounds the upper part of the vagina. Occasionally, as there is no hindrance, the effusion extends up in front of uterus and bladder, as in Williams's[2]

[1] Smellie's 'Midwifery,' McClintock, vol. ii., Case 60, p. 1000.

[2] Trans. Amer. Gyn. Soc., 1904.

case, where a fluctuating tumour appeared above the symphysis pubis, extended outwards into the broad ligament and upwards towards the kidney. In some cases the pelvic fascia offers no barrier, and the effusion has been found to extend from the labium up to and behind the kidney, and even over the lower anterior part of the abdomen.

Hæmatoma of the vagina is most frequently recognized after delivery. In the seven cases which have been under my care it has occurred twice during pregnancy, and five times it was only recognized after delivery. According to Perret,[1] in forty-three cases it happened twice during pregnancy, six times during labour, and thirty-five times during the puerperium. Of special interest is the case recorded by Sasanoff,[2] where a hæmatoma formed in the interval between the birth of twins. Sasanoff collected five similar cases.

The general explanation given of the condition is that it results from the giving way of large varicose veins commonly found around the uterus, vagina, and vulva. That explanation, however, is questioned by many, and long ago, Perret, in a case which terminated fatally, proved that it was capillary in origin by injecting first from the vein and then from the artery. Croom,[3] in recording three cases, considered the etiology of the condition, and came to the conclusion, which was practically that of Perret, that bruising and dragging on the tissue during labour resulted in tearing of the tissue and the fine capillaries. As Barnes[4] very naïvely puts it, 'There is a glacier-like movement of the mucous membrane upon the subjacent tissue.'

It is generally stated, and one would expect that it should be so, that laborious and difficult labours favour the occurrence of hæmatoma. Nevertheless, in quite a number of cases those conditions have not been present, and, as my own two cases and many others prove, it is not very uncommon in pregnancy. Occasionally, in the external variety, direct injuries, resulting from blows, falls, etc., may produce it.

As regards the other variety, the subperitoneal hæmatoma, Williams, who recently described the case already referred to and analysed the records of thirty-three others collected from the literature, found the following conditions: In 63 per cent. the women were pregnant for the first time, and in 80 per cent. the labour was spontaneous; the weight of the children was somewhat below the normal.

The symptoms of hæmatoma are severe pain of a tearing character and, in the superficial variety, bearing down and tenesmus of the

[1] Tarnier and Budin, 'Traité d'Accouchement,' vol. iii.

[2] *Annal. de Gyn.*, December, 1884.

[3] *Edin. Med. Journ.*, 1898, vol. xxxi., p. 1001.

[4] 'Obstetric Operations,' 1886, p. 474.

bowel. It is frequently, but not always, sudden in origin, and is followed by collapse if the hæmorrhage is extensive. Naturally, collapse will be a more prominent symptom with subperitoneal hæmatoma, in which the loss of blood is generally greater, than with the ordinary vulvar or vaginal variety.

The tumour, when visible, as in the vaginal or vulvar forms, presents a typical purple and glistening appearance, and is tender and elastic to the touch. The surrounding parts, too, are displaced, but not to such an extent as occurs in cases where the effusion is subperitoneal. With the latter the uterus is displaced in various directions, forwards, backwards, or to the side, according to the situation of the tumour. The vaginal vault becomes obliterated. In extreme cases, where the amount of blood is great, a wave of fluctuation may be elicited over the lower part of the abdomen.

The diagnosis of the exact nature of the condition is quite simple in cases of the vulvar variety. With the vaginal variety, however, confusion may arise with an inversion of the uterus or a large submucous myoma protruding from the os; but only the most careless examination would result in a mistake being made, for the inverted uterus or a myoma is a body quite distinct from the vaginal walls.

With subperitoneal hæmatoma it is very different. Incomplete rupture of the uterus may present symptoms very similar, and as Williams says, 'It is impossible to distinguish the condition from a hæmatoma following an incomplete rupture of the uterus without a careful exploration of the lower uterine segment.'

The prognosis in the ordinary vaginal and vulvar hæmatoma is good, absorption usually taking place. Infection, however, may occur, and then an extensive suppurating wound results, with all the dangers of general infection. Rupture not infrequently occurs, with hæmorrhage, in some cases severe, in others, as in one recently under my care, very gradual, owing to the smallness of the opening. In my patient's case, however, this had greatly exhausted her, and she was brought into hospital very collapsed. Death has happened on several occasions.

The accepted treatment of vulvar and vaginal hæmatoma is very simple. Absolute rest in bed is all that is deemed necessary, for the effusion is usually absorbed. When, however, there is a constant trickling of blood from the sac, it is well to split open the sac, clear out the blood-clot, and stitch or pack the sac with gauze. This also applies to those few cases where the hæmatoma occurs during pregnancy or labour, and actually interferes with the escape of the child. It is better not to pull the child past the tumour, which is liable to be burst, as happened in a case recently reported.

Should the hæmatoma become infected, it is better to empty the sac and drain the cavity with gauze. In such cases very extensive destruction of the tissue may occur, as in a case under my care

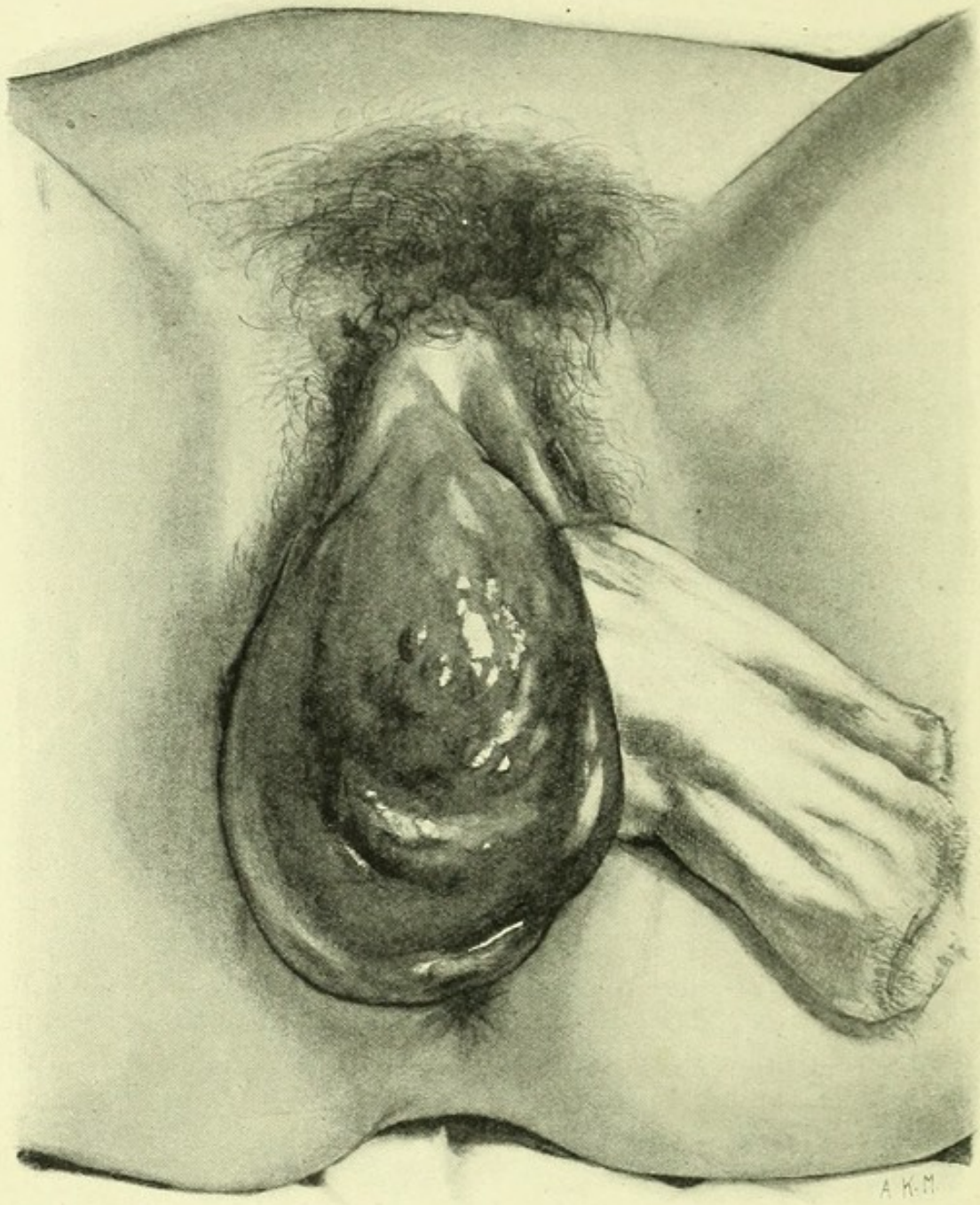


Fig. 118.—Large Hæmatoma of Vulva (Author's Case).
One end of the piece of gauze shown has been pushed into the vagina.

recently (Fig. 118); the hæmatoma became infected and the whole perineal body sloughing a large suppurating cavity formed, into which the bowel and vagina opened.

The treatment which has been sketched is that which has been generally recommended for many years. I am inclined to agree with

Walthard,[1] however, that we might now in many cases go a step further and treat the condition surgically, without waiting for indications such as hæmorrhage and suppuration—at least, in the cases which develop during or after delivery.

The subperitoneal hæmatoma of an extensive nature is upon quite another footing. Expectancy in this variety may be fatal, and, indeed, in past years, often has been. Williams advises opening into the sac from the abdomen, clearing out the fluid and congested blood, and packing the cavity with gauze. The alternative of attacking the effusion from the vagina is less favoured, although there is no doubt that one obtains better drainage by such a route; it should be adopted in those cases where the effusion involves chiefly the tissues of the pelvis. The case recorded by Walthard illustrates this.

[1] *Cent. f. Gyn.*, 1905, p. 919.

CHAPTER XIV

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Carcinoma of the Cervix.

ANOTHER variety of tumour which is occasionally found complicating pregnancy or causing dystocia is carcinoma of the cervix. The complication is a rare one. During the last six years in the indoor and outdoor departments of the Glasgow Maternity Hospital we have had eight cases, a frequency of about 1 in 2,000. Sarwey puts the frequency at 1 in 2,000, and Glochner, for Zweifel's Klinik in Leipzig, at 1 in 1,500.

The reasons for its comparative rarity are obvious. Carcinoma of the cervix, although not peculiar to the later years of reproductive life, more commonly appears then. Again, the growth itself, and the discharge which so frequently accompanies the disease when advanced, to some extent acts as a barrier to pregnancy, although I do not believe the disease in the early stages prevents conception. I know no one who supports the old view of Cohnstein[1] that the growth favours the occurrence of pregnancy.

As regards the influence of pregnancy upon the tumour, and, *vice versa*, of the tumour on the pregnancy, only a word or two is necessary. Most authorities teach that the growth advances more rapidly in the gravid than in the non-gravid uterus. Recently, however, Pinard took exception to this view.[2] Personally, I have only one case to judge by—a woman with an inoperable carcinoma, whom I watched during the last few months of her pregnancy. In her case I was not struck by any rapid increase of the tumour during that time. On the face of it, one would expect the disease to advance more rapidly if the uterus were gravid, for the parts are more vascular and the cellular tissue is looser. However, it is not a matter of very great importance, for it does not in any way affect the treatment.

[1] *Archiv f. Gyn.*, Bd. v., p. 336. [2] *Annal. de Gyn.*, 1901, p. 309.

Most modern writers, including Bar[1] and Condamin,[2] agree with the older statement of Cohnstein that the presence of malignant disease of the cervix predisposes to abortion; not only so, but that the mortality amongst fœtuses which have reached, or nearly reached, term is unusually high, according to Theilhaber as high as 47 per cent. My experience is one dead fœtus in four, and my colleague's results have been equally good, so that I cannot agree with Theilhaber. I cannot, however, go to the other extreme, as some have done, and say that the disease does not predispose to abortion or death of the fœtus, for it is inconceivable that the disease has no effect on these occurrences.

But if, as almost all admit, the presence of carcinoma of the cervix affects pregnancy but little, there is not the least doubt that in many cases it influences labour very adversely. Naturally, the cases most affected are those in which the disease is far advanced, for then the dangers most dreaded—hæmorrhage, rupture of the uterus, and septic infection—are liable to occur.

The diagnosis of carcinoma cervicis (Fig. 119) seldom presents greater difficulty in the gravid than in the non-gravid. In both it is easy of recognition when at all advanced, and very difficult when the disease is still at an early stage. The only reliable test is a careful microscopic examination of the cervical tissue. There is one point of great importance, however. The healthy cervix always becomes much softened during pregnancy, but the carcinomatous tissue does not altogether share in the softening. Consequently, the presence of any hard tissue in the cervix of a woman advanced in pregnancy, or in labour, should always arrest attention, and one should test its friability, either with the fingers or curette, and remove a small portion of the tissue. In a case recently placed under my care the medical practitioner who sent the patient to me correctly diagnosed the condition by the hardness of the cervix. This and the hæmorrhage on touching the cervix were the only symptoms.

As in carcinoma cervicis generally, the most difficult cases to diagnose are those in which the disease has originated in the cervical canal. In most of these, however, the disease is so far advanced that there is an ulcerated surface, and so the diagnosis is evident. Hæmorrhage, if the disease has advanced to any extent, is always a symptom, and must never be neglected. No matter how slight the hæmorrhage may be, its cause must always be searched for, because during pregnancy there should be absolutely no sanguineous discharge, and at the commencement of labour it should be very slight. Several writers have mentioned the frequency of pain and the early

[1] *Thèse*, Paris, 1889. [2] *Annal. de Gyn.*, March, 1905, p. 129.

appearance of it in the course of the disease; in my four cases it was not a feature.

A point of great interest, and one which, as far as I can gather from different writers, has not been emphasized, is that the proportion of operable cases amongst the gravid is much greater than amongst the non-gravid. The terms 'operable' and 'inoperable,' as applied to carcinoma of the cervix, are presumably well understood. The former implies that the operator considers it possible to remove the uterus and tumour, and the latter that he considers it impossible, or at least injudicious, to attempt it, because the disease has advanced too far.

As different operators hold very different views as to when a case is operable and when inoperable, one finds the relative frequency of each variously stated. For example, Mackenrodt[1] puts his operable cases at 92 per cent.; Olshausen[2] at 61 per cent.; Orthmann[3] at 43 per cent.; while at the other extreme there is Sinclair,[4] who gives the operable cases for the Southern Hospital, Manchester, as 22 per cent.; Munro Kerr[5] those for the Western Infirmary, Glasgow, as 18 per cent.; and Schauta[6] those for his Klinik in Vienna as 14 per cent. We cannot discuss, however, this important question of operability of carcinoma of the cervix. All I wish to point out is that, no matter upon what ground one bases one's decision as to whether a case is operable or not, it will be found that there are more operable cases amongst the pregnant than amongst the non-pregnant. Here are a few figures: For the Western Infirmary, Glasgow, as I have already stated, the operable cases between the years 1890 and 1900 numbered 18 per cent.; in the Glasgow Maternity Hospital during the last six years we have had eight cases of cancer of the cervix: only three of those were inoperable. Thus, our operable cases work out at 62 per cent. From Orthmann's cases it will be found that 40 per cent. were operable in the non-gravid, while 83 per cent. were operable in the gravid. Glochner,[7] for Zweifel's Klinik in Leipzig, 1887 to 1901, states that in 974 cases investigated the operable cases in gravid and non-gravid numbered 26·7 per cent., but in the gravid alone they numbered 82 per cent. Lastly, Spencer,[8] according to his table, found the operable cases in pregnancy and labour numbered 50 per cent.

[1] *Cent. f. Gyn.*, 1901, p. 789. [2] *Zeit. f. Geb. u. Gyn.*, 1903, Bd. l., p. 1.
[3] *Monat. f. Geb. u. Gyn.*, 1902, Bd. xvii., p. 778.
[4] *Brit. Med. Journ.*, August 2, 1902. [5] Ref. Sinclair, *op. cit.*
[6] Ref. Orthmann, *op. cit.*
[7] *Cent. f. Gyn.*, 1902, pp. 508, 1446.
[8] Trans. London Obst. Soc., 1905, vol. xlvi., p. 355.

Such a state of matters is highly satisfactory, and, if one thinks of it, it is not surprising. Advanced carcinoma must be a hindrance to conception, and, consequently, one encounters it in the pregnant comparatively seldom. More important, however, than that is the

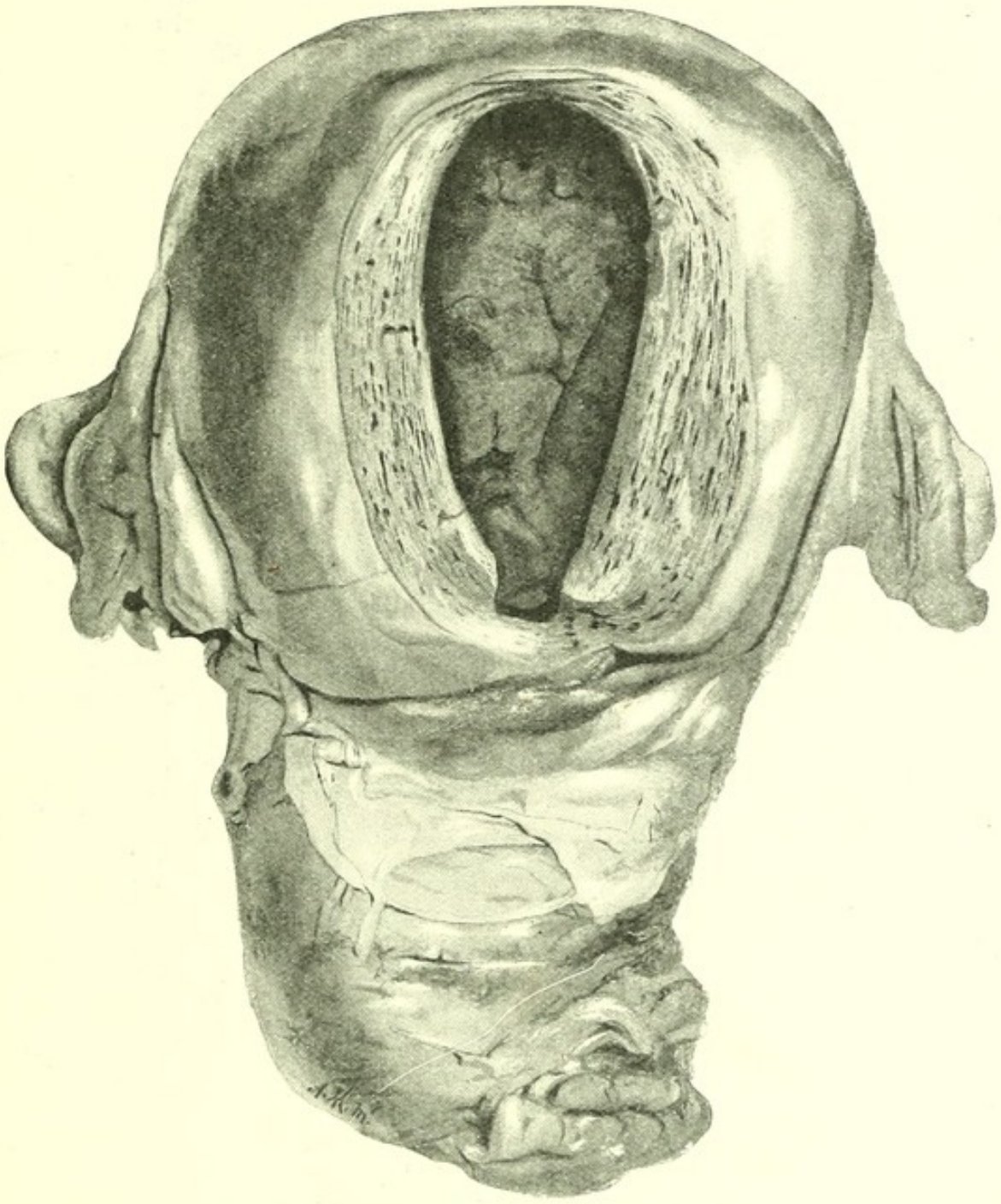


Fig. 119.—Carcinoma Cervicis. (Author's Collection.)
Child extracted by Cæsarean section, and uterus removed *per vaginam*.

fact that, if a woman the subject of carcinoma becomes pregnant, the hæmorrhage causes her to seek advice early, for she is well aware of the danger of hæmorrhage in pregnancy. Lastly, there is the labour which she is bound to go through, and which compels her to

submit to a vaginal examination, and this gives her medical attendant the opportunity of recognizing any tumour.

In discussing the treatment of carcinoma of the cervix in the pregnant or parturient, we shall first consider those cases in which the disease is not too far advanced for removal, and later those where the disease is inoperable.

Cases of Carcinoma of the Cervix complicating Pregnancy and Labour in which the Disease is not too far advanced for Removal.

One would think that it would be admitted by all that whenever a carcinoma of the cervix is recognized, be it early or late in pregnancy, the uterus should be at once removed. Yet there are a few French obstetricians—Pinard,[1] the late Varnier, Bouilly, and others—who question the advisability of immediate operation in the later months of pregnancy, and advocate instead delaying the operation in the interests of the child. Such an attitude towards operable carcinoma cervicis in pregnancy has been generally condemned, and by none more strongly than by Pinard's own countrymen, as witness the recent communications of R. and A. Condamin[2] and Pollosson.[3]

Almost all are agreed, then, that the condition must be dealt with immediately it is recognized, and most approve of removing the diseased uterus along with the ovaries. The induction of premature labour or, if the pregnancy has only advanced to the earlier weeks, the induction of abortion prior to removing the uterus has nothing in its favour. By adopting such a course one adds to the subsequent danger of the hysterectomy, which must ultimately be undertaken, all the immediate dangers of septic infection following the emptying of the uterus.

In addition, all operators, with only one exception, as far as I am aware, recommend the removal of the whole uterus. The exception is Spencer, who in a very interesting paper[4] described three cases where a permanent cure followed (the patients were still well eleven, eight and a half, and eight years after operation) high amputation of the cervix. These cases of Spencer are certainly interesting, but all operators who have lived through the time when high amputation of the cervix was practised could give similar experiences, if not in connexion with carcinoma of the gravid uterus, at least in connexion with the non-gravid. Would not an equally good result have followed hysterectomy in these cases? Spencer's answer is that it has not done so in the past, and he mentions how few permanent cures have followed;

[1] *Annal. de Gyn.*, 1901.
[2] *Ibid.*, March, 1905, p. 129.
[3] *Ibid.*, August, 1905, p. 479.
[4] Trans. London Obst. Soc., 1905, vol. xlvi., p. 355.

indeed, he was able to find only two cases. R. and A. Condamin, however, have collected quite a number of cases operated upon in pregnancy, eight of them late in pregnancy or after labour, and to which the term 'cure' may be rightly applied, for it is four or more years since the operation; besides, they mention several in which there is a good prospect of the cure being permanent. It appears to me unfortunate at this juncture, when the whole tendency is to favour radical measures in dealing with carcinoma, that this old treatment of high amputation should be revived. Without doubt, occasional successes will follow such treatment, but how is one to decide in a particular case when it should be employed and when hysterectomy is necessary? With our present knowledge of carcinoma of the cervix, be it in the pregnant or the non-pregnant, the only course is to remove the uterus and cellular tissue as early as possible, and to err rather on the side of operating too often. Whenever there is the least prospect of removing the uterus and tumour, an attempt should be made to do so, for, without doubt, occasional permanent cures follow even in apparently hopeless cases.

In dealing with carcinoma of the cervix in the pregnant or parturient, if one were to judge by current literature, the vaginal route is very much in favour. This is all the more striking when so many advocate the abdominal route for the condition in the non-gravid. The explanation, however, is simple. In recent years, since it has come to be appreciated that the gravid uterus even of four months and the post-partum uterus at term can be removed without difficulty *per vaginam*, it has become, for the time being, fashionable to adopt the vaginal route. I am inclined to think, however, that there will be a reaction, and that the abdominal route will be employed for all cases, be the disease affecting the gravid or the non-gravid uterus.

In the early months of pregnancy—indeed, up to about the end of the fourth—the ovum and uterus may be removed *per vaginam* entire. If the pregnancy has advanced beyond the fourth month the uterus must first be emptied if it is to be removed by the vagina. Vaginal Cæsarean section,[1] followed by vaginal hysterectomy, is not to my mind a wise procedure. I believe the abdominal route is the best for removing the carcinomatous uterus.

In operable cases where the pregnancy has advanced beyond the early months or the patient is in labour, the following are the alternative procedures:

(1) Cæsarean section followed by abdominal panhysterectomy. (2) Cæsarean section followed by supravaginal amputation of the uterus, with subsequent removal of the vaginal stump *per vaginam*. (3) Cæsarean section, ligation and division of the ovarian and uterine

vessels and other connexions, with removal of the whole uterus *per vaginam*. (4) Vaginal Cæsarean section followed by vaginal hysterectomy.

Naturally, in all cases prior to proceeding to the removal of the uterus, the malignant mass is thoroughly scraped and the vagina disinfected.

(1) **Cæsarean Section followed by Abdominal Panhysterectomy.** — This method of treatment is the one most generally employed. The objection to it, however, is that in pulling up the cervix through the abdomen one runs the risk of infecting the peritoneal cavity. This, however, may be avoided by carefully packing off the intestines with gauze swabs, and by removing also a portion of the upper part of the vagina, clamping the latter off before dividing it, after the manner described by Wertheim.[1] For carcinoma complicating labour at term I have only employed the operation once; the immediate result was highly satisfactory: the patient made a good recovery. Noble puts the mortality at 62 per cent. Brewis, Gemmell, and Saunderson in this country, and many others on the Continent and America, have recorded successful cases. The immediate mortality is now much lower.

(2) **Cæsarean Section followed by Supravaginal Amputation of the Uterus, with Subsequent Removal of the Vaginal Stump per Vaginam.**—This method was recommended by Zweifel. It possesses all the advantages of the abdominal route, and at the same time removes any risk of septic infection, as there is no dragging of the tumour through the abdomen. There is sometimes, however, some difficulty in removing the stump *per vaginam* if the disease has destroyed the cervix, and so the method is not much favoured. The same operation, only performed the reverse way—namely, the removal of the cervix *per vaginam*, and then attacking the uterus from the abdomen—has also been sometimes employed. It, however, possesses even greater disadvantages. Although I have adopted the latter variation, I do not favour either.

(3) **Cæsarean Section, Ligation and Division of the Ovarian and Uterine Vessels and Other Connexions, with Removal of the Whole Uterus per Vaginam.**—This method is specially associated with the name of Olshausen. It was devised with the object of getting over the danger of bringing up the septic cervix through the abdomen. I have upon one occasion employed this method, and was very satisfied with it. The uterus was readily removed, even although in the particular case I mention the pregnancy had reached term. I am inclined to think, however, that the method is unnecessarily complicated as compared with the most modern method

[1] *Surgery, Gynæcology and Obstetrics*, January, 1907, p. 1.

of performing the operation from the abdomen already described under Method (1).

(4) **Vaginal Cæsarean Section followed by Vaginal Hysterectomy.**—This is the most recent method, and is specially associated with the name of Dührssen. Several operators in Germany, more particularly Bumm and Orthmann, favour it, but it has few supporters in other countries. In Great Britain, Wilson[1] has recently recorded two cases successfully operated upon at the eighth month. Orthmann puts the mortality at 17 per cent. The method of performing vaginal Cæsarean section is described in Chapter XXVIII.

Although I have no experience of the operation for malignant disease, I have found it useful in other conditions. Personally, I am not in favour of the method for the condition we are considering.

Cases in which the Disease is too far advanced for Removal.

Naturally, the treatment to be adopted in this class of case will depend upon how far pregnancy has advanced. When the disease is discovered in the early months, the child is the one to be considered; the mother's sufferings must be relieved, but the pregnancy allowed to continue. It may be urged that this is sometimes rather cruel to the woman, and I quite agree, so that had I a case in which I believed the woman's sufferings were extreme, and that they could only be relieved by emptying the uterus, I would do so. In none of our three cases in hospital, however, has this been necessary. In none did the mothers suffer unduly during pregnancy, and in all they carried the child to near term, and were operated upon as I shall describe.

When it comes to the time, either at term or earlier, when it is deemed necessary to empty the uterus, the best method to pursue is to do Cæsarean section and then perform supravaginal hysterectomy. Hysterectomy is performed in order to remove the peurperal uterus from the danger of being infected from the septic cervix. It is thus evident that it is a distinct advantage to operate before labour has commenced, while the cervix is still closed. The stump, after removal of the uterus, may be treated either intra- or extra-peritoneally. Few recommend the latter, although Spencer in this country and Fehling in Germany do so. The object in treating the stump extraperitoneally is to shut off the cervical canal from the abdominal cavity. In the two 'inoperable' cases operated upon in the Glasgow Maternity Hospital in the last five years, one by my colleague and one by myself, on both occasions the cervical stumps were treated intraperitoneally. Both

[1] Lond. Obst. Trans., vol. xlvi., p. 378.

women were delivered of living children, and recovered without any complications. They died five and seven months afterwards respectively. Sarwey's[1] figures—60 per cent. for the conservative Cæsarean section and 54 per cent. for hysterectomy—refer to cases operated upon during labour. I do not for a moment believe that supravaginal hysterectomy during pregnancy has anything like so high a mortality, and recent records confirm this view.

In the cases which come under one's notice for the first time during labour, I believe it is well to carefully scrape and cauterize the malignant mass, provided that by such a procedure the bladder and rectum are not endangered. If they are endangered, it is better to to let the woman run the chances of sepsis. The uterus is then removed by supravaginal amputation. As an alternative to such treatment, the cervix may be scraped at the commencement of labour, and the latter allowed to pursue its natural course. The dangers of so doing are severe hæmorrhage, rupture of uterus, and sepsis. Examples of each of these complications will be found recorded. It must be admitted, however, that a very large proportion of the cases escape the complications mentioned.

Before leaving the subject I would just say that inoperable cases should always be examined a week or ten days after delivery. One or two writers have referred to the fact that these growths often assume a more hopeful appearance as the uterus diminishes in size.

[1] Veit's 'Handbuch,' p. 489

CHAPTER XV

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL *(continued)*

Tumours of the Ovary.

Tumours of the ovary are such a common occurrence that it is not to be wondered at that they should be encountered now and again in the pregnant and parturient. My records show a frequency of about 1 in 1,500, but Fehling found it as often as 1 in 891 labours. It must be remembered, however, that those engaged as specialists have many more opportunities for encountering the complication than the general practitioner, so that statistics based on hospital records or the private practice of obstetric specialists give no correct idea of the frequency of the complication.

All the different varieties of ovarian growths may be found. In the twelve cases which I have had experience of there were six unilocular cysts, two multilocular, and three dermoids.

In the 862 cases collected by McKerron[1] the following were found :

Simple and multilocular cysts (a few papillomatous) ...	594	= 68 per cent.
Dermoids	204	= 23 ,,
Fibromata or solid adenomata	19	= 2 ,,
Malignant (carcinomatous or sarcomatous)	45	= 5 ,,
	862	

The tumours are of all shapes and sizes, but in a very large proportion of cases they are small, and occupy the pelvic cavity.

There seems to be some difference of opinion as to whether or not ovarian tumours increase in size during pregnancy. Olshausen and Schauta believe they do, but Löhlein and Williams have denied this. I can give no personal experience, as I have never had cases under observation before and during pregnancy. I have always removed the tumour whenever I have recognized it.

[1] 'Pregnancy, Labour, and Childbed with Ovarian Tumours,' 1903.

Pregnancy associated with ovarian tumours is usually but little disturbed ; and if any discomforts arise, they are, as a rule, of so slight a nature as to escape recognition altogether, both the patient and doctor attributing them to the ordinary disturbances of pregnancy. In only three of my twelve cases was the condition appreciated during pregnancy. McKerron writes of the cases which come under observation : 'In over 80 per cent. no suspicion of its existence was entertained till its presence was revealed by vaginal examination in the course of delivery.'

Occasionally, during pregnancy, some pain is complained of, and not infrequently disturbance of urination. This latter symptom was markedly present in a case of sacculation of the gravid uterus caused by a broad ligament cyst, fully detailed on p. 285. Again, reflex phenomena, such as morning sickness, are sometimes very much exaggerated, as I saw in a case of lateral flexion of the gravid uterus caused by a small dermoid. It occasionally happens that the great size of the abdomen, especially if it does not correspond to the age of the pregnancy, causes disturbance in the respiratory and circulatory systems, and arrests attention ; but these symptoms are much more frequent with myomata.

Should, however, any of the accidents, to which ovarian tumours are liable, occur, attention is at once directed to the abdomen, and there is every chance of the condition being recognized. The most common accidents are rupture, torsion of the pedicle, incarceration, suppuration, and necrosis.

I have not seen torsion of the pedicle during pregnancy, but in one of my cases it occurred immediately after delivery. McKerron states that in his collected cases it occurred in 12 per cent. during pregnancy, and in as many as 20 per cent. during the puerperium. He puts the condition apart from pregnancy at 8 per cent., a figure that exactly agrees with my own experience, for in my first 100 ovariotomies, completed October, 1906, I had eight cases of torsion of the pedicle. It is therefore evident that the accident is very much more frequent in the pregnant, and especially in the puerperal, condition. I am surprised, however, that McKerron has found it so common during pregnancy. One knows that it is very common during the puerperium, but I hardly thought it was as frequent as 12 per cent. in pregnancy. The symptoms of the accident are quite distinct if the torsion is acute—sudden and severe abdominal pain, with collapse more or less profound, distension and tenderness of the abdomen, and, if the tumour is palpable, increase of its size. When the torsion is more gradual, the pain and other symptoms are less severe.

I have only once encountered rupture of a cyst associated with pregnancy—viz., when removing a dead ovum in a case of abortion. The patient complained only of a little abdominal pain, and there was a slight rise of temperature and pulse. On opening the abdomen a few days later, the collapsed cyst was removed. McKerron puts the frequency at 2·3 per cent., but the older writers put it usually at double that figure. During labour it occurs in about 13 per cent.

As regards suppuration, it is very rare indeed during pregnancy, and it is often a question if the pregnant condition has had anything to do with it. The more likely explanation is that the tumours become infected quite independently of the gravid state, or that the condition existed before the pregnancy. On the other hand, suppuration readily occurs in the puerperium if there is any infection of the parturient canal during parturition. Dermoid tumours are specially liable to be infected.

Necrosis of the tumour is likewise not uncommon, especially during the puerperium. It results from injuries inflicted by pressure, as in the very striking example of the accident recorded later (p. 231).

A very rare accident is the forcing of the tumour down between the uterus and the vagina, and the final expulsion of the tumour *per rectum* or *per vaginam*. McKerron has collected thirteen cases. Walls,[1] Sutton,[2] and Haultain[3] have recently recorded cases. In most of them the accident occurred during forcible extraction with forceps, but in one or two it occurred during spontaneous delivery. In a considerable number of the cases, especially the earlier ones, death resulted.

Another accident which has occurred in a few cases is rupture of the uterus.

The diagnosis of ovarian tumours in pregnancy is usually not difficult. It is easy when the tumour is in the pelvis (Fig. 120) and the pregnancy is not far advanced, for then one can by bimanual palpation differentiate the enlarged uterus and the tumour. Also during labour it is not difficult, for the tumour in the pelvis can be readily felt obstructing the parturient canal. Even when pregnancy has advanced to the later months, with the tumour above the brim, it is not difficult, provided the swelling is of some size. But if, as in two cases which were under my care, the tumour is placed behind the uterus to one or other side of the vertebral column, it may be impossible to reach it. In one of these (Fig. 121) I could only feel high up above the brim an indefinite fullness. I could not, even under an anæsthetic, get any tumour between my hands. In the other case the tumour was not recognized until after delivery.

[1] *Brit. Med. Journ.*, February 3, 1900.

[2] *Lancet*, February 9, 1901. [3] *Ibid.*, January, 1902.

Almost invariably—and this is a feature of great importance—the position of the cervix is altered, and most commonly it is displaced forwards and to one side. If the tumour is large, it may also be

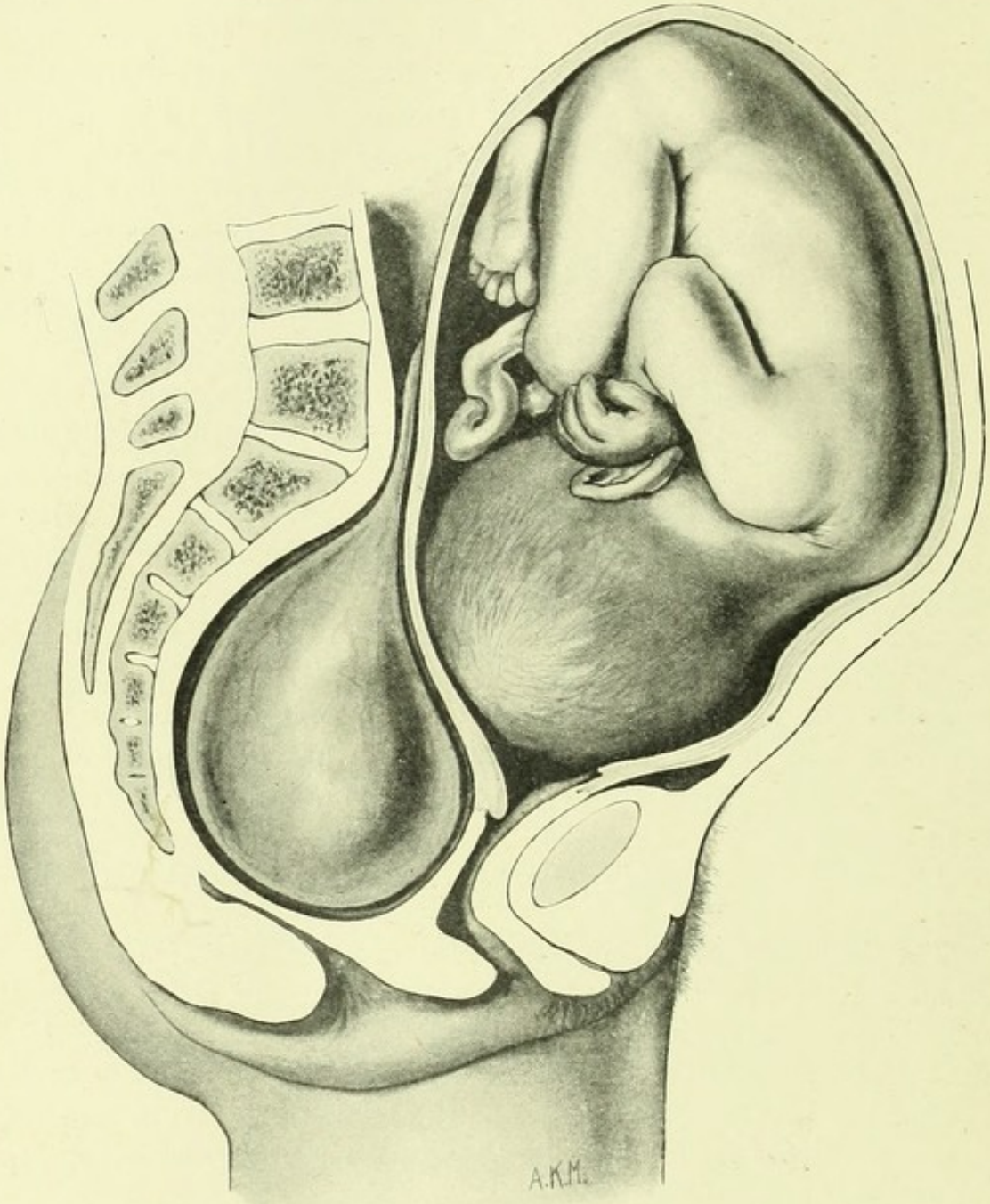


Fig. 120.—Ovarian Cyst entirely in the Pelvis. (Author's Collection.)
This tumour was pushed out of the pelvis in the second stage of labour, and the child extracted with forceps. The tumour was removed three weeks after the confinement by abdominal section.

displaced upwards, although that is a much more common feature of myomatous growths.

So far I have been considering the cases where pregnancy is

a certainty, but the tumour is doubtful. Before the uterus has increased in size, it is often difficult to make sure of pregnancy even with the pelvic organs in a normal condition. Much more is this the

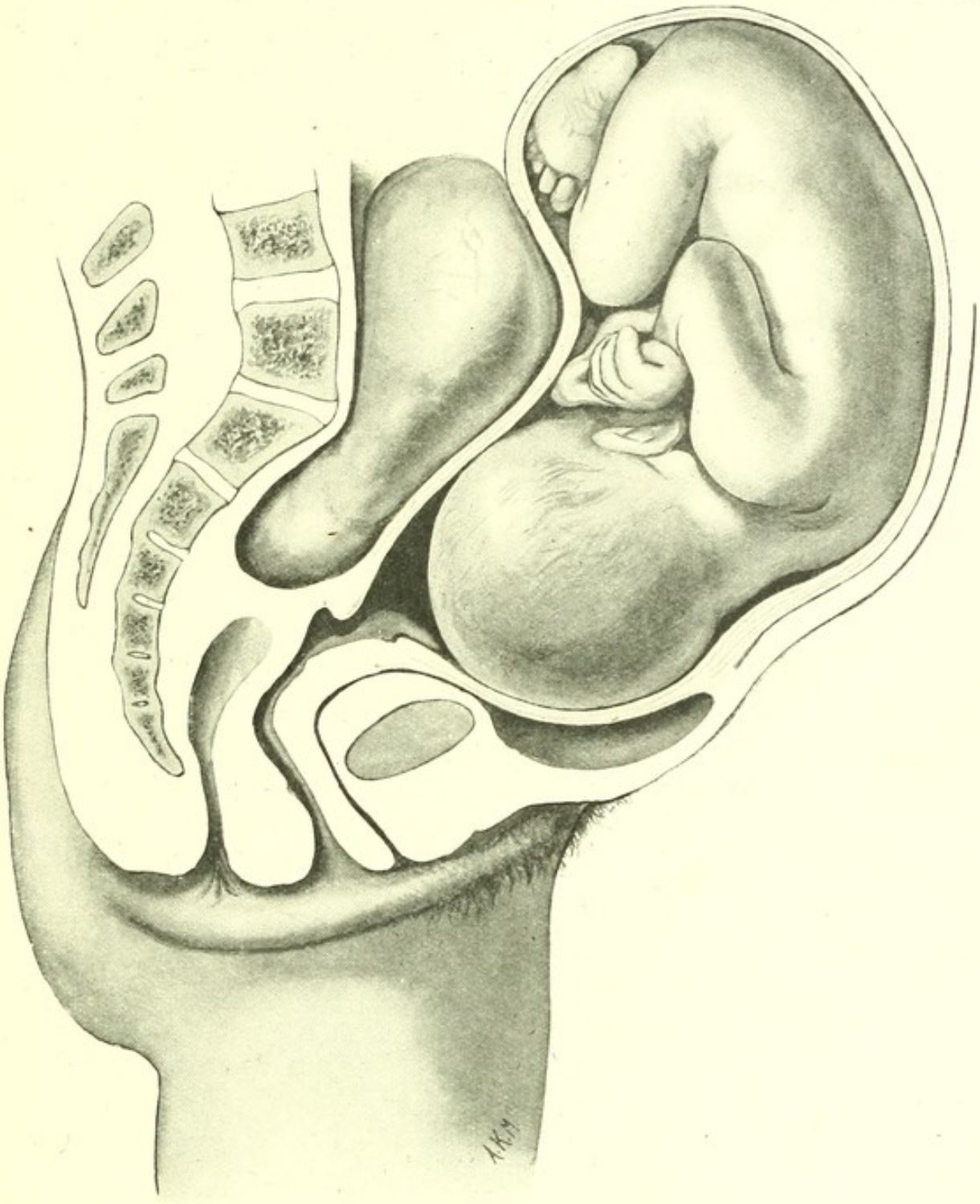


FIG. 121.—Ovarian Cyst which in Part projected into the Pelvis. (Author's Collection.)
This tumour was removed by abdominal section during labour, the child being afterwards extracted with forceps.

case with an ovarian tumour above the brim. The objective symptoms of pregnancy, however, the changes in the breasts and cervix, and,

above all, a steady increase in the size of the uterus, are the indications one relies upon. In this connexion, it must not be forgotten that the subjective symptom of suppression of menstruation is by no means an uncommon feature of ovarian cystomata, quite apart from pregnancy.

Even with a tumour in the pelvis the differential diagnosis may sometimes be difficult. This is seen in two conditions in particular —retrodisplacement of the gravid uterus and extra-uterine pregnancy. Both may simulate or be simulated by an ordinary uterine pregnancy complicated by an ovarian cyst. It is rarely, however, that a careful consideration fails to clear matters up. The absence of the fundus in front and, if the fundus is incarcerated, as the case of retrodisplacement, the difficulty of urination, make the diagnosis easy. Softness and immobility of the tumour and irregular hæmorrhages are the features most to be relied on in the case of extra-uterine pregnancy.

The prognosis when pregnancy or labour is complicated by ovarian tumours is very different to-day as compared to twenty or thirty years ago. The reason for this is obvious. Removal of the tumour during pregnancy has been substituted for expectancy, and displacement or removal during labour has been substituted for dragging the child past the obstruction with forceps or by traction on its legs.

It is now generally accepted that when an ovarian tumour is discovered during pregnancy it should be removed at once, and this no matter what the size, nature, and position of the tumour may be. The extremely good results following abdominal section during pregnancy justify this decided attitude. McKerron, from his analysis of 480 cases, found a maternal mortality of only 5 per cent. In many of these cases, moreover, the injury which the tumour had undergone, and the general condition of the patient at the time of the operation, were really responsible for the death. He writes: 'During the last twelve years no fewer than 299 ovarian tumours during pregnancy have been recorded. Although in many of these acute symptoms existed at the time of operation, only ten of the patients died, or a mortality of 3·3 per cent.'

My own experience is in entire agreement with these figures, for on the few occasions upon which I have operated all the patients made uninterrupted recoveries. On one occasion the operation was of extreme difficulty, for the cyst was a broad ligament one which had burrowed away down into the cellular tissue behind the rectum.

But the results are most satisfactory from another standpoint— viz., pregnancy in a very considerable number of cases is not disturbed. As regards my own four cases, two were aborting at the time they were placed under my care; in the other two the

pregnancy continued undisturbed. Even in the case quoted in which I removed the cyst from the broad ligament in the fourth month the pregnancy continued undisturbed. Curiously enough, of the recorded cases of removal of intraligamentary cysts during pregnancy, in very few has the pregnancy been disturbed. There are comparatively few cases recorded; but it stands to reason that the more difficult the operation, and the more extended the handling of the cyst and the abdominal and pelvic organs, the more likely will labour be induced. As far as can be judged, the pregnancy is less likely to be disturbed when the operation is performed in the early months, as can be seen from McKerron's table:[1]

Total Cases.			Recent Cases.		
Month of Pregnancy.	Number of Operations.	Pregnancy interrupted and Child lost.	Number of Operations.	Pregnancy interrupted and Child lost.	
				All Cases.	Excluding complicated Cases.
		%		%	%
Second.	39	10 = 25·6	28	6 = 20·7	5 = 18·5
Third.	102	19 = 18·6	60	9 = 15	5 = 8·8
Fourth.	84	12 = 14·2	60	7 = 11·6	3 = 5·3
Fifth.	55	14 = 25·4	38	8 = 21	2 = 6·2
Sixth.	22	11 = 34·3	22	8 = 36	4 = 22·2
Seventh.	23	9 = 39·1	15	5 = 33	3 = 20·0
Eighth.	14	6 = 42·8	7	4 = 57	4 = 57·1
Ninth.	7	1 = 14·2	6	0 = 0	0 = 0

Michin[2] gives for ten cases in the Maternity Department of the University of Charkow 100 per cent. maternal recovery and 90 per cent. pregnancy uninterrupted. These figures correspond very closely to the latest statistics of Graefe.[3] The latter author finds that in 215 cases performed since 1902 the maternal mortality was only 0·47 per cent., and the cases where labour was induced only 16 per cent.

With results so good for mother and child, is an expectant attitude ever justifiable? As regards tumours recognized early in pregnancy, it must be a very rare case indeed in which one is justified in leaving matters to Nature, for early in pregnancy, the uterus being small, the cyst can be removed without difficulty, and with a comparatively small abdominal incision. On the other hand, late in pregnancy, seeing that labour is more frequently induced, one may be justified in delaying operation for the sake of the child until shortly before term, when it matters little whether labour comes on or not.

[1] *Op. cit.*, p. 114.

[2] Ref. *Cent. f. Gyn.*, 1903, p. 318.

[3] *Zeit. f. Geb. u. Gyn.*, Bd. lvi., Heft iii.; ref. *Journ. Obst. and Gyn.*, October, 1906.

If such a step is taken, the patient would require to be kept under most careful observation. There is, however, one great objection to this course. Not infrequently ovariotomy late in pregnancy and during labour is rendered difficult by reason of the size of the uterus. This difficulty, of course, may be overcome by bringing the uterus out of the abdomen and replacing it after removing the tumour, although such a step is naturally undesirable, as it involves making a very long abdominal incision.

But if the treatment to be adopted with ovarian tumours during pregnancy is self-evident, it is very different when these growths are discovered and have to be dealt with during labour. It is useless to say that abdominal or vaginal cœliotomy should always be performed, for that is not practicable. How could a country practitioner, for example, perform abdominal section in a farmhouse, many miles from his home, without appliances or assistants? Yet any practitioner in the country may be placed in such a position, and, as a matter of fact, a friend of mine had exactly such an experience. It is perfectly apparent, therefore, that the treatment to be adopted depends largely upon whether or not one is within easy access of a hospital or nursing home, or can get assistants and appliances at short notice.

Without doubt, theoretically, the ideal treatment is to remove the tumour by the abdomen or the vagina, and then to remove the child *per vias naturales*. But, apart altogether from the fact that such a treatment necessitates suitable assistants and appliances, it must not be forgotten that an abdominal section performed upon a patient hurriedly prepared is not unattended with risks to the patient, for careful cleansing of the skin of the abdomen and thorough evacuation of the bowels prior to the operation are important factors in preventing sepsis. Still, making allowance for that, immediate ovariotomy gives better results than any other treatment. Here is a recent example.

One morning, two years ago, I was asked by Dr. J. Wright, of Glasgow, to see a multipara, about eight months pregnant, who had been many hours in labour. The cause of the delay, he believed, was an abdominal tumour. When I examined her, I found labour was well advanced, but the head was prevented from entering the brim by reason of a tumour, the lower margin of which could be felt projecting over the pelvic brim. This was even more clearly made out after emptying the bladder. She was removed to the Maternity Hospital, where I performed laparotomy. There was some little difficulty in reaching the tumour, but that was ultimately accomplished by turning the uterus out of the abdomen. After removing the tumour, the uterus was replaced. The delivery of the child was completed by forceps.

There is a certain number of cases in which, even when the abdomen is opened, and even after the uterus has been turned out, it is not possible to remove the tumour. In such, the only course open is to perform Cæsarean section, extract the child, and then deal with the tumour. That such a treatment is occasionally necessary is quite certain, and it is foolish for some writers to say that Cæsarean section is never necessary in cases of ovarian cystomata. Backhaus[1] and Van der Briele[2] recently recorded cases, the former where a dermoid and the latter where a broad ligament cyst existed, which could not be dealt with until the uterus was emptied.

What might be done in the case of broad ligament cysts is simple puncture from the vagina, for one knows that such a treatment cures many of these cysts. Couvelaire[3] actually did this, and delivered the child *per vaginam*, and found, some years later, no trace of any tumour. Even if one did not diagnose the exact condition until the abdomen was opened, it might be quite sound treatment, instead of trying to enucleate the cyst, to tap it from below.

More commonly, however, the difficulty has been in getting the tumour out of the pelvis, as in the recently recorded cases of Füth[4] and Sippel.[5] In such cases, as I have already mentioned, it is often sufficient to turn out the uterus and then remove the tumour.

McKerron was able to collect in 1903 only nine cases of abdominal ovariotomy during labour. Since then a large number of cases have been recorded, and all with most satisfactory results.

Good results have also been obtained from vaginal ovariotomy during labour. The cases which are suitable for this treatment are small tumours low down in the pouch of Douglas, so that one can be sure of getting a pedicle long enough to allow of a ligature being applied. I have twice had experience of this operation—once for an ovarian tumour and once for a pedunculated myoma which bulged down into the vagina. I had no difficulty in removing the tumour first, and then the child, and finally stitching up the vaginal incision. In the case of the myoma, when tying the pedicle, the latter gave way, but as the tumour was a myoma, I did not think it necessary to open the abdomen, for the gauze which I pushed into the pouch of Douglas, when removed after the birth of the child, was quite dry. There had been no bleeding. Ranch[6] has recorded a similar accident in the case of vaginal ovariotomy. In that case—and this should always be done in the case of ovarian tumours—the abdomen was opened and the pedicle secured.

[1] *Cent. f. Gyn.*, 1901, p. 763.
[2] *Ibid.*, 1902, No. 51.
[3] *Soc. d'Obst. de Gyn. et de Péd. de Paris*, July, 1902.
[4] *Cent. f. Gyn.*, 1902, No. 51.
[5] *Monat. f. Geb. u. Gyn.*, April, 1905.
[6] Inaug. Dis., Leipzig, 1903.

Personally, I have no great liking for vaginal cœliotomy, for both in the cases referred to and in others which I have performed on the non-pregnant there has been some little difficulty in securing the pedicle. In theory the operation is very simple. An incision being made over the tumour, and the pouch of Douglas opened, the tumour is pulled out through the wound. The pedicle is then tied. In doing so it is well to pass the ligatures through its tissue, so that when the pedicle is cut and the tension upon it removed the ligature will not slip. After the tumour has been removed, the wound in the vault of the vagina is stitched. No drainage is necessary. The child should then be extracted by forceps, or the delivery left to Nature. In some few cases, to be referred to later, the tumour, if it cannot be removed, may be evacuated of its contents, provided it is cystic, secured by a ligature, and removed after the delivery of the child, when the pedicle is relaxed, owing to the uterus being so much smaller.

As regards the results obtained from this method, they are highly satisfactory. McKerron collected seven cases, all of which recovered. Since then many other cases have been described. The strongest advocate of the vaginal route is Dührssen ;[1] but even he is forced to admit that there is sometimes difficulty with the pedicle, and that the patient must be prepared for the abdominal operation.

But, as already stated, the ideal treatment of immediate ovariotomy is not always possible, as, for example, in the two following cases :

A patient was sent to me by Dr. Jackson, late of Sanquhar, a few months after her confinement, on account of a painful swelling, which could be felt low down in the left iliac fossa. She resided at a distant farm, several miles from the doctor, who arrived when labour was far advanced. On examination, he found that the child's head was prevented from descending by reason of a small ovarian tumour. He had only his ordinary obstetric instruments, and had no assistant beyond a neighbour, who had come in to lend a hand. He tried to displace the tumour, but failed. As he wrote to me, he had therefore no alternative, as far as he could see, but to puncture the tumour and deliver the child. This he did. The woman's recovery was uninterrupted. After seeing the patient, I sent her into hospital, and was present when abdominal section was performed. The operator found the tumour most intimately attached to the bowel, and he had great difficulty in removing it. The patient died of sepsis a few days after the operation.

Late one evening, a few years ago, I was asked by Dr. Cooper, of Dennistoun, to see a multipara whose labour was protracted on account of a small tumour which he diagnosed as being of

[1] *Deut. Med. Woch.*, October 13 and 20, 1904.

ovarian origin. The os was fully dilated and the tumour was pressed far down by the child's head. The surroundings being unsuitable for abdominal section, we decided to try to displace the tumour from the pelvis, and extract the child before having recourse to vaginal cœliotomy. Dr. Cooper put the patient deeply under chloroform. I only succeeded in dislodging the tumour, however, after I had pushed the fœtal head out of the pelvis. A living child was extracted by forceps. Some weeks later I removed the tumour—a small dermoid—by abdominal section. The operation was very easy, and the patient made an uninterrupted recovery.

Without doubt, when the surrounding conditions are not favourable for abdominal or vaginal cœliotomy, the best course to pursue is to push the tumour out of the pelvis. In doing this, it should always be remembered that it is of great advantage to have the patient deeply anæsthetized; also, when pushing up the tumour, to dislodge the presenting part from the pelvis, as was done in the last case described.

The results obtained by this treatment show a mortality of 5·7 per cent., a mortality only slightly worse than those following ovariotomy.

So far, the courses sketched—viz., removal or displacement of the tumour—are those which should be followed if possible. When, however, we come to the last group of cases, in which these forms of treatment are deemed unsuitable or impossible, we find at once differences of opinion. One thing, however, is certain—that it is never justifiable to pull the child past the obstruction, either by forceps or by traction on the legs. Craniotomy will help but little, and is not to be considered, even if the child is dead. The results of pulling a child past the obstruction are most disastrous, for the maternal mortality is somewhere about 30 per cent. with such treatment. Rupture of the cyst or severe injury, with subsequent necrosis, are the usual accidents which follow. Here is a case which illustrates the danger of this treatment.

A patient was admitted to the Western Infirmary, under my care, four days after a very difficult and tedious labour. She had an extremely rapid pulse, a temperature of 102° F., and looked and felt very ill indeed. On examination, I found a large soft tumour behind the uterus. I was informed that the delivery of the child, five days prior to the patient's admission, was accomplished with great difficulty by means of forceps, owing, the doctor said, to the presence of a tumour in the pouch of Douglas. Two or three days later I performed abdominal section, and removed a necrotic multilocular cyst. So necrosed was the tumour that it broke in pieces as I removed it. The woman died the following day.

Brute force, in this as in all other obstetric operations, may there-

fore be dismissed. There remains, consequently, only one course—to puncture or to incise the cyst. It must at once be admitted that many disapprove entirely of this treatment, and, rather than have recourse to it, advocate the removal of the patient to a home or hospital, or sending for an obstetric surgeon, even although such a course involves many hours' delay. I have great sympathy with such an attitude, but I cannot quite agree to so extreme a position, for I do think there are cases occasionally encountered when puncture or incision must be resorted to.

To simply puncture the tumour, unless it is a broad ligament cyst, is undesirable, for it is a haphazard treatment, and will result almost certainly in some of the contents of the cyst escaping into the abdomen and infecting the peritoneum. To be quite exact, however, one must admit that the contents of ovarian cystomata is generally sterile.

A better course is the following:

The vaginal walls being held back by retractors, an extensive incision is made over the projecting tumour. The bleeding is seldom great, and can be easily controlled. When the peritoneum is reached it should be opened with scissors. Two fingers are then introduced into the pouch of Douglas, and the tumour, if possible, pulled out. If the pedicle can be safely ligatured and the tumour removed, this should be done. If not, the tumour should be freely incised and the contents evacuated. If then a loop of silk can be passed over the collapsed tumour, this should be done, the long ends being drawn outside the vagina. The tumour should then be packed with gauze, and a little strip of gauze pushed up beyond the tumour. By such a device one can keep the tumour well against the vaginal incision. The child should be extracted immediately if this is possible, if not the case should be left till the os is sufficiently dilated. After the child is extracted and the placenta expelled, the lips of the cervix should be grasped with volsellum forceps (or a ligature applied through them), and slight traction made on the uterus. The ligature which is round the ovary should then be pulled upon, and pressure made on the uterus from above. By these means the ovary may now be brought within reach, and its pedicle ligatured and tied. The vaginal wound should then be closed, or a little loose packing left in for twenty-four hours.

Simpler than such a procedure is the suggestion of Fritsch, to stitch the sac to the edges of the vaginal wound; but it is not always easy to pass sutures in the vagina, and the sac of all ovarian tumours is very friable. I agree with Spencer, therefore, that it is better to pack the sac with gauze.

At any time in the puerperium one may be called upon to remove a tumour which has been displaced or punctured, for complications are very liable to follow labour. I have had experience of, or seen in the practice of colleagues, twisting of the pedicle, suppuration and necrosis, adhesions to the bowel, and even obstruction of the bowel.

I have already detailed a case in which necrosis followed. Here is one in which the pedicle became twisted.

Mrs. A——, multipara, was admitted to the Western Infirmary, under my care, in September, 1906. She was in an extremely collapsed condition; the pulse could hardly be counted, and she had a temperature of 101° F. Her abdomen was greatly distended and very tender. The history obtained from her medical practitioner was to the effect that ten days previously she had been delivered of a full-time child without any great difficulty. The practitioner was aware of the presence of a cystic tumour. Shortly after delivery she complained of abdominal pain, which steadily increased. A diagnosis of an ovarian cyst with a twisted pedicle was made, and the abdomen opened. The tumour was found most intimately adherent to the surrounding structures. It was removed with no great difficulty. Two complete twists from left to right were found in the pedicle. The patient died the day following the operation.

All operators refer to the complications which I have mentioned. Doran says that in fifteen cases operated upon shortly after birth, there were no complications in only three, and Kynoch,[1] in three cases operated upon during the puerperium, found necrosis in one and suppuration in another.

Bearing in mind such records, it is advisable always to remove the tumour as soon as possible after delivery, and immediately any untoward symptom appears. Within the last few months I have removed upon two occasions an ovarian cyst early in the puerperium. In the one case the operation was performed on the second day, and in the other on the fourth day after the confinement. The results in both cases were highly satisfactory, and neither of the patients were much disturbed.

[1] *Journ. of Obst. and Gyn. Brit. Empire*, September, 1906, p. 270.

CHAPTER XVI

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Fibro-Myoma of the Uterus.

In considering the subject of fibro-myomata and parturition, I have found it impossible to do so without also discussing these tumours as they affect, or are affected by, pregnancy and the puerperium. I have, however, omitted entirely, as being outside the province of this work, the question of the influence which the tumours have upon fertility—a subject which has aroused a considerable amount of interest in recent years. I would refer those interested in that matter to the writings of Pinard,[1] Hofmeir,[2] Haultain,[3] and Olshausen.[4]

It appears to me desirable to consider the subject under the following heads: (1) The effect fibro-myomata have upon pregnancy, labour, and the puerperium; (2) the effect pregnancy, labour, and the puerperium have upon fibro-myomata; (3) diagnosis; (4) treatment.

1. The Effect Fibro-Myomata have upon Pregnancy, Labour, and the Puerperium.

The frequency with which myomatous tumours of the uterus are encountered in the pregnant and parturient is most difficult to estimate, as is evidenced by the figures of different writers, for while one observer only records tumours of considerable size, another includes every small nodule which he happens to recognize when palpating the gravid uterus. In the Clinique Baudelocque, during the ten years ending December, 1904, Pinard found, out of 21,891 deliveries, 171 women with fibro-myomatous tumours (0·7 per cent.). Although I cannot give my own figures, I am not surprised at this apparently high percentage, for, in common with others, I have found

[1] *Annal. de Gyn.*, January, 1905. [2] *Zeit. f. Geb. u. Gyn.*, 1900, Bd. xlii., p. 383.
[3] 'System of Gynæcology,' Allbutt, Playfair, and Eden, 1906, p. 269.
[4] Veit's 'Handbuch der Gyn.,' 2nd edition, 1906, Bd. i., p. 791.

myomata very frequently when palpating the uterus during pregnancy and labour.

The frequency of these growths is of interest quite apart from the abstract question of frequency, for it is evidence of the enormous number of women who are performing their various duties, and more particularly that of reproduction, without being much disturbed by the presence of these tumours. Indeed, so much has this impressed all specialists who have had experience of obstetrics, as well as gynæcology, that, speaking generally, their attitude towards myomata complicating pregnancy and parturition is very conservative.

In the Glasgow Maternity Hospital during the last six years, in which time we have had fully 35,000 cases of labour, as far as I can discover, cœliotomy has only been necessary upon three occasions. At various times, in recent discussions at the London Obstetrical Society, Cullingworth, Herman, Lewers, Routh, Spencer, and Donald, have pointed out the infrequency with which major operations are necessary in pregnancy and labour. Spencer,[1] for example, was able to say that at the University College Hospital in fourteen years, during which there had been, roughly speaking, 35,000 cases of labour, he had only once required to perform cœliotomy and remove the uterus. In America it is exactly the same; while in France such an authority as Pinard[2] stated that for the years 1895-1901 inclusive, in 14,000 cases, myomata were found present in eighty-four. Of these, sixty-six went to term, thirteen had premature labour, and five aborted; in only four cases was it necessary to interfere with the pregnancy. In Germany the views of practising obstetricians and gynæcologists are equally emphatic, as witness the recent writings of Olshausen, Hofmeir, Winter, and a host of others.

But having said so much regarding the harmlessness of fibro-myomatous tumours of the uterus in pregnancy and parturition, let us consider the complications which do arise occasionally as a result of their presence.

Naturally, one would expect that the presence of myomata in a gravid uterus would predispose to abortion and hæmorrhage, and this, indeed, is the teaching of the older writers. The frequency of such occurrences, however, has been overestimated, for, except in cases where the tumours, by their size and disposition, interfere with the growth of the uterus and with its circulation, they are surprisingly infrequent. In my experience, they have been only slightly more common in cases of myomata, and most modern obstetricians hold similar views, as may be judged by the writings and remarks of the various authorities already referred to.

[1] Lond. Obst. Trans., vol. xliii., p. 202. [2] *Annal. de Gyn.*, September, 1901.

Undoubtedly, the most important disturbances produced by myomata, and those which most generally furnish the indication for operative interference, are the symptoms generally referred to as 'pressure symptoms.' The growing tumour and uterus increase in size to such an extent that the functions of the surrounding organs are interfered with, more especially if the tumour is impacted in the

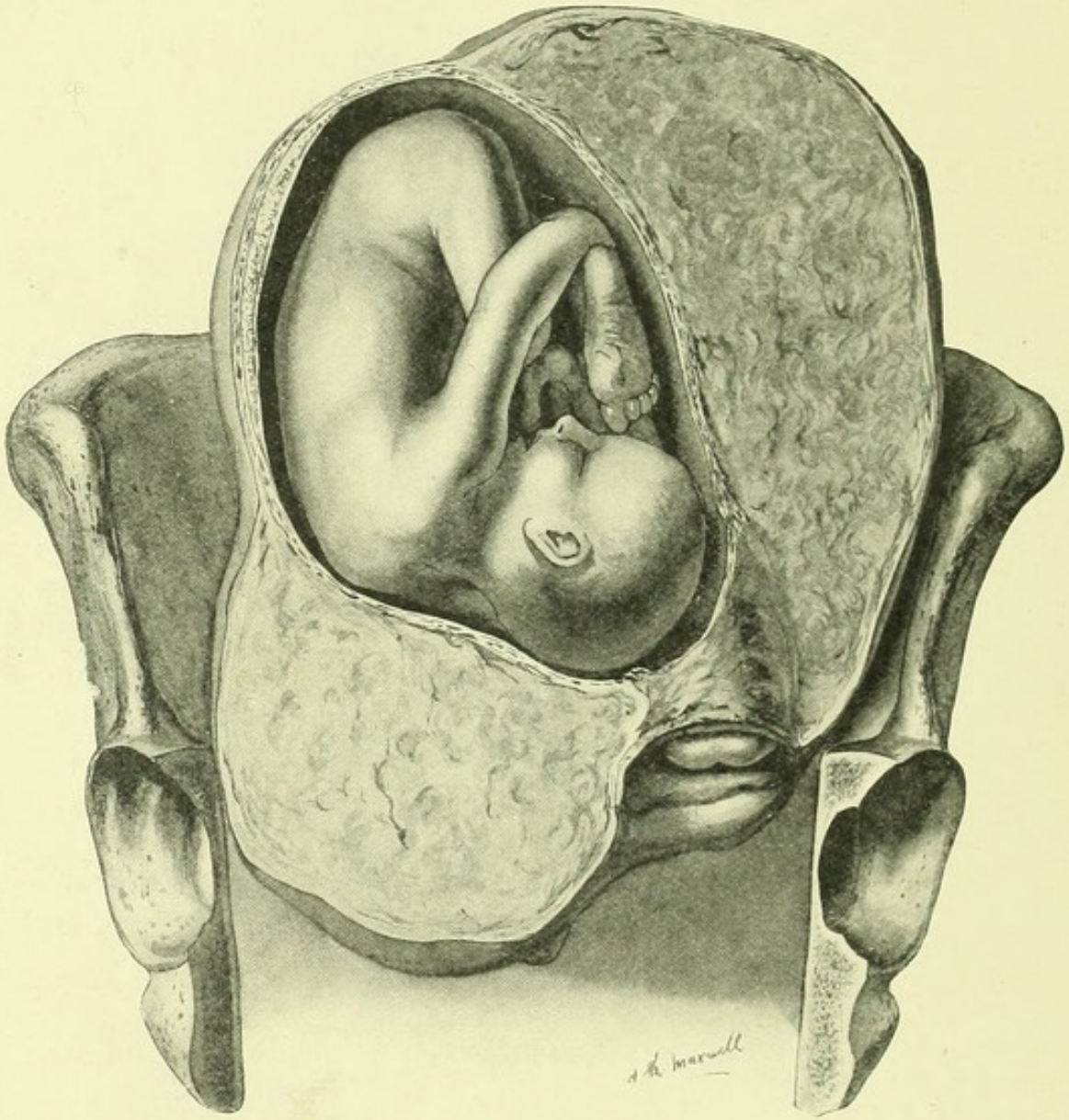


Fig. 122.—Fibro-Myomata associated with Pregnancy. (Author's Case.)

pelvis (Fig. 122). The organs most commonly pressed upon are the bladder, urethra, and bowel; but the larger vessels, especially the veins, have often their circulation decidedly interfered with, and, if the tumour and uterus grow to an enormous size, cardiac and respiratory functions are very much disturbed.

While slight interference with the structures and organs named may be permitted, whenever disturbances in them become marked

and relief cannot be obtained by rest and ordinary means, operative interference becomes imperative.

An unfavourable situation of the placenta, more especially placenta prævia, has been frequently referred to. Olshausen says that implantation of the placenta over the tumour, owing to its frequency, is more than a coincidence. He thinks that possibly the mucous membrane over the portion of the tumour being thickened and bulging into the cavity may favour the implantation of the ovum to that locality. Wertheim,[1] however, questions this, and refers to a case of Schwarzenbach, where the portion of the placenta situated over the tumour was very thin and poorly developed. Manual removal of the placenta may be rendered difficult by the intimate connexion between placenta and tumour, difficulty in reaching the placenta because of the tumour has been mentioned by several writers including Donald, Von Treub, and Freitch. Puppel[2] in one case, after repeated attempts, found it necessary to remove the patient to hospital and have hysterectomy performed.

Retrodisplacement of the uterus, even incarceration, has been observed once or twice, and a few years ago I saw a sacculation of the gravid uterus caused by a myoma of the anterior wall.

It is very doubtful, however, if spontaneous rupture of the uterus during pregnancy has ever resulted. Olshausen very rightly questions Hagan's case.[3] Eckstein[4] records a case where rupture followed a very difficult extraction, owing to a submucous myoma obstructing the canal; but in that case the rupture was not spontaneous.

Fibro-myomata of the uterus may interfere with the course of labour by mechanically hindering the progress of the child through the parturient canal and by distorting the uterus, and so favouring malpresentations and malpositions of the child.

As regards dystocia, of much greater importance than the size of the tumour is its situation. The growths which cause difficulty are those situated low in the uterus, especially those of cervical origin; also pedunculated myomata, as, for example, a case which was recently under my care, and is described later. But tumours of the body of the uterus, if they extend downwards into the pelvis, may also give trouble during parturition, although it is surprising how many of these growths, even when of considerable size, become displaced from the pelvic brim by the uterine retraction or by slight pressure from below. Hofmeir, Cullingworth,[5] Spencer, and many others, refer

[1] Winckel's 'Handbuch,' Bd. ii., Teil i., p. 444.
[2] *Deut. Med. Woch.*, December 17, 1903.
[3] *Amer. Journ. of Obst.*, vol. xxvii., 1893, p. 305.
[4] *Monat. f. Geb. u. Gyn*, Bd. xviii., Heft v.
[5] St. Thomas's Hospital Report, 1899.

specially to such an occurrence. The explanation of such cases is that the tumour is really implanted in the uterine body above the lower segment.

If the tumour only overhangs the brim during pregnancy, it will almost certainly not cause any trouble by mechanically narrowing the canal during labour. On the other hand, a tumour which projects into the pelvic cavity, and is not pulled out of it by the uterine contractions, nor displaced by manual pressure, should be very carefully watched, and operated upon if the pressure upon it is too severe.

Dystocia may also result from unfavourable positions and presentations assumed by the fœtus. This applies almost exclusively to tumours situated in the lower portion of the body and cervix. In such cases, from the summaries of various writers, Olshausen found vertex, breech, and transverse presentations 54 per cent., 24 per cent., and 19 per cent. respectively.

Lastly, labour may be disturbed by uterine inertia and post-partum hæmorrhage. The former has been vaguely referred to by one or two writers; but it is very doubtful if it is much more common in women the subjects of uterine myomata than in those whose uteri are presumably healthy. Post-partum hæmorrhage is a more serious matter, and is especially favoured by implantation of the placenta over the tumour. A case of the kind occurred recently in the Maternity Hospital.

2. The Effect of Pregnancy, Labour, and the Puerperium upon Fibro-Myomata of the Uterus.

But while labour and the puerperium may be disturbed (as described) by the tumours, the latter, in their turn, are liable to various alterations, and these we must now consider.

The most evident effect pregnancy has upon fibro-myomata is to cause an increase in the size of the tumours. For the most part, it is only interstitial tumours which are affected, but even subserous growths may become enlarged if their attachment to the uterus is still extensive. The increase in size is very largely caused by œdema, although there also occurs a distinct, if varying, hypertrophy of the muscle cells, with the result that the tumour becomes more elastic. During the puerperium the size decreases with the involution of the uterus. It is very questionable if the tumour ever disappears, although a small nodule is sometimes all that remains of a large growth. This increase of the tumour during pregnancy and its atrophy during the puerperium has been often observed. Recently, however, I had under my care a case in which the tumour did not

decrease after pregnancy; indeed, it steadily increased, the pregnancy appearing to start its active growth.

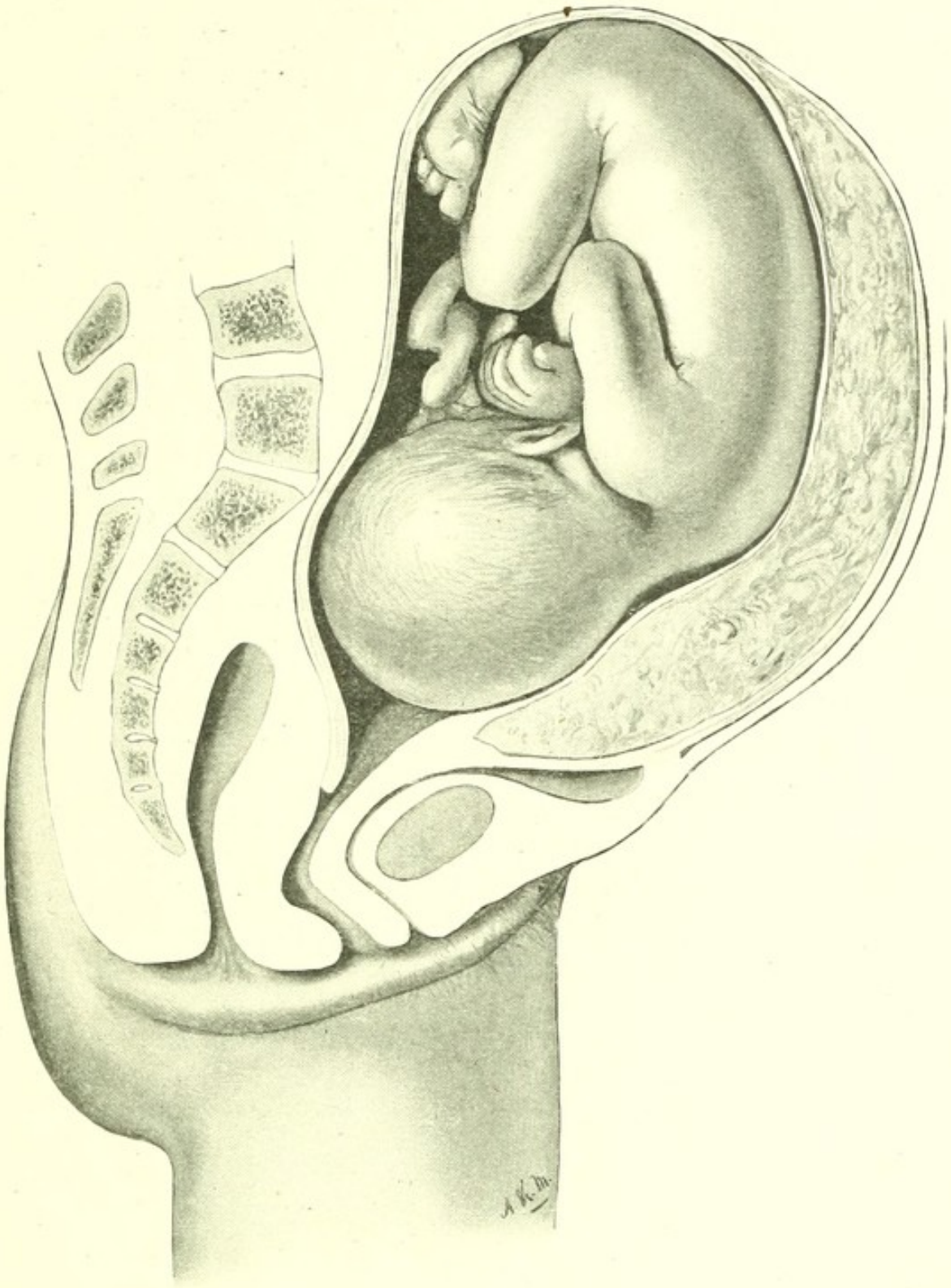


FIG. 123.—Large Fibro-Myoma in Anterior Wall flattened out. (Author's Case.)

The fœtal parts could not be felt, nor could the fœtal heart sounds be heard. The child was delivered at term alive. The author had enucleated a large fibroid from the body of the uterus some six years before.

But, besides being altered in size and consistency, the tumours often becomes altered in shape by the gravid uterus. Very often they become much flattened out, and if situated low down on the body wall or cervix, this may result in a portion of the tumour being displaced downwards into the pelvis. Recently I saw a patient in whom the tumour had been so evenly flattened out on the anterior uterine wall that I could not distinguish it from the anterior wall (Fig. 123). Indeed, it was not until after delivery that the large tumour was recognized. The peculiar feature was the impossibility of palpating the fœtal parts, and the impossibility, on the most careful and repeated examination, of discovering any evidence of the fœtal heart. The living child, which was large, was delivered with forceps.

In tumours which become pedunculated, torsion of the pedicle has only very occasionally occurred. The features of such a complication are the same as those which follow twisting of the pedicle of an ovarian cyst: severe and sudden pain, with tenderness over the tumour, and sometimes increase in its size, although the latter feature is not so marked in the case of a pedunculated myoma. At any time the tumour may become impacted in the pelvis, and give rise to all the symptoms characteristic of such a condition—great pain, nausea, dysuria, and difficult defæcation. Should such symptoms be present, and the tumour intimately connected with the uterus, it may be extremely difficult to say which part is tumour and which the gravid uterus.

Until a few years ago, what has been said regarding the effect of pregnancy and labour upon fibro-myomata would have been sufficient, as the only recognized reasons for interfering with such growths were pressure symptoms or an obstruction in the parturient canal. Recently, however, another indication for operative treatment has been brought forward by some writers, and in this country more especially by Bland-Sutton—viz., degeneration of the tumours. This author claims that degeneration of fibro-myomata during and as a result of pregnancy is a common occurrence, and so far, indeed, has he gone that he recently published a paper entitled 'The Inimicality of Pregnancy and Uterine Fibroids.'[1] While obstetricians and gynæcologists are greatly indebted to Sutton for all he has done for gynæcology, and while they admire the cleverness of this title, they cannot but feel he has greatly exaggerated the danger, in all probability because, being a general surgeon, he sees only the serious cases of fibro-myoma in pregnancy, but does not see the hundreds of cases which they see, and which never cause any trouble.

According to Sutton, a special feature of these fibro-myomata which undergo degeneration during pregnancy is pain and tenderness

[1] 'Essays on Hysterectomy,' 1904.

in the tumour. The degeneration is very generally the variety known as 'red degeneration,' in which the cut surface of the tumour resembles a raw beefsteak. I quite agree with Sutton that pain in fibro-myomata should always arrest attention; but from my own experience I do not attach the same importance to pain in these tumours in pregnancy. In the last eighteen months I have seen in consultation three cases of myomata complicating pregnancy in which pain in the tumour was a marked feature. In all three the pregnancy was allowed to continue undisturbed, and no untoward symptoms arose either during parturition or the puerperium. I informed the medical attendants of the patients that I was prepared to operate at any time if any unfavourable symptoms developed, or if the pain became excessive. In this connexion Stewart[1] described a case in which a myoma associated with pregnancy was removed because of the pain complained of. The tumour presented no unusual appearance.

As bearing upon this subject, the remarks made by Pinard on two cases shown by Lepage[2] are of special interest:

'I desire to add some further information about the two patients whose histories M. Lepage has just related to you. He has not laid sufficient stress on the condition of the women when they entered the Clinique Baudelocque, nor of the treatment which was there followed. These women, with the uterus crowded with fibroids, suffered terrible pain, and complained continuously. I believe that many surgeons, had they examined at that moment, would have thought, in view of the general bad condition of the patients, that the time had come for surgical interference, and would have performed extirpation of the uterus. I ordered these women complete rest in bed, a milk diet, and regulated the urinary and intestinal functions. Little by little the pain passed away; there has been no hæmorrhage, and in the uterus of these elderly primiparæ, crammed with fibroids, the children have developed sufficiently to be born, of average weight, at full term.'

But apart from the subject of the degeneration of fibro-myomatous tumours during pregnancy, which, after all, is a matter no one can generalize upon with the evidence at present at our disposal, there is no doubt the tumours are occasionally injured during parturition. Here, again, situation is of more importance than size, for, naturally, tumours in the upper part of the uterus are more likely to escape injurious pressure than those situated in the lower areas of the body and cervix.

Injuries were much more frequent when it was the practice to

[1] *Brit. Med. Journ.*, 1906, vol. i., p. 548.

[2] *Comptes Rendus de la Société d'Obstét. de Gyn. et de Péd. de Paris*, October, 1903; ref. *Journ. Obst. Gyn. Brit. Empire*, 1904, vol. v., p. 60.

drag the child past the tumour, as then it was bruised and crushed between the fœtal head and the bony wall of the maternal pelvis. As in ovarian growths, the injuries to the tumours may not be immediately evident, the disturbances, such as pain, rise in temperature or pulse from infection, and other symptoms, only appearing a few days after delivery. Personally, I have been struck with the danger of infection. I have four cases in my mind, three of them seen by me in consultation after delivery, where serious septic disturbances followed parturition. In fact, one patient died, and two escaped only after weeks of illness. In all the tumours were situated low down on the uterus, and, although no great force was used in delivering the child—for, as a matter of fact, only in one case was forceps used—I have little doubt but that the tumours were injured during parturition. Hofmeir, writing in 1896, says: 'I cannot deny that I have often contemplated the puerperium with great anxiety.' In a later paper[1] he speaks less seriously of the condition. Olshausen, Winter, Wertheimer, and many other Continental writers, express similar views. The practical bearing of this is that the puerperium should be carefully watched in all cases where the tumour has been compressed between the fœtus and the bony canal, and the tumour, with or without the uterus, removed should any complication arise.

Expulsion of the tumour from the uterus during or after delivery has been observed by several writers. A few years ago, when examining a primipara who had been in labour some hours, I discovered a firm body within the os and slightly in front of the presenting head. At first I took it to be the cord, but on more careful examination under an anæsthetic I discovered it to be a flattened myoma, of about the size of a pigeon's egg. I removed the tumour, and allowed the labour to proceed (Fig. 73).

A most interesting case is one reported by Seeligmann,[2] in which that operator removed by 'morcellement' a submucous myoma, the size of a fœtal head, without disturbing an eight weeks' pregnancy. The tumour was forced through the os externum, and this was accompanied by severe pain and excessive bleeding. There are not a few records of such tumours being expelled during the puerperium. Many years ago Priestley[3] recorded a case in which he removed one on the fourteenth day of the puerperium. The tumour was deeply embedded in the uterus, and had retarded the delivery very much. Herman[4] showed one which presented at the os uteri ten days after delivery. Many similar cases have been described.

[1] *Zeit. f. Geb. u. Gyn.*, 1900, Bd. xlii., p 383.
[2] *Cent. f. Gyn.*, 1902, No. 21, p. 547.
[3] Lond. Obst. Soc. Trans., vol. i., p. 217. [4] *Ibid.*, vol. xxxiii., p. 31, 1892.

Finally, inversion of the uterus may occasionally follow, and a few examples of that accident are recorded by Tarnier and others. Quite recently Mackenrodt reported one.[1]

3. Diagnosis of Fibro-Myomata complicating Pregnancy and Labour.

The diagnosis of a fibro-myoma of the uterus during pregnancy may be easy or difficult, and the ease or difficulty will depend very much upon the form and situation of the tumour and the age of the pregnancy. The tumour, which is irregular in outline, projects laterally, is pedunculated, and pushes the uterus over to the opposite side or bulges down into the pelvis and displaces the uterus, so that it is almost impossible to reach the cervix, can be recognized by anyone. On the other hand, the tumour smooth in outline and moulded on the uterus, as in a case I have already referred to, may be impossible to differentiate from the uterus.

But there is the other diagnostic difficulty—the recognition of the pregnancy. If the pregnancy is still only of a month or two's duration, it is, as a rule, impossible to be quite certain of its existence; while, on the other hand, if it has advanced to mid-term or further, one can usually, unless it is very much embedded in tumour tissue, be quite certain regarding it.

At an early stage, when the abdominal swelling is of comparatively small size—say, about the size of a sixteen to twenty weeks' pregnancy—mistakes may be made in several ways, and, to illustrate this, let me mention a very striking one made by myself.

Several years ago my house-surgeon in the Glasgow Maternity Hospital and I diagnosed a subserous myoma complicating pregnancy in a patient who was sent to the Maternity Hospital as a case of extra-uterine pregnancy. She complained of great pain and tenderness over the uterus, which was distended by an eighteen to twenty weeks' pregnancy. On palpating the abdomen, an elastic swelling could be detected in the antero-lateral wall, and, presuming that the pain was caused by some change in the tumour which we were satisfied we felt, I opened the abdomen. Greatly to my chagrin, I discovered a normal gravid uterus, without the slightest trace of any tumour in its substance or its neighbourhood.

It seems extraordinary that such a mistake should occur. That it not infrequently happens, however, is evidenced by the fact that I have twice been asked to see similar cases. There are two explanations of such phantom uterine tumours during pregnancy. One is

[1] *Zeit. f. Geb. u. Gyn.*, 1903, Bd. xlix., Heft i., p. 145.

that portions of the uterus are seized between the palpating hands, and the other that areas of the gravid uterus contract, and sometimes remain contracted for some time. The latter peculiarity has been remarked on by several writers, but by none in so interesting a manner as by Bar, who calls attention especially to a partial contraction of the anterior surface of the uterus associated with great pain—exactly the features my case presented. He mentions how sometimes it is only by repeated examinations that the phantom nature of the tumour can be recognized.

Upon two occasions, with very unusual varieties of extra-uterine pregnancy, I have had difficulty in making up my mind as to whether the tumour was an ectopic sac or a myoma in a gravid uterus. One was a case of tubal pregnancy which had advanced to about the thirty-sixth week, when the body of the uterus felt like a myoma, and the sac like the ordinary gravid uterus. The other was an interstitial ectopic pregnancy of about the fifth month. In both cases, however, the history directed one to a correct appreciation of the nature of the swellings. They are referred to and figured in Chapter XXXII.

Sometimes for a week or two one is in doubt as to whether the tumour one feels is a rapidly growing myoma or a pregnancy. In many such cases it is both, as I experienced lately. A myoma seldom grows as rapidly as a gravid uterus, but I saw one recently which started growing very rapidly, and caused the patient's physician and myself to be in doubt about the case for a few weeks. Time, however, invariably clears up such cases, and unless there is some great urgency for operating it is as well to delay doing so.

If the tumour is subserous, and has a distinct pedicle, the error may very easily be made, as happened to me in the case I have recorded (p. 251), of considering the neoplasm ovarian in origin. Likewise, if the tumour is submucous, and is projecting into the lower part of the uterine cavity, it may be mistaken for the child's head, or, if small, for the cord, which happened to me in a case also referred to (p. 134). Another mistake which I have twice seen made with abdominal tumours of this size, but one which, so far, I have not been guilty of, is confusing the gravid uterus with a pedunculated fibroid. As all are aware, in the gravid uterus about the sixteenth week there is great mobility between the body and cervix, owing to the softness of the tissue at the junction of these two parts. The illustration (Fig. 124) explains how the mistake may arise—viz., through the examiner pressing the cervix between his hands, and taking it for the entire uterus.

Then, again, if the myoma is spread out over the surface of

the uterus, the tumour or the pregnancy may be overlooked. If the tumour is on the posterior wall, the gravid sac is readily palpable; but if the tumour is on the anterior wall, it may push the fœtus altogether out of reach, as in the case illustrated (p. 239). In such cases a rectal examination is of great value. Rosthorn,[1] for example, was able to get ballottement through the rectum in a case where he could not make out the fœtus from the abdomen. A rectal examination may also be of value when the differential diagnosis is between a retroflexion of the gravid uterus and a myoma complicating pregnancy.

The important symptoms of pregnancy—softening of the cervix, partial discoloration of the vagina, suppression of menstruation—are, with few exceptions, present. The softening of the cervix, however,

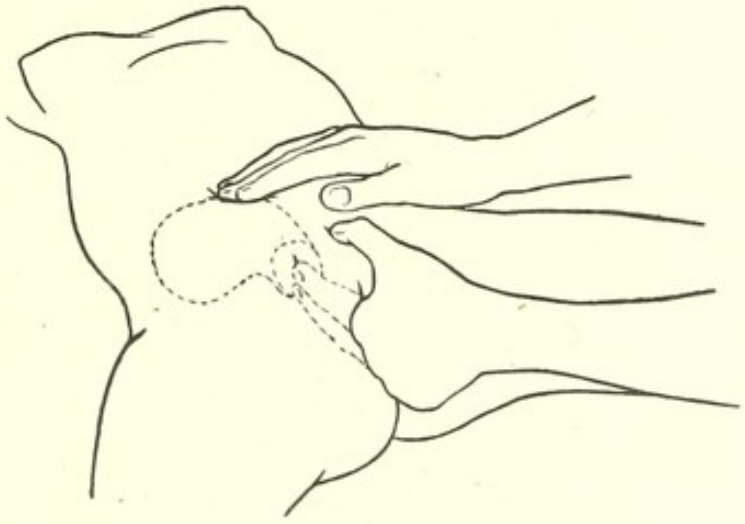


FIG. 124.—Mistaking a Lateral Flexion of the Uterus Gravid to Four Months for a Myoma.

especially when the tumour is situated low down on the uterus, is often not so characteristic as in an ordinary pregnancy, although it is seldom absent. Discharges of blood may occur, and may resemble menstruation, but they are invariably slight, and are not common unless in cases of abortion. Still later, the fœtal heart sounds, if present, make pregnancy a certainty, although their absence, even in the later months, cannot exclude it.

In the other class of cases, where it has been decided that a pregnancy exists, and the uncertainty is regarding the myoma, only careful palpation and consideration of the condition can decide matters, and my advice is, in all cases of doubt, to take time, and make one or two examinations before coming to a decision.

It has occasionally happened that mistakes have occurred in con-

[1] Ref. Olshausen, *op. cit.*

fusing a myoma with a second fœtus, not only during pregnancy, but even during labour, after the first child has been born. Indeed, once or twice an accoucheur has waited patiently for what he thought was the second child, when what he really had to deal with was a large myoma. The other mistake of confusing a second child, either during pregnancy or after the birth of the first, with a myoma is less excusable.

4. Treatment of Fibro-Myomata complicating Pregnancy, Labour, and the Puerperium.

What has been said regarding the features of fibro-myomata in the pregnant and the parturient may have left the reader in some doubt as to the indications for surgically interfering with them. Before discussing, therefore, the methods of operating, let me in a word or two summarize my previous remarks, and indicate the cases in which interference is necessary.

1. Tumours should only be removed during pregnancy if, on the one hand, they are distinctly endangering the life or seriously disturbing the functions and general health of a patient, and, on the other hand, if they are undergoing serious degeneration or injury. Also, in the interests of the child, when at all possible, interference should be delayed until the later weeks of pregnancy.

2. Speaking generally, whenever a tumour, at the end of pregnancy or during labour, is decidedly obstructing the parturient canal, and that tumour cannot be displaced out of the pelvis, it should be removed, with or without the uterus.

3. All tumours which have been injured during labour, or which show signs of undergoing marked degeneration, or have become infected after parturition, should be removed, with or without the uterus, as early as possible.

One's attitude, therefore, to fibro-myoma in the pregnant is to operate only if interference is distinctly indicated. Possibly, as the years go by, the indications for interfering may become less restricted, and may more closely correspond to those which hold for ovarian growths; but at the present time gynæcologists who have had experience of obstetrics operate upon myomata in pregnancy as seldom and as late as possible.

Pregnancy.—When a fibro-myoma causes such disturbances in pregnancy that interference becomes necessary, it will be found very often that the tumour is impacted in the pelvis. In certain cases, by digital pressure from the vagina, with the patient in the knee-elbow or Sims' position, the growth may be dislodged; but in a very large

proportion that simple treatment fails, and more radical methods have to be employed.

In former years induction of abortion, or, if the pregnancy had advanced to the later weeks, induction of premature labour, was the treatment generally recommended and practised. Such treatment, however, has been entirely abandoned. For my part, I can conceive of few circumstances under which it is indicated, for, even if it is successfully carried out—and that is not always an easy matter, owing to the distortion of the uterus—one has in no way improved the condition of the woman, for the operation would require to be repeated should she again become pregnant. I have said there are few circumstances under which premature emptying of the uterus is indicated, and some may say there are none. I could, however, conceive it justifiable if the woman was suffering from some grave concurrent disease which rendered an abdominal operation a matter of extreme gravity. Even in such a case, however, the accoucheur would require to satisfy himself that the bringing on of abortion or labour would not be a greater tax upon the woman than abdominal section.

In only a comparatively few cases is it possible to remove the tumour by the vagina. Small pedunculated myomata lodged in Douglas' pouch, pedunculated submucous tumours projecting from the os, and cervical myomata of small size, may, however, be removed by that route, and in many cases without disturbing the pregnancy.

Enucleation of a cervical myoma from the vagina should only be attempted if the tumour is of moderate size and entirely in the pelvis. It is sometimes not easy to decide such a matter, for only a portion of the tumour may be projecting into the pelvis. One can usually tell, however, if there is any mass above, by pushing the uterus or child into the pelvis and observing how the tumour descends. Also, by making a rectal examination one may be able to define the tumour if it is situated behind the uterus. It is not wise to attempt to remove large myomata by enucleation through the vagina; nor are the extensive vaginal incisions recommended by Dührssen suitable for such cases.

By far the largest proportion of cases which require surgical interference cannot be safely attacked from the vagina, but must be approached from the abdomen.

When abdominal interference is deemed necessary in cases of myomata complicating pregnancy, the operator has two alternatives to choose from—removal of the tumours, and hysterectomy in some form or other. It will be admitted by all that, if a myoma is pedunculated, the rational treatment is to ligate and divide the

pedicle, just as one would do in the case of an ovarian cyst. Of such cases, Olshausen in 1896 collected twenty-six cases. Of these, six died, or 21 per cent. Of the twenty-three which lived, abortion occurred in only three, or 12 per cent. Twenty-one per cent. in no way represents the present-day mortality, however, for the operation should really have a death-rate little different from ovariotomy. Thumin,[1] writing in 1901, collected sixty-two cases which had been recorded between 1885 and 1900, and they gave a mortality of 9·6 per cent., and resulting abortion in 18 per cent.

But of much greater interest are the results following myomectomy or enucleation. The operation of enucleation has come into great favour in recent years, and very rightly so, for, theoretically, it is the ideal operation. There is this also to be said in its favour when employed on the gravid uterus, that at such a time one sees the uterine tumours at their worst, for they are much enlarged, and if they happen to be multiple they are much more distinct. In two respects the operation is a most satisfactory one. The existing pregnancy is disturbed in less than a third of the cases, and the uterus is left for future pregnancies. As regards results, Thumin in 1901 collected forty cases, which gave a mortality of 5 per cent., and resulting abortion in 29·6 per cent.

In this country in recent years there have been many cases recorded, and a great many more which have never been reported. Donald[2] and Sutton[3] have each referred to cases in which they had enucleated a fibro-myoma from the gravid uterus without disturbing the pregnancy; while Thring[4] has reported six cases, all of which recovered, and in five of which pregnancy was undisturbed. Equally good results have been described by Doran[5] and Routh.[6]

It is evident, therefore, that the treatment of fibro-myomata by enucleation is most encouraging, and, if the tumours were only single, would be the method invariably employed. In many cases, however, this variety of tumour is multiple, and the uterus is so extensively invaded that there is no possibility of removing all the tumours. As regards such cases, when many tumours exist, it is quite impossible to lay down any hard-and-fast rules regarding treatment. It is, however, interesting to know that Emmett[7] removed nine myomata from a gravid uterus without disturbing the pregnancy.

Another matter of satisfaction is that, even although the tumour

[1] *Archiv f. Gyn.*, vol. lxiv., 1901.
[2] Lond. Obst. Trans., vol. xliii., p. 180. [3] 'Essays on Hysterectomy,' 1904.
[4] *Journ. Obst. and Gyn. Brit. Empire*, September, 1906.
[5] *Brit. Med. Journ.*, 1906, vol. ii., p. 1446.
[6] *Clinical Journal*, May 23, 1906. [7] *Amer. Journ. of Obst.*, September, 1901.

is deep in the uterine wall, it may be enucleated with safety to the patient and the fœtus. Several cases have been recorded where the operator actually exposed the decidua. Of such cases, one described by Mackenrodt is most interesting. A woman three months pregnant complained of pain and fever. Mackenrodt considered it to be arising from a uterine myoma undergoing degeneration. He enucleated the tumour, and in doing so exposed the decidua. The patient recovered and did not abort.

The ease with which the tumour comes out of its bed during pregnancy, and especially during the puerperium, is well known to all operators, so that part of the operation is comparatively simple. The treatment of the raw surface left is of greater importance. Donald[1] recommends closing it in layers, and uses catgut. He attaches great importance to making very shallow layers, as otherwise too much tension is thrown on the uterine wall, and in that way he thinks abortion is favoured. Certainly, careful stitching of the uterine wound is of the greatest importance, for, apart altogether from the risk of abortion, which, after all, although disappointing, is not serious, there is the distinct danger of rupture of the uterus and hæmorrhage. I can find no recorded case of rupture following, but there have been several where hæmorrhage from the uterine wound continued and necessitated the removal of the uterus.

But more frequently the operator chooses hysterectomy. No doubt the brilliant results obtained by operators in this and other countries will encourage others to consider fully the advantages of enucleation before having recourse to an operation which removes all chance of subsequent pregnancies.

The two methods of hysterectomy, open to one before the child is viable, are supravaginal amputation and the removal of the entire uterus, or panhysterectomy. Naturally, if the child is viable, one would first perform Cæsarean section. As all operators are agreed that panhysterectomy is a little more difficult and complicated than supravaginal hysterectomy, and as its mortality is slightly higher (although the statistics do not support the last contention), it is apparent that supravaginal amputation is the operation of choice, and panhysterectomy need only be had recourse to under special circumstances. The most obvious compelling circumstance is when the tumour or tumours have so altered the position and shape of the cervix as to render amputation through it wellnigh impossible. Another indication is infection of the cervical canal.

A considerable number of cases of hysterectomy have been recorded. Thumin collected fifty-six cases of panhysterectomy, with a mortality

[1] Lond. Obst. Trans. vol. xliii.

of 8·9 per cent., and eighty-nine cases of supravaginal amputation, with a mortality of 11 per cent. Winter, still later, puts the mortality at 7·7 per cent. and 9·9 per cent. respectively. It would appear, therefore, that total extirpation is attended with a rather smaller mortality than amputation. Routh's[1] figures are 16 per cent. and 21 per cent., but they do not represent the mortality of the respective operations at present, as they are taken for older records.

As regards this country, numerous successful cases of hysterectomy have been recorded by Cullingworth, Cameron, Donald, Sutton, Herman, Spencer, Lewers, Doran, Routh, and many others. A very large proportion of these writers favour supravaginal amputation.

Labour.—Before considering in detail the different methods of treatment of fibro-myomata in labour, let me caution against dragging the child by force past a tumour. Such treatment is most unwise. Consequently, forceps, version, and craniotomy, be the child dead or alive, do not come into consideration at all, unless the obstruction is so slight as to be almost negligible. It may, of course, be necessary to complete delivery by one of these methods, but none of them should be had recourse to when there is a decided obstruction. It is quite unnecessary for me to give figures to prove the disastrous results following such treatment as forcible extraction with forceps, version, craniotomy, induction of labour, and abortion; and, indeed, I could only give old statistics, such as those of Süsserott and Lefour, published many years ago. Only if one were placed in some out-of-the-way country district would the treatment be justifiable. Under such circumstances, however, I would consider the risks of a long journey, even a very long journey, to a hospital or nursing home infinitely less grave than those involved in pulling a child by force past an obstructing fibro-myoma.

Many of the tumours which project into the pelvis may be pushed up, and are even dragged up, by the contractions of the uterus. Tumours of the cervix, however, cannot, as a rule, be so dealt with. They must either be removed by the abdomen or by the vagina. When possible they should be removed by enucleation. They can, as a rule, be easily shelled out after the capsule is split. Amongst the early recorded cases of vaginal enucleation of cervical fibroids is the one described by Braxton Hicks.[2] He tried to deliver with forceps, but failed. The tumour was easily enucleated, and he delivered a living child with forceps. One of the most recent cases of this nature is the one described by Robinson,[3] where a large

[1] *Brit. Med. Journ.*, 1905, vol. xi., p. 803.
[2] Trans. Lond. Obst. Soc., vol. xii., p. 273.
[3] *Brit. Med. Journ.*, 1906, vol. ii., p. 1637.

myoma growing from the posterior lip of the cervix was enucleated, and afterwards the child was delivered with forceps.

The simplest of all myomata to remove are the pedunculated. They may be either subserous or submucous. An example of a submucous one which occurred in my practice, and was removed during labour, has been already referred to (p. 134). Here is a short report of a pedunculated and subserous myoma which obstructed labour, and was recently under my care :

Mrs. A——, a multipara, was admitted to the Glasgow Maternity Hospital advanced in labour. The os was fully dilated, but the child, which presented by the vertex, could not be expelled because of a tumour which occupied the pouch of Douglas. The tumour was very tense, and was about the size of a closed fist. It could not be displaced from the pelvis, as it and the fœtal head were firmly impacted in the cavity. I took the tumour for an ovarian cyst. As the case seemed peculiarly suited for vaginal cœliotomy, I made an incision over the tumour through the posterior fornix of the vagina. Without the least difficulty, and with little or no bleeding, the pouch of Douglas was opened into, and the tumour, which was evidently solid, seized with volsellum forceps. On pulling it through the vagina it was found to be a pedunculated myoma. Having transfixed the pedicle, I was proceeding to tie the ligatures when the pedicle tore across, as far as could be judged, at the point where it was attached to the uterus. Finding no vessel of any size in examining the pedicle, which came away with the tumour, I did not feel concerned about its having given way. As a precaution, however, I put a strip of gauze into the pouch of Douglas. I then proceeded to extract the child with forceps. That was very easily accomplished, and the child was alive. The placenta was expelled without difficulty. Finally, I removed the gauze from Douglas' pouch, and, finding it was not blood-stained, I closed the vaginal wound. The patient made an uninterrupted recovery.

One would, of course, only think of vaginal cœliotomy if the tumour projected into the pelvis and was of small size. Myomata with such a long pedicle are very uncommon, so that, although the operation described is one suited for ovarian tumours, it is seldom that myomata can be so treated.

Although in many cases it is an advantage, when possible, to operate before labour has started, it is not always a wise proceeding, for there is a fair number of cases on record where, as the labour has progressed, the tumour has been dragged up. If, therefore, there is any prospect of such a termination—and I have already indicated the cases in which such an occurrence might be expected—it is advisable to delay operation until later.

In those cases in which a more extensive operation, than simple emoval of a pedunculated tumour is necessary, the following courses

are open, and I mention them in the order in which they would commend themselves to one anxious to consider the uterus as far as possible, and at the same time do the best for the mother :

1. Myomectomy followed by extraction of the child *per vias naturales*.
2. Cæsarean section followed by myomectomy.
3. Hysterectomy.
4. Conservative Cæsarean section.

Not a great deal need be said regarding these methods. The conditions which guide one to choose enucleation during pregnancy are the same as those which should influence one in choosing that method during labour.

Vaginal myomectomy during labour has already been referred to (p. 250). Abdominal myomectomy followed by extraction of the child *per vaginam* with forceps, version, etc., can only be resorted to when labour is far advanced and the os fully dilated, for no one would care to allow a uterus from which a myoma had been recently enucleated to have many hours expelling a child. True, one might incise the cervix, but it is a question if, by adopting such a course, one is not pushing a method beyond its rational limits. The same applies to delaying operation until the os is sufficiently dilated, for the tumour hinders dilatation. In this connexion, I find a case reported by Olshausen where a myoma was removed by the abdomen, and afterwards the dead child delivered by forceps. Calderini[1] records a case of enucleation and closure of the abdomen and delivery by version.

The second method mentioned, Cæsarean section followed by myomectomy, is the course to be followed in those cases where the tumour cannot be enucleated until the uterus is emptied. We have already seen that one is compelled sometimes to adopt a similar course with ovarian cystomata obstructing labour. If such a course is necessary, it is advisable to turn the uterus out and make the Cæsarean section wound in such a position that an extension of it will permit of the removal of the tumour. Thumin collected eight cases operated upon by this method, and since then Martin, Koblanck, and Olshausen[2] have added to the number.

It is the form of treatment which should be employed when the tumour is single, but it is very questionable if it is advisable when there are several tumours.

Without doubt, hysterectomy is the method generally favoured, and rightly so, for the uterus is generally too extensively diseased to be of much future service. In most cases—they are not many—the child has first been removed by Cæsarean section, but in an in-

[1] *Cent. f. Gyn.*, 1890. [2] Veit's 'Handbuch Gyn.,' 2nd edition, 1907.

teresting case described by Sutton (Fig. 125) the whole uterus was removed with the child *in situ*. The latter proceeding is only justifiable if the child is dead. With a living child, and, indeed, if there is the slightest possibility of its being alive, the uterus must be opened

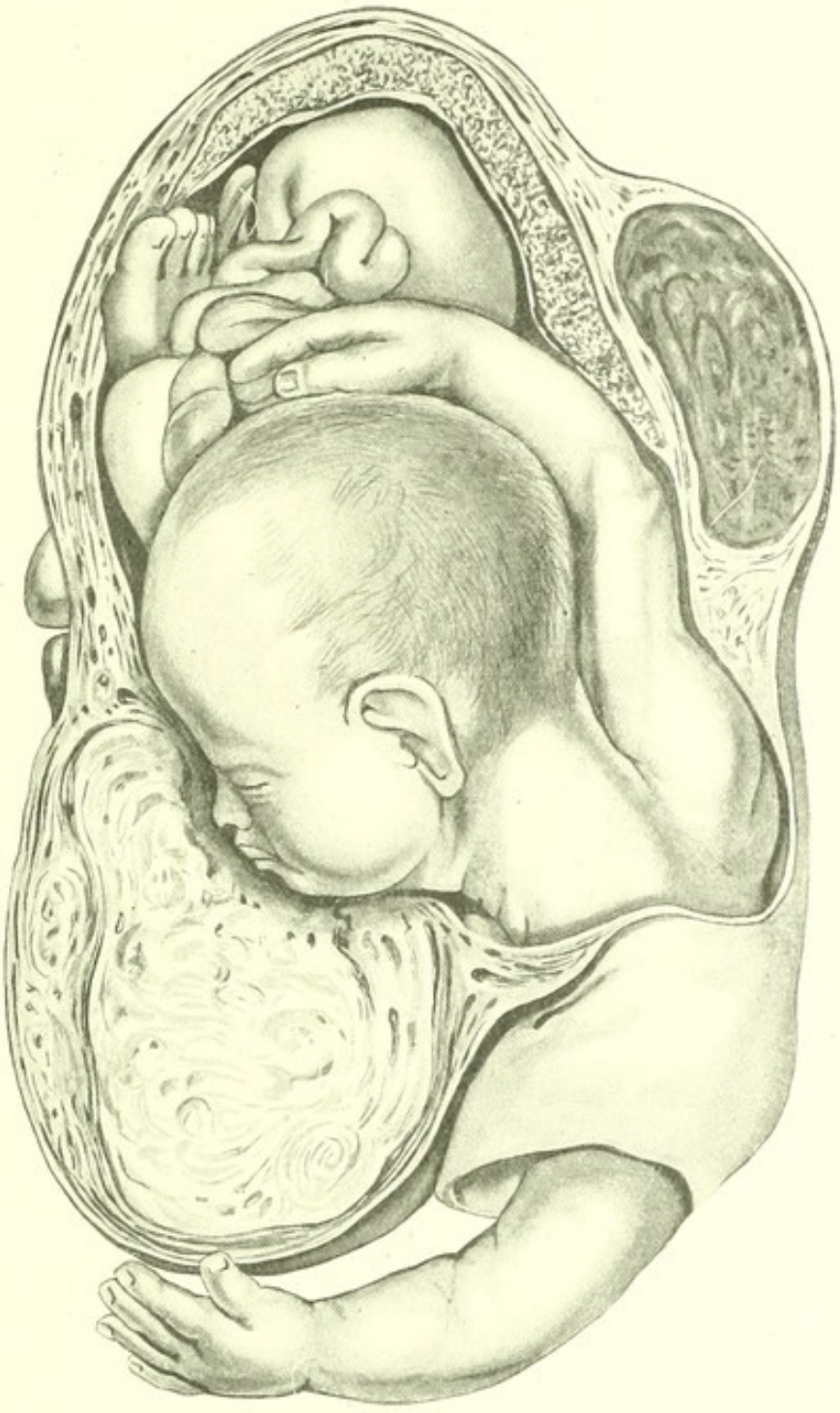


Fig. 125.—Uterus with Fibro-Myomata, and containing a Full-time Child, removed by Panhysterectomy during Labour. (Bland-Sutton.)

into and the child extracted before one proceeds to hysterectomy; for although there is one case on record where the uterus was opened into only after its removal and yet the child was alive, that does not justify one in following such a procedure.

Here, again, the choice is between supravaginal amputation and panhysterectomy. As in the case of hysterectomy during pregnancy, the position of the tumour is the chief influencing circumstance. But there comes in also the danger of septic infection from the cervix, so that if there is any reason to be suspicious of the parturient having been infected, panhysterectomy should be chosen. Thumin's figures are of interest: Cæsarean section followed by panhysterectomy, fourteen cases, with one maternal and fœtal death, or 7·1 per cent.; and Cæsarean section followed by supravaginal amputation, forty-nine, with six maternal and nine fœtal deaths, or 12 per cent. and 18 per cent. respectively. Curiously, the results are rather better with panhysterectomy, and Thumin favours it, especially the combined vaginal and abdominal method of extirpation. Although I have always found panhysterectomy either during pregnancy or labour peculiarly easy, owing to the looseness of the cellular tissue, I cannot quite understand why the latter should give better results than supravaginal amputation, and I am inclined to think that the mortality of the two must be very much the same. The method of removing the uterus is described in connexion with the operation of Cæsarean section (Chapter XXVI.).

There is a large number of cases on record where conservative Cæsarean section was performed. Personally, I think the simple conservative operation incomplete, for the tumour or tumours are left behind, and although they usually diminish in size very decidedly after delivery, they seldom completely disappear, and they usually enlarge again in subsequent pregnancies. The conservative operation was the one employed until fifteen or twenty years ago, and Sänger in 1882 wrote in its favour.[1] The results, however, have not been good, although it must be remembered that one is comparing figures of operations performed fifteen years ago with those performed to-day. Disregarding the operation carried out in pre-antiseptic days, we find, according to Kirchheimer, twenty cases operated upon between 1881 to 1893, with twelve deaths, a mortality of 60 per cent. Thumin, writing in 1901, found six more cases recorded, with three deaths. The only one who, at the present time, as far as I know, advocates the simple conservative Cæsarean section is Lewers, who recorded two successful cases quite recently.[2]

Puerperium.—Before leaving this subject, let me say a word regarding myomata which give trouble during the puerperium. These are for the most part submucous and interstitial, although even the subserous may occasionally be injuriously affected by the labour, as when the

[1] 'Der Kaiserschnitt bei Uterus-fibromen.'
Lond. Obst. Trans., 1905, xlvi., p. 117.

pedicle gets twisted or the tumour gets bruised. Some operators go the length of advising the removal of all fibroids immediately after delivery. But this is unnecessary, for many tumours, as every one admits, give rise to no trouble, and shrivel up and become very small indeed. The only variety which should always be removed, whether they are giving trouble or not, are the pedunculated submucous.

But although it is quite unnecessary to operate upon all cases, from what I have seen, it is advisable to remove the tumour, either with or without the uterus, whenever there is evidence of any septic disturbance in the puerperium.

When the tumour is submucous, all that is necessary is the introduction of the fingers and the shelling out of the tumour, and that is easily done as a rule. One trouble, however, is that occasionally there is very profuse bleeding ; Martin, for example, lost two patients, although the tumours were removed a fortnight after parturition. Before proceeding to operate, therefore, it is well to have the patient prepared for abdominal section, in case that may be found necessary. As a rule, however, plugging the uterus is quite sufficient. Another danger is infection, particularly if one waits until there are distinct indications for operating. Speaking generally, hysterectomy is safer than simple myomectomy in cases where the tumour is deeply embedded in the uterine wall, as one might easily go through the uterine wall. Panhysterectomy is the best method to employ, for in most cases the whole uterine cavity will be infected.

CHAPTER XVII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Tumours of the Bladder and Rectum.

Tumours of the Bladder.—When speaking of tumours complicating parturition, I mentioned incidentally the case referred to by Smellie, where a vesical calculus obstructed labour, and was ultimately forced out of the bladder *per vaginam*. McLintock[1] refers to one in which a large stone was removed from a woman seven months pregnant without disturbing the pregnancy. Thomas[2] also recorded a case operated on during pregnancy. Hugenberger, in his monograph on the subject, written in 1875, collected twenty-three cases. In many of these great injury occurred, while sometimes the tumour was removed during labour or pushed out of the way. Personally, I have nothing to say regarding the condition, for I know of no case of the kind having occurred in the Glasgow Maternity Hospital. In recent years very few cases have been recorded. Rosenfeld[3] has described a case where lateral lithotomy was performed at the fifth month because of a urinary calculus and a septic condition of the urinary tract. Abortion occurred on the third day, and the patient died on the fourth.

Tumours connected with the bladder are very rare at all times. In the few cases where they have been associated with the neck of the bladder they might well cause dystocia, but so far I have not encountered such a case, or, indeed, seen any reference to it in obstetric literature, although I doubt not the condition has been observed. Vanderlinden[4] describes a myxo-fibroma removed two months after labour at full time. During the patient's pregnancy there had been no bladder trouble beyond three slight attacks of hæmaturia. Labour was undisturbed, but on the sixth day of the puerperium, on palpating the uterus, a tumour of some size was discovered above the

[1] Smellie's 'Midwifery,' vol. xi., p. 101.
[2] *Lancet*, 1838-1839, vol. i., p. 58.
[3] *Münch. Med. Woch.*, No. 39, 1895.
[4] Ref. *Zeit. f. Gyn.*, 1900, p. 887.

symphysis pubis. Some weeks later the tumour and a portion of the bladder were removed.

Tumours of the Rectum.—The majority of tumours of the rectum encountered in practice are of a malignant nature. This is especially seen in the cases where the rectal tumour has been found complicating pregnancy or labour. Odd cases will be found recorded where the tumours have been of a simple nature. Quite recently Alexandrow[1] reported one where a pedunculated fibroma of the rectum obstructed the delivery of the child. During extraction with forceps the tumour was pushed out of the anus. A somewhat similar case was described many years ago by Barnes.[2]

Carcinoma of the rectum, however, is the chief tumour of interest. As, however, I have had no personal experience of the condition, I am indebted to such monographs as those of Holländer,[3] Krause,[4] A. W. Russell,[5] and Nighoff.[6]

The diagnosis of carcinoma of the rectum in pregnancy and labour, if the tumour is of any size, has usually presented no great difficulty, although, without doubt, there have been many cases in which the condition must have been overlooked. In most of the cases recorded a hard mass was felt pushing the posterior vaginal wall forward. Sometimes, however, this narrowing of the canal has been very slight, for the delivery was spontaneous, as in Kjelberg's[7] second case, where an inoperable carcinoma was discovered six weeks after a normal and spontaneous delivery, and Rossa's[8] case, where the delivery was also spontaneous at term.

The symptoms of the condition are constipation; in a few cases, as Duncan's,[9] even intestinal obstruction. Generally, also, there has been pain in the sacrum, tenesmus, and irregular bleedings from the rectum.

The effect of the tumour upon parturition has been variable. As already stated, some cases have terminated spontaneously, but in most there has been distinct obstruction—an obstruction which has sometimes been so great as to necessitate Cæsarean section. In many of the cases, however, the child has been dragged past the tumour, sometimes without the growth, being much injured; but on other occasions with considerable laceration to the tissues.

Speaking generally, the circumstances which should guide one in

[1] *Bull. Gén. de Thérap.*, April 30, 1905; ref. *Zeit. f. Gyn.*, 1906, p. 1429.
[2] Lond. Obst. Trans., vol. xxi., p. 28.
[3] *Archiv f. Gyn.*, Bd. xliv.
[4] Inaug. Dis., Bonn, 1900.
[5] *Scottish Med. and Surg. Journ.*, June, 1903.
[6] *Cent. f. Gyn.*, 1905, p. 881.
[7] *Op. cit.*
[8] *Cent. f. Gyn.*, 1902, p. 1241.
[9] *Lancet*, 1898, vol. i., p. 405.

the treatment of carcinoma of the rectum complicating pregnancy and labour are very much the same as those which, as we have already seen, guide one in dealing with carcinoma of the cervix. The older methods, such as induction of labour, if the disease is recognized in pregnancy, and the dragging of the child past the growth if the condition is seen for the first time during labour, are unsound in principle. Induction of premature labour might at first sight appear correct enough treatment, but why sacrifice the child, or run the risk of doing so? It is much better to allow the pregnancy to continue to term and perform Cæsarean section.

Taking first of all the cases recognized in pregnancy, one should decide whether the case is operable or inoperable. If operable, the tumour, with the necessary portion of bowel and surrounding structures, should be at once removed; while, if the disease is inoperable, the pregnancy should be allowed to continue up to or as near term as possible. As far as I can find, Kjelberg's[1] first case is the only one in which the tumour was removed without disturbing the pregnancy, which had reached the fourth month. Spontaneous labour occurred at term. The modern surgical attitude towards carcinoma affecting the uterus is to remove, not only the uterus, but also the cellular tissue around the uterus. Is it therefore sound surgically to simply remove the rectal growth, and allow the pregnant uterus to remain?

It is just possible that, owing to the presence of the enlarged uterus, there may be difficulty sometimes in deciding whether or not the tumour can be removed. If that should happen the patient must have the benefit of the doubt. If need be the abdomen must be opened, and the uterus turned out. The condition of the rectal growth should then be examined, and, if operable, the pelvic contents removed. Should, however, the malignant disease be considered inoperable, the pregnant uterus is replaced in the abdomen and the pregnancy allowed to continue.

Some may think that allowing the pregnancy to continue in inoperable cases is inhuman, and so should I if the woman's sufferings were great. In these cases, provided opium loses its effects, the patients' sufferings will usually be sufficiently relieved by performing an inguinal colotomy, as Duncan did in his case. The attitude assumed by this operator appears to me to be beyond doubt the most sound.

In cases of rectal carcinoma recognized during labour Cæsarean section is a much sounder treatment than pulling the child past the growth. The dragging of the child past the growth has proved

[1] Ref. *Zeit. f. Gyn.*, 1903, p. 1076.

disastrous upon several occasions, as, for example, in the cases recorded by Herman[1] and Cruveilhier.[2] Quite a number of successful Cæsarean sections have been performed; and even in Duncan's case, where an inguinal colotomy had been performed previously, Cæsarean section was most satisfactory, as the child and mother were both saved. The tumour, if operable, may be dealt with at the same time as the child is delivered; but it is better practice to allow the woman to recover from the confinement, and to deal with the rectum a week or two later.

[1] Lond. Obst. Trans., vol. xx., p. 191.
[2] Ref. Hollander, *op. cit.*

CHAPTER XVIII

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL *(continued)*

Suppurative Conditions in Pelvis and Abdomen.

Suppurative conditions connected with the reproductive and other pelvic organs complicating labour are more frequent than is generally supposed. In recent years, in the Glasgow Maternity Hospital and in private practice, I have had several cases under my care.

Of abscesses about the vulva, those connected with the glands of Bartholin are the most common. I have seen two cases, one of which died of acute septicæmia. The other recovered, probably because the whole tissue, including the gland and surrounding parts, was removed and the vulva very thoroughly cleansed. These abscesses sometimes contain very virulent pus, although not infrequently the infecting organism is the gonococcus.

Some little time ago I performed a Cæsarean section in a nursing home upon a woman at the end of her second pregnancy, who had had a very difficult craniotomy at her previous confinement owing to the smallness of her pelvis. There was a sinus discharging in the groin, connected, as was afterwards discovered, with the spinal column. The parts about the thighs and vulva were most thoroughly cleansed and isolated from the abdomen by means of wet dressings and bandages. The operation was performed at term and before labour had started. The whole uterus was removed. The woman made a most satisfactory recovery, but from the seventh to the seventeenth day there was slight febrile disturbance. Jardine has recorded two cases of retroperitoneal abscess, one behind the kidney and the other behind the cæcum. In one of the cases rupture occurred into the peritoneal cavity, and in both the women died. Freund[1] records a case where at the sixth parturition, which occurred prematurely, a parametric exudation, which had developed after the previous labour burst,

[1] Ref. Wertheim, Winckel's 'Handbuch der Geburtshülfe,' Bd. ii., Teil i., p. 491.

and was followed by the woman's death. Several interesting cases are referred to by Wertheim.[1]

But more frequent than the conditions described are those in which the suppurative process has been connected with the ovaries and tubes. Quite a large number of such cases are on record. Personally I have experience of two—one in which the diagnosis was confirmed at the post-mortem examination; the other in which, unfortunately, there was no examination after death. The histories of both cases were very similar. The case in which the diagnosis was confirmed was a multipara whom I saw in consultation with Dr. Gardner Neill. The history was as follows: Seven days before she had been delivered without any difficulty of a living child. For three days she remained well, but early on the fourth the temperature rose and the pulse became more rapid. Abdominal pain also developed. When I saw her three days later she was extremely ill, with very rapid, irregular and feeble pulse, and great abdominal distension. She was evidently dying, and too feeble for operation. A few hours after I saw her she died. At the post-mortem examination there was general peritonitis, which had evidently arisen from an abscess connected with the tube. In Jardine's[2] case the temperature and pulse were also normal until the third day. The late Milne Murray[3] described an interesting case in which he saved the patient by laparotomy.

The pus which escapes into the peritoneal cavity may come from the fimbriated ends of the Fallopian tubes or from a rupture of the sac. In some cases only one tube is affected, as in Murray's and the one I have just described, but generally both tubes are involved.

Short of actual rupture or leakage from the tubes, the latter may become injured. I removed a single pyosalpinx some years ago in the fourth week of the puerperium from a woman who had had great abdominal pain since her confinement. The tube was very vascular. She made an excellent recovery.

Early in the puerperium, when the uterus is large and soft, it is not easy to palpate the tubes, and once or twice I have been on the point of opening the abdomen, when the pain and fever have subsided with regular intra-uterine douching. Sudden and severe abdominal pain, with steady development of symptoms of general peritonitis, must immediately be dealt with by abdominal section. After removal of the sac, the question of vaginal drainage will arise. While I am quite in favour of such drainage under ordinary circumstances in general septic pelvic peritonitis, it appears to me

[1] Winckel's 'Handbuch,' Bd. ii., Teil i., p. 490.

[2] 'Clinical Obstetrics,' p. 437.

[3] Edin. Obst. Trans., vol. xxv., 1899-1900, p. 38.

a mistake in cases early in the puerperium, for the discharge in the vagina may readily infect the uterus. Ordinary drainage through the abdominal wound I am very sceptical about, although some still look upon it with favour. If it is decided to drain, I think it best to make a counter-opening in the loin.

Another condition, and one which closely simulates pyosalpinx, is appendicitis. In the two cases of this condition which I have seen, I obtained from both a history of previous attacks. The pain was extreme but local, and quieted down with rest and fomentations.

Appendicitis in connexion with pregnancy is a subject which has aroused great interest amongst obstetricians and surgeons in recent years, and this is not to be wondered at considering how common the condition is. Cuthbert Lockyer referred to the subject in the discussion on 'The Appendix and Pelvic Inflammation,' which took place at the annual meeting of the British Medical Association in Toronto,[1] and emphasized very strongly the dangers of the condition and the advisability of operating early.

Recent contributions to the subject, such as Füth's,[2] show that it is a condition of very great gravity, and that unfortunately it is often overlooked, the pain complained of being attributed to the enlarging uterus. A most useful paper is one by Meyer,[3] who considers 143 collected cases. He comes to very much the same conclusions as other writers, and he gives interesting statistics. It seems to be generally admitted that, although pregnancy does not predispose to a primary attack of appendicitis, if the woman is subject to appendicitis she is more liable to have recurrences during pregnancy. There is also greater risk of abscess formation. In all probability this is largely due to the obstinate constipation of pregnancy and the disturbance produced by the large uterus. In the cases in which there is no abscess formation, pregnancy is rarely disturbed by the removal of the appendix. In the suppurative cases, however, abortion or premature labour frequently follows, and the pregnant woman is then in special danger of septicæmia.

As can be readily understood, the diagnosis may be very difficult indeed. Suppose the woman complains of a little pain in the right iliac fossa, how readily one may attribute it to the disturbing effect of the growing uterus, or even to a threatening of abortion. Theoretically, the condition of the pulse and temperature should guide one, but I need hardly remark that frequently in the very worst cases, where there is an extensive collection of pus, these are only slightly disturbed.

[1] *Brit. Med. Journ.*, 1906, vol. i., p. 1709.
[2] *Archiv f. Gyn.*, Bd. lxxvi., Heft iii., p. 507.
[3] *Amer. Journ. of Obst.*, 1906, vol. i.

The history of previous attacks, and the fact of the pain being localized and the part being tender to pressure, and, above all, the appearance of the woman and the blood-count, must be one's guides when there is little disturbance of pulse or temperature.

Many conditions may simulate, or be simulated by, appendicitis—viz., ovarian tumour with twisted pedicle, painful myoma, extra-uterine pregnancy. But, after all, mistakes regarding this condition are not so serious, for operation is generally necessary in all of them.

I have had once or twice under my care patients who complained of severe uterine pain, but in whom I could discover absolutely nothing abnormal. The pain in most of these cases was diffuse. As the women were multiparæ, I looked upon the condition as being the result of chronic metritis. Should it happen that the pain is localized, as in one of my cases, the diagnosis is extremely difficult. Fortunately, in my case the pain was left-sided.

During labour a chronic appendicitis may be lit up, or an old abscess burst, and a free escape of pus occur into the general peritoneal cavity. In such cases the severe and acute pain persisting even during the intervals between the uterine contractions would arouse suspicion. In extreme cases the condition might simulate rupture of the uterus. Zalachos[1] records two cases where the two conditions coexisted.

But in all probability the greatest diagnostic difficulties occur in the puerperium, for then any pain, tenderness, and rise in pulse and temperature are naturally put down to septic infection of the uterus. When, however, the labour has not been severe, and there has been no reason for sepsis occurring, and especially when the uterus is well retracted and the os firm and closed, then in all right-sided iliac pain one should think of appendicitis.

All writers, without exception, are agreed that the same surgical principles should guide one in treating a case of appendicitis in the pregnant as in the non-pregnant.

The appendicitis should be treated and the uterus left severely alone. If abortion or labour follows, the delivery must, of course, be completed, every possible care being taken to prevent infection of the uterus, for cases of this nature are the most serious.

The condition of the parturient after delivery must be carefully watched, and the abdomen opened if it is deemed necessary. Should the latter become imperative, an attempt must be made to shut off the vagina and vulva as far as possible from the field of the abdominal operation by carefully packing the vagina. After the abdominal operation is completed, the vaginal packing should be removed.

[1] Epitome, *Brit. Med. Journ.*, November 11, 1905.

All cases occurring in the puerperium must be promptly dealt with, and if there is any suspicion of abscess formation the abdomen must be immediately opened.

The recent results in the cases associated with an extensive pus formation have, as I have already said, been very satisfactory. Even some of the cases where general peritonitis has been present, as in the most interesting one described by Mauchlaire,[1] have resulted in recovery.

[1] *Annal. de Gyn.*, 1905, p. 243.

265-286

CHAPTER XIX

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Alterations in the Axis of the Canal—Displacements Backward, Forward, and Downward—Displacements the Result of Vaginal and Abdominal Fixation of the Uterus.

UNDER this heading of alterations in the axis of the parturient canal, several very interesting conditions come for consideration. The one which naturally occurs to one's mind, and which we shall first discuss, is backward displacement of the gravid uterus. In addition to that, however, there is the forward displacement associated with a pendulous abdomen, and the alterations in the uterine axis which result from ventral and vaginal fixation.

It is unnecessary, I think, to consider here the lateral deviations of the uterus so constantly present during pregnancy, and so generally directed to the right, for, beyond the fact that they favour occasionally malpositions and malpresentation, they disturb but little either pregnancy or parturition. The late Milne Murray made an interesting contribution to this subject some years ago.[1]

Backward Displacement of the Gravid Uterus.

Of all the displacements of the gravid uterus this one is, without doubt, the most interesting. It is also the one most frequently encountered. Every obstetrician has met with it many times, and I doubt if there is any general practitioner of experience who has not had experience of it. The subject, therefore, is of very great importance to all who practise obstetrics. Of special interest is it to us in this country, for to William Hunter belongs the honour of having been the first to consider exhaustively the complication. Others before him, Gregoire in France and Kilmann in Germany, for example, knew of the condition and incidentally referred to it, but

[1] Edin. Obst. Trans., vol. xxii., p. 39.

all writers are agreed that Hunter was the first to consider it in detail. But students of Glasgow University should take particular pride and interest in the matter, for the specimen—the uterus was removed post-mortem—upon which Hunter lectured on October 21, 1754, is still to be seen in all its beauty in the Hunterian Museum of our University. Here is a drawing of the specimen (Fig. 126). Hunter seems to have taken peculiar pride in the specimen, for it is seen

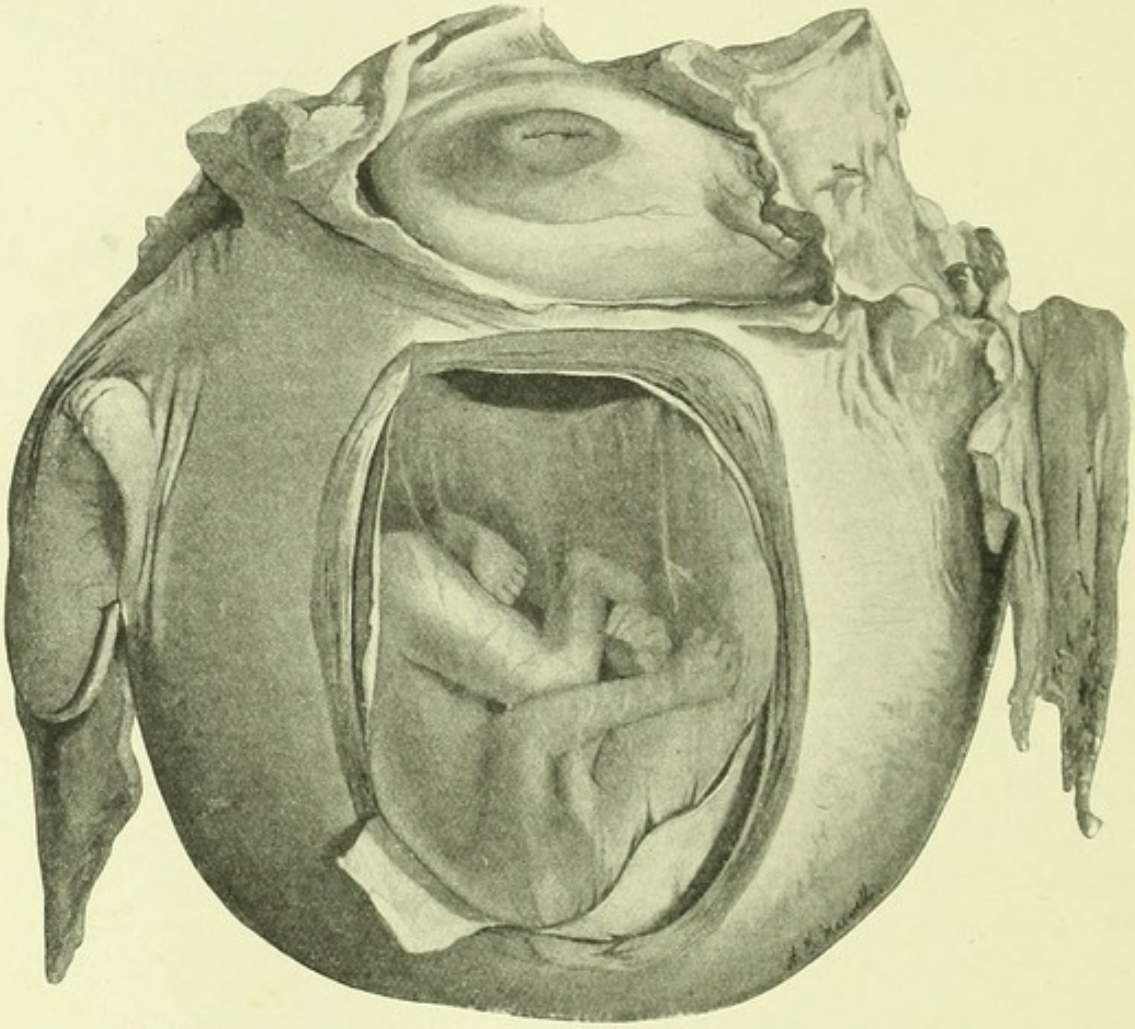


Fig. 126.—Drawing of Specimen 48,158, Hunterian Museum, Glasgow University. The specimen was obtained from the case of retroversion of the gravid uterus which formed the text of Hunter's historic lecture on the subject.

resting upon the table in the portrait of him by Sir Joshua Reynolds. The history of the specimen appears to be of such interest as to warrant me inserting it here, especially as one can give it in Hunter's[1] own words:

'A young woman, about four months advanced in her first pregnancy, after a fright was taken ill, and could not without great difficulty go to

[1] 'Medical Observations and Inquiries by a Society of Physicians in London,' 2nd edition, vol. x., p. 401.

stool or make water. Her complaint grew worse daily, till on Saturday, October 12, both these evacuations were entirely suppressed. The suppression of urine continued, without any relief being given, till Thursday, the 17th, when Mr. Walter Wall, surgeon, was called to her assistance. He drew off by the catheter about 7 or 8 quarts of urine. He then attempted to throw up a clyster; but very little passed up, and it had no manner of effect. In the afternoon about 3 quarts of water tinged with blood were drawn off by the catheter.

'In order to discover the cause of these symptoms, Mr. Wall introduced a finger into the vagina, which could not pass up on account of a large tumour that lay behind the vagina, and pressed it close to the inside of the ossa pubis. As there was not room to pass the finger, he could neither reach the extremity of the vagina nor could he discover anything like the os uteri.

'After this he examined the rectum, and found that the same tumour, which lay above and before the gut, pressed it so strongly against the gut inside of the os coccygis, etc., that the finger could only be passed a very little way.

'These circumstances made Mr. Wall recollect a case of retroverted uterus which M. Gregoire had given in his lectures at Paris. He then concluded that this was a case of the same nature, and attempted to reduce the uterus by laying the patient on her back, and by assisting with one finger in the vagina and another in the rectum, as M. Gregoire had directed, but without any success. The poor woman continuing in great pain, Mr. Wall came to me on Saturday, the 19th, gave me an account of what had passed, and desired me to visit her with him. We found her exceedingly weak and suffering great pain. She was lying upon her back. I passed my finger between the tumour and the inside of the os pubis, a little to one side of the urethra, upon which a considerable quantity of urine was discharged, as my finger removed the pressure upon the urethra. We then proposed a second attempt to reduce the uterus to its natural situation, for which purpose we placed her upon her knees and elbows, with her head and shoulders as low as possible. Then I introduced one hand into the vagina and two fingers of the other hand into the anus, and endeavoured to replace the uterus by pushing it up with the two fingers, and at the same time by trying to draw down the upper part of the vagina, which was considerably retracted from its natural situation. But these attempts were all in vain; she became weaker every hour, and died on the Monday following.

'On Wednesday we were allowed to open the body. Upon cutting into the abdomen we found the bladder amazingly distended with urine, and filling up almost the whole anterior region of the abdomen, like the uterus in the last months of pregnancy.

'When urine was discharged by opening the bladder, we observed that the lower part of the bladder, which is united with the vagina and cervix uteri, and into which the ureters are inserted, was raised up as far as the brim of the pelvis by a large round tumour (viz., the uterus), which entirely filled up the whole cavity of the pelvis. We then passed a catheter up the vagina, and observed that it raised up the bladder at the top of the tumour—a demonstration that the upper end of the vagina, and consequently the os

uteri, was situated there; and upon making a crucial incision through the bladder and vagina at that place, we found that it actually was so. The os uteri made the summit of the tumour upon which the bladder rested, and the fundus uteri was turned down towards the os coccygis and anus. The uterus in that retroverted state was grown so large, and thence so wedged in the pelvis, that we could not take it out until we had cut through the symphysis of the ossa pubis, and torn these bones considerably asunder to enlarge the space within the bones of the pelvis.'

After Hunter's communication the subject seems to have given rise to a great deal of interest, for one finds in the 'Medical Observations and Inquiries,' vol. v., no fewer than four different communications. In addition, there seem to have been discussions regarding it, for Hunter speaks of 'the very existence of such a disease having been contradicted, till of late, at least, in a neighbouring enlightened country.'

Varieties of Backward Displacement of the Gravid Uterus.—In backward displacement of the uterus in the non-pregnant it is customary to distinguish two varieties—viz., retroversion and retroflexion; for, although the two have much in common, each has a significance peculiarly its own. If this distinction is admitted to be useful and desirable in the non-pregnant, should it not also be adopted in the gravid?

In writing on this subject, Leishman[1] remarks: 'As the clinical history of the two classes of cases is essentially different, it is necessary that a clear distinction be drawn between them.' Such was the attitude of all writers in the middle of the last century, as may be seen from the descriptions by Burns, Rigby, and others. Towards the end of the century, however, less importance was attached to the matter, and the two terms were employed indiscriminately. In our country retroversion was, and still is, the term most favoured—in all probability because it was the one employed by Hunter. The same also applies to France. In Germany, on the other hand, retroflexion is the one in more general use. Quite recently, however, in such important monographs as those of Dührssen[2] and Chrobak,[3] the essential differences between the clinical features of the two displacements have been again emphasized.

Not content with the broad distinction between the two groups mentioned, some writers have subdivided retroversion into three different degrees—it is impossible to do this with retroflexion. This subdivision of retroversion goes back to Hunter's time, for in his last

[1] 'System of Midwifery,' 2nd edition, p. 279.
[2] *Archiv f. Gyn.*, Bd. lvii, 1899.
[3] *Samml. Klin. Vorträge*, No 377, 1904.

paper on the subject, published in 1776 under the title 'Summary Remarks on the Retroverted Uterus,' he says: 'In this distressing state the uterus may be (1) fully retroverted, (2) half retroverted, (3) so far in its natural state that the body of the uterus shall be downwards.'

One sees from this division how carefully Hunter had been observing the cases that had come under his notice since he met with his first one in 1754; indeed, so accurate is his classification that it practically is the same as the one given in the latest monographs already mentioned. Hunter, however, did not recognize a

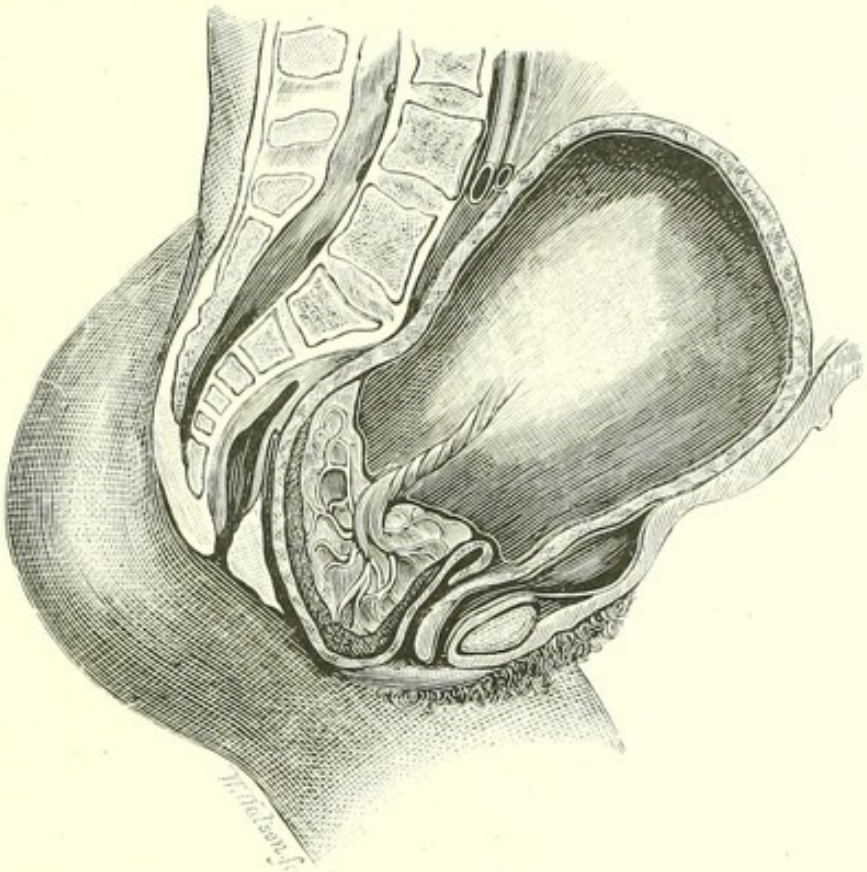


FIG. 127.—Sacculation and Partial Retroversion of the Gravid Uterus. (Dr. W. L. Reid.)

retroflexion, although Lynn suggested the term in the case he reported.

While agreeing in the main with the contention of Dührssen and Chrobak, that the two varieties are distinct, I am inclined to side with Wertheim,[1] who thinks the distinction more of theoretical interest than of practical importance. It is perfectly true that with extreme retroversion symptoms appear later, and the replacement of the uterus is more difficult to effect than when the organ is retroflexed or only half retroverted. The essential features of the two conditions are the same, however.

[1] Winckel's 'Handbuch,' Bd. ii., Teil i., 1904.

But there is yet another variety, and in some respects it is the most interesting, where a portion of the uterus remains imprisoned in the pelvis, while the anterior and upper part of the wall, as the organ enlarges, extends into the abdomen. It has been variously described as 'partial,' 'incomplete,' and 'spurious' retroflexion. In recent years, however, another term for the condition has come to be employed—viz., 'sacculation' of the uterus. The historical example of the variety, and the one generally quoted, is Oldham's, although the condition was known long before Oldham described his case. The illustration (Fig. 127) given here is from a case described by Dr. W. L. Reid,[1] of Glasgow, who kindly lent me the block.

Features and Progress of the Condition.—As has been already indicated, the condition is found almost without exception in women who have suffered from a backward displacement. It is stated to have followed once or twice some fall or jerk when the bladder was overdistended, but if such cases have occurred, they are very exceptional, as the overdistension of the bladder is the result, not the cause, of the complication. Very occasionally old adhesions, tumours, deformities of the pelvis, especially undue projection of the promontory, have been found. These conditions, however, will be referred to later.

At first the condition gives rise to little discomfort. As a rule the third month has almost been completed, and the uterus has become slightly incarcerated, before any symptoms present themselves. This statement, however, must be qualified, for occasionally reflex disturbances, such as hyperemesis, are more marked, and are immediately relieved if the displacement is recognized and corrected.

It is the bladder which suffers in retrodisplacement of the uterus during pregnancy, for, beyond emptying itself, the uterus escapes as a rule. The first evidence of the displacement is in most cases a difficulty in urination, and, indeed, so characteristic of the condition is this symptom that its presence in the early months of a pregnancy should always arouse in one's mind the suspicion of backward displacement.

The time of its onset is, as a rule, the twelfth to the fourteenth week, but the size of the uterus, and especially the variety of displacement, influences this not a little. With retroversion of the second degree and retroflexion difficulties in urination appear earlier than with extreme retroversion. In these latter cases the fourteenth or fifteenth week, or even later, may be reached before symptoms manifest themselves. The difficulty in urination is at first slight, but as a rule gradually increases, although it must not be forgotten

[1] Edin. Obst. Trans., vol. v., 1879.

that occasionally, it may come on quite suddenly, and so simulate retention, the result of an acute displacement. Finally, complete retention of urine occurs, or sometimes an incontinence, due to an overflow; and this has led a casual observer to overlook the real nature of the condition.

Mechanical pressure upon the neck of the bladder by the displaced cervix is generally given as the reason for the retention, although, at first, the latter probably results from œdema of the bladder wall, produced by the cervix pressing upon the veins and retarding the circulation about the neck of the bladder. Reed[1] discusses this matter in detail, and considers it due chiefly to pressure upon the nerves supplying the bladder.

Several writers, including Barnes, describe and figure the bladder cavity becoming divided by the cervix into two unequal parts. This, however, as Dührssen points out, can only occur in cases of extreme retroversion. I have certainly observed it in one case.

As a result of the retention of urine, the bladder becomes enormously distended. Its wall becomes also much thickened; in one case, at which I assisted Professor Murdoch Cameron, the wall was as thick as that of the gravid uterus. In part this increase in thickness is a true hypertrophy, but to a considerable extent, owing to pressure upon the veins about the neck of the bladder, the wall of the latter becomes œdematous and more or less extensively necrosed. Portions of mucous membrane, sometimes the whole mucous membrane, and occasionally, in exceptional cases, even the muscular and peritoneal coats of the bladder, become separated and expelled *per urethram*. The cases of this nature in which practically the whole bladder wall is shed are of extreme interest. In the English language Haultain's paper is very complete up to 1890.[2] Since then, Dührssen and Chrobak, and others, have referred to numerous cases. One can understand how the mucous membrane may be shed, and even how a layer of the muscular tissue may come away, but how the whole muscular and even the greater part of the peritoneal coat may become detached is more difficult of comprehension. Such an occurrence, however, is now admitted by every one. In the cases which recover, a new receptacle for urine forms.

With the injuries to the bladder mentioned, conditions are most favourable for the invasion of septic organisms, with the result that all degrees of local inflammation follow, and neighbouring structures and organs become matted together. Although this, to a great extent, forms a protection against a general peritoneal infection, it may very

[1] *Amer. Journ. of Obst.*, 1904, vol. xlix., p. 155.

[2] *Edin. Med. Journ.*, June, 1890.

decidedly prevent reduction of the uterus. At any time these protecting adhesions may give way owing to the growth of the ovum or as a result of artificial attempts at reduction. A general peritonitis naturally follows.

Rupture of the bladder, which may occur spontaneously or may

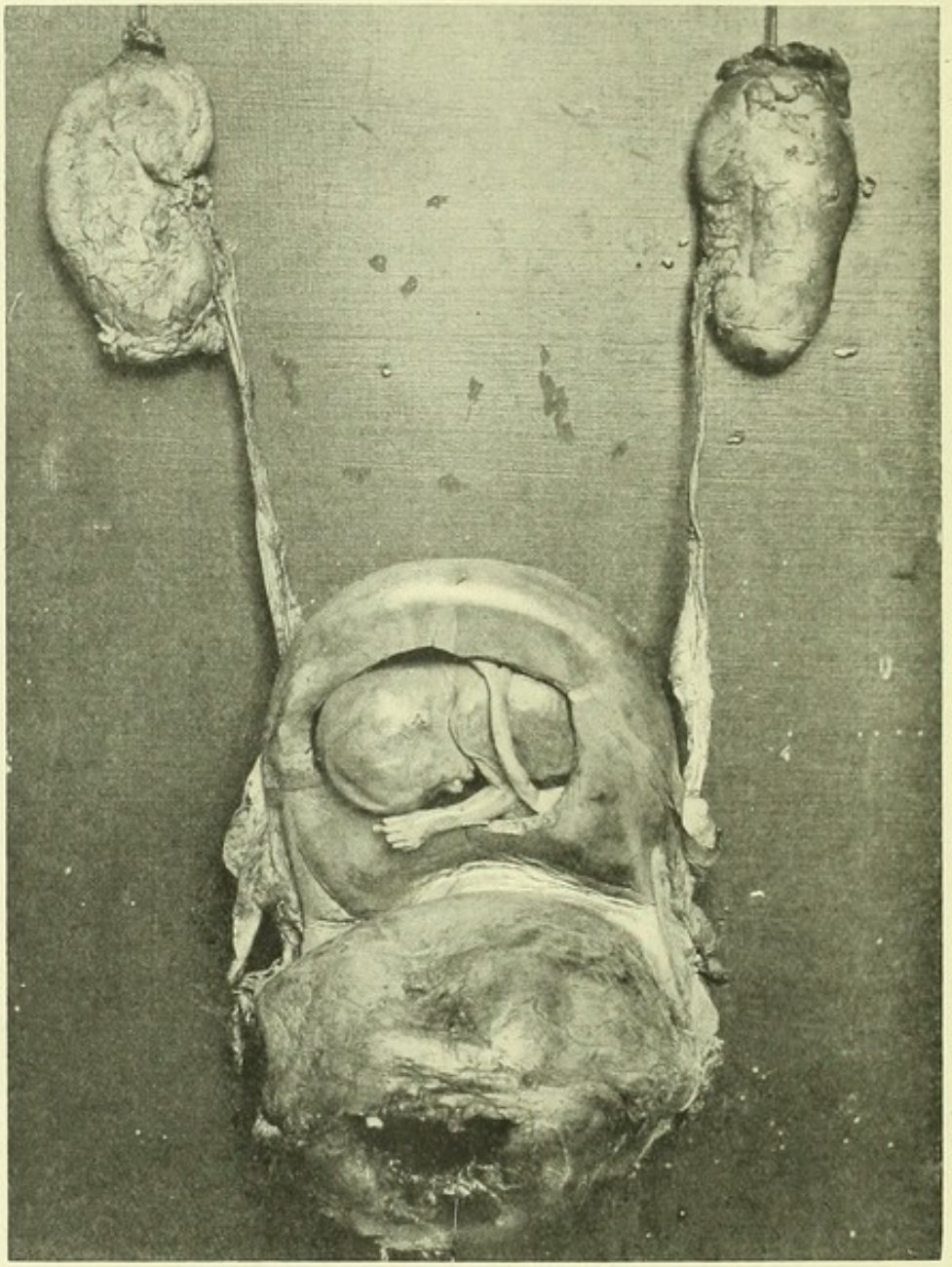


FIG. 128.—Fatal Septic Cystitis, with Rupture of the Bladder, following Retroversion of the Gravid Uterus. (Lloyd Roberts.)

follow manual attempts at rectification, is the most serious of all accidents, and is invariably fatal. Lloyd Roberts[1] recently recorded a case, the illustration of which he has kindly allowed me to introduce here (Fig. 128). Gottschalk,[2] in his collected series of

[1] *Journ. Obst. and Gyn. Brit. Empire*, vol. x., July, 1906, p. 51.

[2] *Archiv f. Gyn.*, 1894, Bd. xlvii.

seventy cases, found it occurred eleven times, while Berge,[1] in his collection of ninety fatal cases of incarceration of the gravid uterus, found that the cause of death proceeded from the bladder in 80 per cent.

Following the overdistension of the bladder, the necrosis of its walls, and the infection of its contents, distension and infection of the ureters and kidneys—pyonephrosis and pyelitis—may supervene.

Very much less severe than the urinary complications described are disturbances of the bowels. Constipation is often very persistent, and Dienst[2] quite recently described a case of obstruction of the bowel, but, as far as I can gather, there is only one fatal case on record, that by Treub,[3] where, at the post-mortem examination, the compressed colon was found gangrenous.

A still rarer complication is where the distended uterus has been pushed down between the vagina and rectum, and finally protrudes through one or other of these canals. The most striking example of this kind, where the fundus bulged into the vagina, is recorded by Grenser and quoted by Barnes.[4] Halbertsma[5] records one in which the uterus caused the rectal wall to bulge through the anus. The uterus itself, however, did not bulge through the anus, as some writers have stated.

A very rare occurrence is rupture of the uterus; Main[6] has described such a case.

As the disease advances and remains untreated, a variety of symptoms appear, such as rapid pulse, febrile temperature, furred tongue, and, shortly before death, great restlessness and delirium. These, however, are for the most part the results of septic infection.

So far as we have considered the complication, its progress has been from bad to worse. But while such is the course run by many of the cases which come under observation, there is a very large number in which the displaced organ spontaneously rights itself, and an equally large number, probably, in which abortion occurs. The relative frequency of these two occurrences is difficult to estimate, but considering how common backward displacement of the uterus is, and how frequently such a displacement is discovered when dealing with cases of abortion, one is justified in the conclusion that each of the terminations, spontaneous rectification and abortion, frequently happen. A most interesting paper by Herman[7] deals with this

[1] *Monat. f. Geb. u. Gyn.*, 1901, vol. xiii., p. 812.
[2] *Deut. Med. Woch.*, November 16, 1905.
[3] *Journ. Obst. and Gyn. Brit. Empire*, June, 1905.
[4] 'Obstetric Operations,' p. 222.
[5] *Monat. f. Geb.*, vol. xxxiv., p. 414.
[6] *Archiv f. Gyn.*, Bd. lviii., p. 125.
[7] *Brit. Med. Journ.*, 1904, vol. i., p. 877.

subject. Taking his own cases in the London Hospital from 1885 to 1903 inclusive, and those of Champneys for St. Bartholomew's Hospital from 1881 to 1892, there were 115 cases treated, and in these only 5 aborted, or 1 in 23. In this paper Herman quotes Charles' results —1 in 8, and Busch's—1 in 17. Without doubt, when the pregnancy has advanced to the stage of causing symptoms of incarceration, abortion is not nearly so frequent. Amongst recent writers who make a distinction between retroversion and retroflexion it is generally agreed that with both abortion is liable to occur, and with both, except in the case of extreme retroversion, spontaneous rectification occurs infinitely more frequently than incarceration.

The generally accepted explanation of spontaneous rectification, which, by the way, rarely occurs after any manifestation of incarceration, is that the uterus, as it distends, drags the retroflexed part out of the pelvis. Under strong uterine contractions this may occur suddenly, but in many cases it is a gradual process. Contractions of the round ligament are not generally accepted as having much to do with spontaneous rectification.

But there is the third group, in which a portion of the uterus is left behind in the pelvis. This is now referred to as partial retroflexion or sacculation of the gravid uterus. It is quite possible in certain cases, where, for example, a tumour of the uterus or the ovary exists, that the retrodisplacement is really secondary, the tumour preventing the uterus from extending upwards in the abdomen, but in other cases it is certainly the result of adhesions. I once saw a case where a myoma of the uterus prevented the fundus from rising and caused sacculation, while a few years ago a case was sent to me where a broad ligament cyst had a similar effect. Croom,[1] Dührssen,[2] and a host of others, have recorded similar cases. As examples of sacculation, the result of a portion of the gravid uterus remaining behind, mention may be made of the cases described by Oldham,[3] Merriman,[4] Barnes,[5] Hicks, Reid,[6] and Dührssen.[7]

A case of very great interest is one recently recorded by Macleod,[8] where pregnancy went on to term and the child was delivered by Cæsarean section. When the abdomen was opened a small fibroid was discovered in the anterior uterine wall, and the fundus could not be raised because of the adhesions to the neighbouring structures.

As stated before, I do not consider that it serves any purpose to

[1] 'Clinical Papers,' 1901, p. 203.
[2] *Op. cit.*, p. 70.
[3] Lond. Obst. Trans., vol. i., p. 317.
[4] 'A Synopsis of the Various Kinds of Difficult Parturitions.'
[5] *Op. cit.*, p. 217.
[6] Edin. Obst. Trans., 1879, vol. v., p. 56.
[7] *Op. cit.*, p. 70.
[8] *Brit. Med. Journ.*, 1901, vol. i., p. 143.

distinguish between sacculation and partial retroflexion, particularly as the features of both are in all essentials the same.

With sacculation, although bladder troubles occur, they are seldom so extreme, and there is never the extensive destruction of the bladder walls which is so common an occurrence in the ordinary varieties of displacement. Abortion is common, but in not a few pregnancy has continued to term.

Diagnosis. — The diagnosis of retrodisplacement of the gravid uterus is not, as a rule, difficult. Prior to incarceration there are generally no symptoms whatever, although on passing the examining finger into the vagina a large swelling is felt, and the vaginal canal is found to run directly upwards behind the symphysis. High up, sometimes higher than the finger can reach, is the cervix. A bimanual examination reveals the absence of the uterine body in front, and its presence in Douglas' pouch behind. Suppression of menstruation, alteration in the breasts, etc., and enlargement of the uterus, decide one in favour of pregnancy, in addition to a backward displacement. It is unnecessary to explain that tumours of the ovary, myomata, and hæmatocele may simulate or be simulated by a retrodisplaced uterus, and that each of these conditions, especially if there is a coexisting pregnancy, is only to be distinguished by a careful consideration of the case in all its aspects, and, above all, by a most careful bimanual examination.

Later, when symptoms of incarceration exist, and especially if they have existed for some time, and the bladder wall has become much thickened, exact palpation of the pelvic and lower abdominal contents becomes most difficult. All are familiar with the error of mistaking a distended bladder for a tumour, and the simple means of preventing such an occurrence—viz., emptying the bladder by catheter. But in cases in which difficulty in urination has existed for some time, even after the bladder has been emptied and retracted, so thick are the walls of the latter that the organ can sometimes be felt above the symphysis, just like a uterus gravid to the third or fourth month; thus the retracted bladder may be mistaken for the gravid uterus, and the swelling in Douglas' pouch—the gravid uterus—for an ovarian or myomatous tumour. Such an error is made evident by passing a sound into the bladder and feeling it through the abdominal wall, high up, inside the swelling, that projects above the symphysis.

There is a feature invariably present, and one which seldom exists to any extent in other conditions simulating incarceration of the retrodisplaced gravid uterus, and that is the great difficulty, often the inability, to pass urine. As far as I have seen, no tumour, be it uterine or ovarian, incarcerated in the pelvis and

pressing upon the bladder and uterus ever gives rise to such extreme and persistent difficulty of micturition as does the incarcerated retrodisplaced uterus. Certainly I have seen both ovarian cysts and myomata of the uterus causing urinary trouble, once or twice to the extent of requiring catheterization, but never the persistent obstruction one finds with the complication at present under discussion.

There is one other condition which, occasionally, very closely resembles retroversion of the gravid uterus — viz., extra-uterine pregnancy, especially if the sac has ruptured and there is a pelvic hæmatocele. Curiously enough, in this condition also there is often some difficulty in micturition, although it is never so extreme as in retrodisplacement. Here is a case which was under my care :

Extra-Uterine Pregnancy simulating a Retroflexion of the Gravid Uterus.

J. C——, aged thirty, 3-para, was admitted to the Western Infirmary under my care on March 11, 1898.

The patient complained of pain in the right side and difficulty of micturition and defæcation of four weeks' duration. She had had two children, the last eight years before. Menstruation had always been regular since the age of fifteen. Her last period was on November 12. About four weeks prior to admission she began to have pain in the lower part of her abdomen. A week later she took to bed, where she remained until transferred to hospital. While confined to bed, she had considerable difficulty in passing urine and very obstinate constipation.

On bimanual examination, the cervix was found pressed against the symphysis pubis and higher than normal. This was caused by a large tumour filling up the pouch of Douglas and extending slightly above the brim. There seemed to be a certain amount of mobility in the tumour. On careful palpation, the anterior wall of the uterus seemed to be continuous with the upper part of the tumour, and the posterior lip of the cervix with the lowermost part.

I had no hesitation in making the diagnosis of retroflexion of a gravid uterus, a diagnosis that the patient's medical attendant had made before sending her to hospital. Attempts at replacement under chloroform were made, but although the tumour could be raised, it was impossible to get it completely above the promontory of the sacrum.

For some days after these manipulations there was bleeding and pain in the lower part of the abdomen. These symptoms, however, disappeared with rest and morphia suppositories. Ten days later she was again carefully examined under chloroform, when I began to be doubtful about the correctness of the diagnosis. The condition of the parts was exactly the same as on her admission.

On the day following the second examination, Professor M. Cameron having returned, we saw the case together, and he quite agreed that it had all the appearances of retroflexion of the gravid uterus. As, however, the

patient's condition was not satisfactory, he advised passing the sound, which was done. It passed into the uterus about 3 inches in the normal direction. The case was therefore cleared up. The following day the abdomen was opened, and a large sac of an extra-uterine pregnancy moulded to the posterior wall of the uterus removed. It was adherent to the surrounding parts, and was situated exactly in the middle line deep in the pouch of Douglas. The pregnancy had advanced to almost the fourth month, to judge by the fœtus contained in the sac.

Many examples of this mistake have been described. Most of the text-books on midwifery mention it, and not a few monographs and communications to various societies exist on the subject. For example, Giles[1] records two cases, while Barbour[2] has made two communications on the subject. The more recent monographs of Dührssen, Chrobak, and Wertheim, all refer to it in some detail.

As illustrating the danger of a mistaken diagnosis, mention may be made of the case reported by Van der Haeven.[3] The woman was a primipara three months pregnant, where a diagnosis of retroversion of the gravid uterus was made. After the tumour in Douglas' pouch was apparently replaced, profound collapse came on and a retro-uterine hæmatocele formed, evidently from rupture of a gravid tube. An error of the opposite nature is a case recorded by Asterblum,[4] where the pouch of Douglas, and then the retroflexed uterus gravid to four months, were opened, in the belief that the condition was a hæmatocele. Death followed from sepsis. When the abdomen was examined post-mortem, an inflammatory exudation covered the retroflexed uterus.

Undoubtedly, the diagnosis between the two conditions is often difficult. Indeed, judging by the reported cases, the symptoms may be almost exactly similar. The fact, however, that with extra-uterine pregnancy one usually gets a history of attacks of pain and of irregular discharges of blood, that the retention of urine is seldom so complete, that the contour of the sac is less uniformly smooth, and that the cervix is seldom so much displaced upwards, will usually clear up the diagnosis.

Barnes[5] lays special stress on the position of the cervix. He says: 'One general fact of great service in forming a diagnosis is this — almost all bodies which get into Douglas' pouch come from above, and so push the uterus, not only forwards, but at the same time downwards, thus bringing the os uteri within easy reach and pointing downwards. On the other hand, retroversion of the uterus lifts the os upwards and tends to throw it forwards.'

[1] Lond. Obst. Trans., vol. xxxix.
[2] Trans. Edin. Obst. Soc., vol. xix., p. 156.
[3] Epitome No. 318, *Brit. Med. Journ.*, 1898, vol. i.
[4] *Cent. f. Gyn.*, 1905, p. 154.
[5] *Op. cit.*, p. 226.

Theoretically that may be correct, but in practice it is not always so, as witness Barbour's case, where the cervix was 'above reach,' and the case I have reported, where it was distinctly higher than usual. The irregular discharges of blood, so helpful in the differential diagnosis, as pointed out by Barbour, are not always present, as in my case they occurred only after manipulative attempts at replacement. On the other hand, in retroflexion they may occur if abortion threatens, as was illustrated by a case recently under my care.

In the case of partial retroflexion or sacculation, the diagnosis is often extremely difficult, and the records of almost all the cases already referred to show this. Indeed, in a number the true state of matters was only appreciated when the finger was introduced into the uterus. Besides, in many cases a tumour was also present. What adds to the difficulty is the fact that the sacculation is often œdematous, and so simulates a tumour of ovary or uterus. Undoubtedly, in some few cases the fœtal head has been felt through the thinned-out wall, but this was not so in Reid's case (Fig. 127), for the placenta was implanted in the sacculation.

Advanced extra-uterine pregnancy is stated to simulate the condition of sacculation, although in neither of the two cases of the condition which I have seen was there any very marked projection of the tumour into the pelvis. There are, of course, exceptions, as in Phillips'[1] case, but in a very large number of recorded cases of advanced ectopic pregnancy which I have consulted projection of the sac into the pelvis has not been a feature.

It is obvious, therefore, that no rule can be laid down for guidance in such cases. This, however, may be said, that a consideration of the history and a careful examination, repeated if necessary, will usually result in a correct appreciation of the nature of the condition.

Treatment.—Before discussing the treatment of cases in which the retrodisplaced gravid uterus has become incarcerated, it is well that we consider for a moment the means that should be adopted to prevent the occurrence of this complication.

As retrodisplacement of the uterus, without doubt, is occasionally a barrier to pregnancy, there is much to be said in favour of correcting all cases of backward displacement in the married prior to the menopause, even although no symptoms are present. Whatever view one takes as regards that matter, all are agreed that, whenever a displacement is discovered during pregnancy, it should be corrected, particularly if the case is one of extreme retroversion. In most cases such rectification is easy, and can be carried out by pressing the fundus upwards from the vagina. In a certain number, however—and

[1] Obst. Trans., 1900, vol. xlii., p. 121.

I had one of the kind recently under my care—the uterus cannot be replaced by such means, even although it is not fixed by adhesions behind. Under such circumstances, the other means at our disposal, which we shall consider later, may be tried, or the patient may be kept in bed and spontaneous rectification allowed to occur. If the latter course is pursued, an examination should be made from time to time, and a little pressure exerted upon the fundus. It must be remembered, however, that examples of extreme retroversion are not suited for such expectant treatment. After the uterus is replaced, a vulcanite pessary of the Hodge or Albert Smith form should be inserted into the vagina, and retained there until about the fourteenth or fifteenth week. By that time the uterus has become so enlarged that the pessary may be safely removed without any risk of the uterus falling back into the hollow of the sacrum. In the early weeks of pregnancy, while the pessary is being worn, the patient should be very careful, and I always put such patients to bed at the times which would have been menstrual periods had pregnancy not existed.

Whenever, upon examination, one finds a retrodisplacement presenting features of incarceration, replacement naturally becomes imperative. It must, however, be remembered, in the treatment of this condition, what has been frequently remarked regarding its symptomatology, that attention to the bladder is everything. So important is this that in many cases, if the patient is put to bed and the bladder kept empty by catheter, the malposition of the uterus will correct itself. It is therefore my rule to keep the bladder empty for a day or two before making any attempt at replacing the uterus, if there has been any great urinary difficulty. Particularly should this rule be followed if there are evidences of cystitis and extensive necrosis of the bladder wall, for during forcible attempts at replacement under such circumstances rupture of the bladder has occurred on several occasions.

It has occasionally happened that difficulty has been experienced in passing the catheter, but if a gum-elastic one is used that is never serious, so that suprapubic puncture of the bladder need not be considered. There are, of course, cases where there is difficulty in withdrawing the urine, owing to the necrosed portions of bladder wall blocking up the catheter. Such cases we shall consider immediately.

When cystitis exists, the bladder should be regularly irrigated with a weak saline solution. In the extremely severe cases, where there is a large quantity of blood-clot, necrosed bladder wall, and stinking urine, much more radical treatment becomes necessary, or the debris cannot be washed out. The bladder must be emptied, therefore, through the dilated urethra, or if that is impossible it

must be opened into. The former proceeding is not much favoured, for, under the circumstances, a sufficient dilatation of the urethra is hardly possible. One is left, therefore, to choose between making the opening from above or from below. Sinclair and Pinard have recorded cases in which the bladder was opened and washed out from below. A most interesting case is recorded by Cameron,[1] where the bladder was opened into from above, all blood-clot and debris cleared out, and finally stitched, after which the uterus was replaced and the abdomen closed. The patient not only recovered, but pregnancy was uninterrupted, and she was delivered of a living child at term.

Having attended to the bladder in the manner indicated, one is in a position to attempt replacement of the uterus. In most of the cases simple manual manipulations are all that is necessary. After having placed the patient in the knee-elbow position, or, what is equally efficacious, the Sims position, two fingers are passed into the vagina, and steady pressure exerted upon the fundus. The advantage of the Sims position is that it does not preclude the administration of an anæsthetic, while attempts at replacement are being made.

When pushing up the uterus in order to avoid the promontory, pressure should be made more to one side, and preferably to the right of the pelvis, for the fundus is most commonly directed to that side, and there is a little more room there. I do not favour carrying out the manipulations from the rectum, as Hunter suggested and a few operators have since advocated, notably Herman,[2] who claims that one can exert pressure higher up. If, after several attempts, success does not follow, one should desist, and leave the patient for twenty-four hours, as there are many cases on record where, after fruitless attempts at manual replacement, the organ has spontaneously righted itself. Here is an example from my own practice:

Incarcerated Retroflexed Gravid Uterus which after Several Fruitless Attempts at Replacement righted Itself.

H. H——, aged thirty-one, 3-para, came under my care at the Western Infirmary, Glasgow, in August, 1894. She stated she was about four months pregnant. She complained of great pain in the abdomen and difficulty of micturition, with an almost constant dribbling of urine, of about four weeks' duration. Her first pregnancy was normal in every respect, but her last, in 1887, terminated in a miscarriage at the third month. She last menstruated on April 28, just about four months before her admission to hospital. The symptoms of dysuria, etc., came on, therefore, at the end of the third month of the pregnancy.

On examination, the abdomen was much distended and tender to pressure.

[1] *Brit. Med. Journ.*, October 31, 1896.

[2] *Ibid.*, 1904, vol. i., p. 877.

The bladder being emptied (60 ounces of urine were drawn off), the distension and tenderness of the abdomen disappeared. On bimanual examination, the cervix was found raised and pressed against the symphysis pubis by the very much enlarged body, situated in Douglas' pouch. The diagnosis of retroflexion of the gravid uterus made by her medical attendant prior to admission was confirmed. Attempts were made to replace the organ, but failed, even when she was placed in the genu-pectoral position. I therefore advised the house-surgeon to keep the bladder empty by passing the catheter every eight hours, to see that the bowels were thoroughly emptied, and to prepare the patient for chloroform on the following day, when further attempts would be made to rectify the displacement. The woman was told to lie well round on her face, and to sometimes assume the genu-pectoral position. After my attempts at replacement she expressed herself as feeling much relieved, and she was able to pass urine quite freely a few hours after. On examination on the following morning, prior to giving her chloroform, great was my surprise to find the uterus in normal position. She was dismissed a few days later feeling perfectly well.

When, after repeated attempts at short intervals, manual reposition proves unsuccessful, there are several manœuvres which should be tried. Amongst the simplest is pulling down the cervix with volsellum forceps while pressure is exerted upon the fundus by the fingers (Fig. 129). I have, however, always found, and other operators have had a similar experience, that the cervix of the gravid uterus very readily tears, and that one cannot, therefore, put much traction upon it; besides, one often cannot reach the cervix. Much better is the device of employing a colpeurynter distended with water or quicksilver, as Albert[1] and Funke have recently advocated. The safest way of employing the colpeurynter is to leave it distended in the vagina, and allow the steady pressure of it to gradually push up the fundus. One can, however—and, if I mistake not, Olshausen advocates the method—place the colpeurynter in the vagina and distend it while the patient is in the lithotomy position, and then allow the legs to fall down as in the Walcher position.

A similar device, recommended by Sinclair[2] and others, is the employment of a watch-spring pessary of such a size that when introduced into the vagina it maintains an oval shape, and so exerts a steady and constant pressure upon the displaced fundus. It is quite obvious that the colpeurynter or watch-spring pessary can only be employed if there is room in the vagina. In Sinclair's most interesting case this could only be attained after the bladder had been cleared of the debris it contained, and the cervix had been pulled down by volsellum forceps.

[1] *Münch. Med. Woch.*, 1903, No. 12.

[2] Trans. Lond. Obst. Soc., vol. xlii., p. 338.

Such are the devices to be tried for the correction of an incarcerated retrodisplaced gravid uterus. They almost invariably succeed, and, indeed, some operators go the length of saying that they never fail. Such a position, however, is too extreme. It is certainly very striking that many accoucheurs of wide experience have never encountered a case of irreducible retrodisplacement of the gravid uterus, a fact which should always lead one to pause before pronouncing the displacement irreducible, and to question the judgment of such an operator as

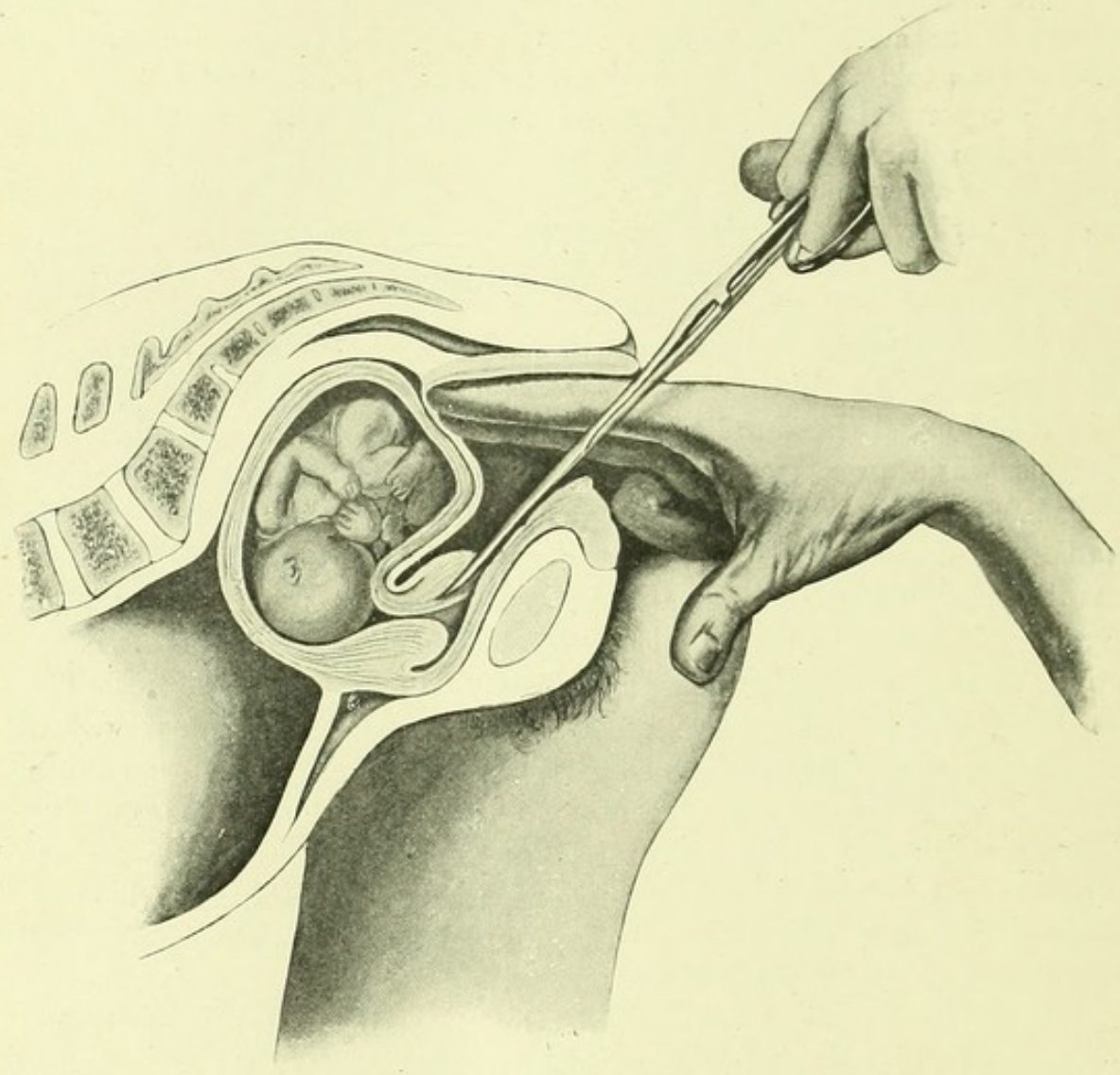


Fig. 129.—Replacement of Incarcerated Retroflexed Uterus. (After Bumm.)

Jacobs, who recently described twelve cases in which he had to perform abdominal section.

Admitting, then, that although rare cases are now and then encountered in which replacement by the ordinary methods already described is impossible, let us consider for a moment the means at our disposal for treating such very troublesome cases.

There are two courses open to one in dealing with cases of irre-

ducible retrodisplacement of the gravid uterus: one is to empty the uterus from below, and the other to open the abdominal cavity and replace the uterus by pulling the fundus up while an assistant pushes it from the vagina.

The former alternative was the only method employed until recent years, and induction of abortion by passing a sound or elastic bougie was the proceeding most favoured. But in not a few cases, particularly if the condition was one of retroversion, it was found impossible to introduce the instrument. In such cases puncture of the uterus from the vagina or rectum was recommended, and as recently as 1886 we find Barnes writing:[1] 'If it be found impossible to pass an instrument through the os uteri, if induction be also impossible, and the symptoms urgent, it is justifiable to puncture the uterus by the vagina or rectum.' Barnes preferred puncture from the rectum. He says: 'The rectum is to be preferred, because puncture there is more certain to tap the body of the uterus and to keep clear of the cervix.' Some years later Sänger[2] suggested incision and emptying the uterus from the vagina, and this proceeding was successfully carried out quite recently by Wennerstrom.[3] Olshausen, in a case in which the uterus was irreducible because of pelvic deformity, removed the whole organ *per vaginam*.

In recent years, however, the possibility of replacing the uterus from the abdomen without sacrificing the child has become more evident every day. Laparotomy for the condition under consideration was suggested years ago. Burns, for example, in the tenth edition of his text-book, published in 1863, writes (p. 298): 'It has also been asked whether it would not be allowable to make an incision into the abdomen and push up the uterus. Section of the symphysis has also been proposed.' The latter treatment—symphysiotomy—has been suggested from time to time, and is of special interest, for it will be remembered in Hunter's historical case, that at the post-mortem examination, it was only after the symphysis was divided that the displaced uterus could be raised from the pelvis.

The successful results obtained by laparotomy have brought that treatment more and more into favour, and many cases are now on record. One of the earliest was Cameron's, already referred to. Jacobs,[4] Mann,[5] MacLean,[6] Mouchet,[7] and Handfield Jones,[8] are a few

[1] *Op. cit.*, p. 228. [2] *Cent. f. Gyn.*, 1894, p. 175.

[3] *Cent. f. Gyn.*, 1903, p. 302.

[4] *Journ. d'Accouchement*, April, 1898, and Epitome *Brit. Med. Journ.*, June 4, 1898.

[5] *Amer. Journ. Obst.*, July, 1898. [6] *Ibid.*, August, 1898.

[7] *Annal. de. Gyn. et d'Obst.*, December, 1901.

[8] *Journ. Obst. and Gyn. Brit. Empire*, October, 1903.

operators who have recorded cases so treated (Fig. 130). Jacobs has operated upon as many as twelve cases, and in four of these he found adhesions of the uterus to surrounding tissues. Handfield Jones' case is of special interest, for he found the adhesions so intimate that owing to the patient's collapsed condition he could not proceed to their complete separation.

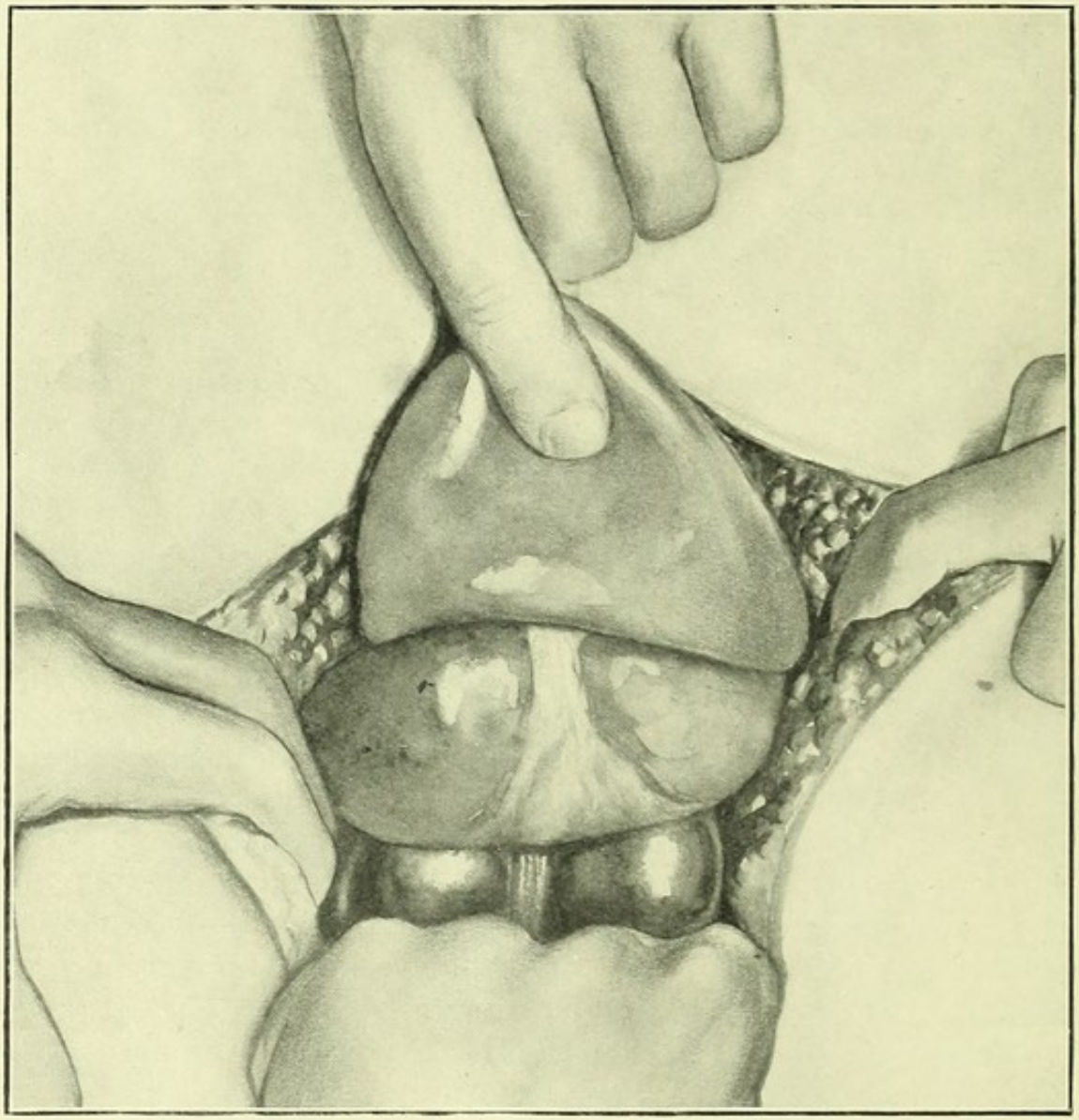


FIG. 130.—Incarceration of the Retroflexed Uterus. (After Wertheim.)

In front the bladder is being dragged forward, thus permitting the uterus being seen. Distinct adhesions can be seen on the posterior surface of the uterus.

Here, perhaps, it is well to mention that adhesions between fundus and surrounding tissues may be primary and the cause of the displacement, or secondary and the result of inflammation following septic infection from the bladder. In the former the adhesions will probably be very difficult, and sometimes impossible, to break

down, as in Macleod's case, but in the latter they will readily give way. In a few no adhesions existed. In a number where tumours were the cause, the removal of the latter allowed of replacement. The following, which occurred in my practice, illustrates this (Fig. 131):

Incarceration of the Retroflexed Gravid Uterus with Broad Ligament Cyst—Laparotomy—Removal of Cyst—Replacement of Uterus—Continuance of Pregnancy.

The patient, a fairly robust multipara, aged twenty-seven, was sent to me by Dr. Armstrong, of Kirkintilloch. She had had one child three years before. The period prior to her present pregnancy was about December 27, 1903.

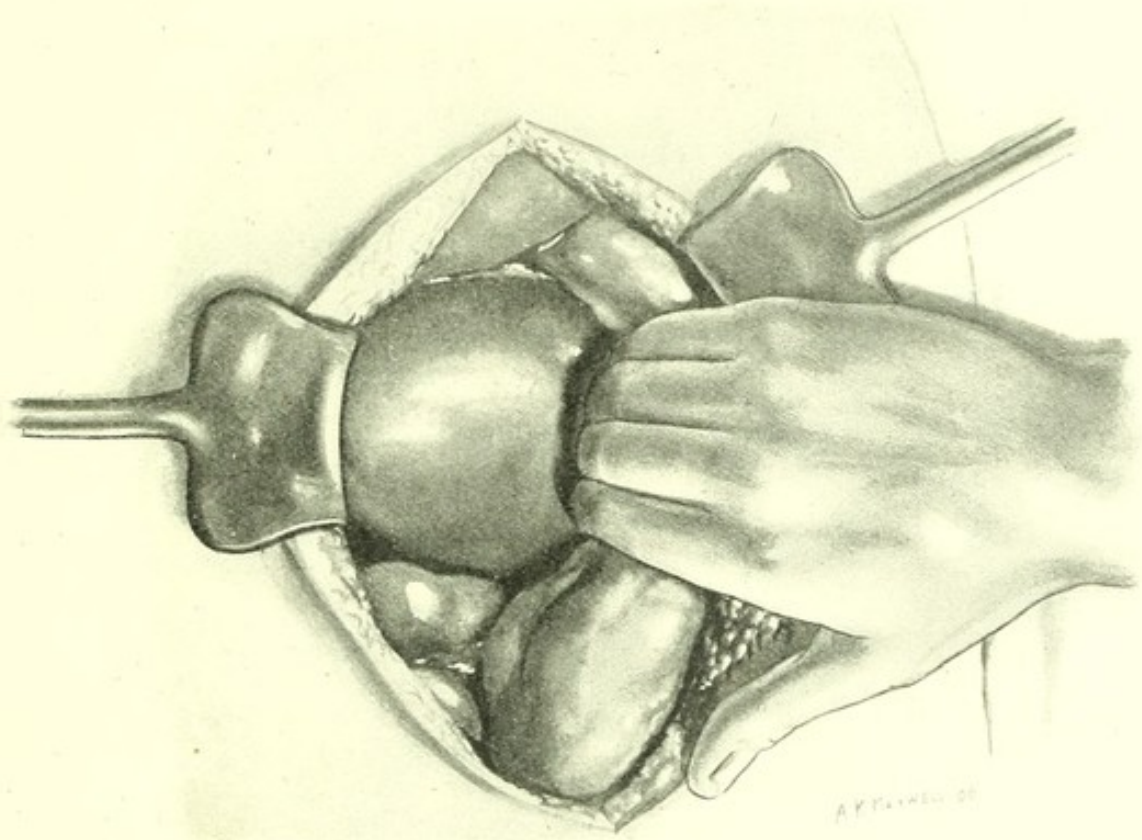


FIG. 131.—Retroflexion of Uterus caused by Large Broad Ligament Cyst. (Author's Case.) The retractors are holding apart the edges of the abdominal wound while the hand pulls the cyst over, thus permitting the uterus being seen.

I saw her first on April 28, 1904, when she told me that for six weeks she had been troubled with her urine—during four with frequency of micturition, but during the last two with retention. For two days Dr. Armstrong drew off the urine with catheter. Diagnosing the condition as an incarcerated retroflexed gravid uterus, he sent her to me. I examined her under chloroform with him, and agreed that such was the condition, and that the cause

was probably a tumour preventing the uterus from rising up. On May 1, I opened the abdomen, and removed with some difficulty a cystic tumour about the size of a fœtal head from the left broad ligament. I then pushed up the uterus from the vagina. The patient made an excellent recovery, and the pregnancy was undisturbed until seven and a half months were reached. The difficulty in micturition, which disappeared after the operation, returned slightly for a week or two before delivery. She was delivered of a small seven and a half months child without trouble.

It is specially pleasing and encouraging that in a large number of cases not only was the uterus replaced, but pregnancy continued. In all Jacobs's cases except one pregnancy continued ; this also happened in the cases recorded by Cameron, Mouchet, Mann, and myself. In operating upon such cases, steady pressure from the vagina by an assistant is of the greatest help, and there is no doubt that it is an advantage to place the patient in the Trendelenburg position.

If, in spite of such devices, I still found it impossible to raise the uterus, I would seize the organ with volsellum forceps, and try to get my fingers down behind the fundus, not only for the purpose of breaking down adhesions, but to allow air to get into the pouch of Douglas. Should it still be impossible, I would perform Cæsarean section, empty the uterus, stitch it up, and perform ventro-fixation.

But a word must be said regarding those rare cases of sacculation of the gravid uterus in which the pregnancy continues to term. Recently, as we have already seen, Macleod had to perform abdominal section for such a condition, and naturally such a proceeding is the only course open to one, if the sacculation cannot be removed or the child extracted. As Merriman and others have shown, however, the uterine contractions of labour are sometimes sufficient to remove the sacculation, and in Reid's case delivery was completed by bringing down a leg.

Sometimes the sacculation may be removed by pulling the abdominal portion of the uterus downwards and forwards, and pushing the sacculation upwards and backwards. Olshausen and Barnes record successes after such manipulations.

If laparotomy is necessary, one should only proceed to Cæsarean section if there are other indications for that operation, or if one failed, as did Macleod, to pull up the sacculation. If the sacculation can be relieved, it appears to me desirable that the child be delivered, if possible, *per vias naturales*, although it might be considered wiser to perform Cæsarean section if the uterus was the seat of myomatous tumours, and if the condition of the patient was such that an abdominal section would disturb her less than a prolonged labour.

Forward Displacement of the Uterus during Pregnancy and Labour.

All are aware that a feature of the early weeks of pregnancy, and one which sometimes assists the obstetrician in coming to a diagnosis of pregnancy in doubtful cases, is an increased degree of anteflexion. The reason for this occurrence is the increased weight of the fundus and the softening of the tissues at the upper part of the cervix. As a result of this increase of normal flexion and version, frequency of micturition results in not a few cases; indeed, in the early weeks of pregnancy it is a very general complaint. There should never be, however, any confusion of such a symptom with ischuria paradoxica, which, as we have seen, is a feature of the incarcerated retrodisplaced uterus; for, if the story of the patient leaves any doubt, a careful examination of the condition of the pelvic organ will clear up any obscurity. In addition to this 'irritability of the bladder,' constipation may be aggravated, although I have never seen it more pronounced than one ordinarily finds it during pregnancy.

Another feature emphasized by Graily Hewitt and others is an aggravation of the sickness of the early weeks. Without attaching too much importance to anteflexion as a cause of hyperemesis, I must admit that on several occasions I have seen the latter condition associated with an undue forward displacement of the uterus. It might only be a coincidence, but it has been too frequently remarked by others to justify such an explanation. Besides, I have seen the sickness relieved, and only relieved, by correcting the displacement. There is no evidence that an undue forward displacement is associated with a tendency to abortion, but pelvic uneasiness, aching over the symphysis and down the thighs, and difficulty in locomotion, are features that have occasionally been found associated with the malposition.

The diagnosis of the condition of exaggerated anteflexion or anteversion — it is unnecessary to distinguish between the two, although they both occur—is not difficult. On vaginal examination, the cervix is discovered tilted back and higher in the pelvis than usual—sometimes very markedly so—while at the same time the fundus is unusually low. On bimanual examination, it is readily made out that the swelling in part is the anteflexed uterus, although occasionally, I must admit, it has felt very much like a myoma in the anterior uterine wall.

Incarceration of the antedisplaced uterus is never of any serious moment; indeed, it is questionable if, properly speaking, it can occur.

Should symptoms arise, and it is believed that the displacement is the cause, occasional pushing up of the fundus, with the patient in the dorsal decubitus and the pelvis raised, and a tampon or colpeurynter, have proved successful.

Later in pregnancy all are familiar with the falling forwards of the uterus in cases where the anterior abdominal wall is much weakened, where the uterine cavity is unusually distended, and where the vertebral column and pelvis are deformed by disease.

The cases with which we are really concerned here, are those in which the anterior abdominal wall is at fault. A pendulous abdomen, especially amongst multiparous women of the working class, is not uncommon. This condition allows the uterus to project forwards and hang over the symphysis when the woman is in the erect position. The most marked examples of the condition are found associated with distinct separation of the recti muscles. The worst case of the kind that has come under my care was where the cicatrix of an abdominal wound had given way. The displacement was so extreme that the uterus hung down over the patient's thighs when she stood up, while, on vaginal examination, the cervix could hardly be reached.

Rosner[1] has described a case where the gravid uterus became incarcerated in a ventral hernia. Abdominal section, and then Cæsarean section, were necessary. The uterus was finally removed, because there was complete occlusion of the os externum.

Extreme anteflexion of the uterus, besides being a source of great discomfort to the patient during the later weeks of pregnancy, may be the cause of considerable trouble in parturition. Malpresentations, especially breech and footling presentations, are very common. The uterine axis during labour being altered, and the resistance of the abdominal wall being lost, labour is retarded until the firm support of a binder is supplied. During the puerperium, also, anteflexion occasionally prevents the escape of the lochia, and a condition arises sometimes termed 'lochiometra.' I have only once seen a typical example of this condition. When I removed the anteflexion and passed in an intra-uterine douche-tube, I was surprised at the quantity of pent-up lochia which escaped.

The treatment of the condition is obvious—a firm abdominal belt. The material to be used is of no great importance, although a broad strip of flannel, over which is applied an elastic binder, is probably the best.

It will often be found in such cases as we are considering, especially amongst women of the poorer classes, that there is con-

[1] *Cent. f. Gyn.*, 1904, p. 1486.

siderable irritation of the skin over the lower part of the abdomen and pubes, owing to chafing between the two surfaces. This is a distinct source of danger to the patient, for the irritated areas and the skin about the pubes harbour innumerable micro-organisms. Every precaution must therefore be taken to cleanse the part, and, if possible, have the raw surfaces healed before labour comes on.

Prolapse of the Uterus.

Prolapse of the pregnant uterus is not a common complication, and when it does occur, it is usually in multiparæ who have suffered from prolapse for some time. The most extreme case of the kind which has come under my observation was an elderly multipara, four months pregnant, who, after some slight strain, had a complete procidentia of the gravid uterus, associated with complete urinary obstruction. On emptying the bladder, the uterus was easily replaced, and maintained in position with the help of a pessary.

Slighter degrees of the displacement, where the os uteri has appeared or even projected beyond the vulvar orifice, I have, on a few occasions, observed, and in these cases there was generally also difficulty in micturition.

As far as I can find, there is no case on record in which pregnancy has continued until term in a uterus completely outside the vagina, but there are one or two recorded where a considerable portion of the uterus, with limbs of the contained fœtus, have projected beyond the external orifice.

The older writers frequently referred to acute prolapse during labour. Mauriceau and Smellie, for example, refer to such cases; recent writers, however, rarely do so.

I have once or twice seen the presenting head covered with the undilated cervix just within the vulvar orifice, and during extraction with forceps have even found the edges of the cervix appear outside. A case such as Jentzen's,[1] where there projected a portion of the head completely covered with the thinned-out cervix, is extremely rare. In that particular case the author incised the cervix and delivered a dead child with forceps. The patient was a primipara, and he states that before labour there was neither prolapse nor hypertrophy of the cervix.

Naturally, the condition that is most likely to be mistaken for prolapse of the uterus is hypertrophy of the cervix, and, as a matter of fact, the two conditions often coexist. Confusion is especially liable to arise if acute œdema of the cervix occurs. This condition, which has been referred to recently by several writers, is considered in Chapter XIII.

[1] *Arch. de Tocol.*, Paris, 1890, vol. xvi., p. 268.

The treatment of prolapse of the uterus is to replace the organ, and maintain it in position, if need be, by means of a support. If, however, the ordinary support—namely, a vulcanite or watch-spring pessary—is not sufficient, the patient should be kept in bed until the uterus is of such a size that it can no longer fall down. The replacement of the prolapsed uterus is seldom difficult. It might, however, happen that, owing to adhesions or a tumour, replacement is impossible, and although I am not aware of any such case, I see no reason why it might not occur, seeing that an irreducible prolapse in the non-gravid has been more than once described, for example, quite recently by Barbour Simpson.[1] In the event of such a condition, two courses would naturally be open to one—namely, to empty the uterus or to perform abdominal section and remove the condition producing the prolapse. By adopting the latter means, one would hope to permit the pregnancy continuing.

The cases in which there has been difficulty in reducing the prolapse have invariably been successfully treated by keeping the patient in bed and emptying the bladder at regular intervals, and, from time to time, pushing the cervix and lower part of the body upwards, for in these cases difficulty in replacement arises partly from the overdistension of the bladder, and partly from the œdematous condition of the cervix.

Displacements of Uterus the Result of Vaginal and Abdominal Fixation.

In recent years many operations have been devised for correcting backward and downward displacement of the uterus. The three most important have been shortening of the round ligaments (Alexander-Adam operation); incising the vaginal wall, pushing aside the bladder, and fixing the anterior wall of uterus to the vaginal wound (vaginal fixation); opening the abdomen and fixing the uterus to the anterior abdominal wall (hysteropexy or abdominal or ventral fixation). With the relative merits of these different methods we are not concerned, except in so far as they affect, disturb, or complicate subsequent pregnancies and parturitions. The one which undoubtedly does this least—in fact, I have never heard of it causing any trouble whatever—is the 'Alexander-Adam operation.'

Quite otherwise is it with 'vaginal fixation,' an operation which has been practised but little in this country, but which was for some time much favoured in Germany. After the introduction of the operation, some fifteen years ago, it was universally advocated. Very

[1] Edin. Obst. Trans., 1904-1905, vol. xxx., p. 94.

soon, however, it was found as a result of the operation that parturition was often very difficult, and that even Cæsarean section was sometimes necessary. Some few years ago we had, in the Glasgow Maternity Hospital, an illustration of the extreme dystocia that might result

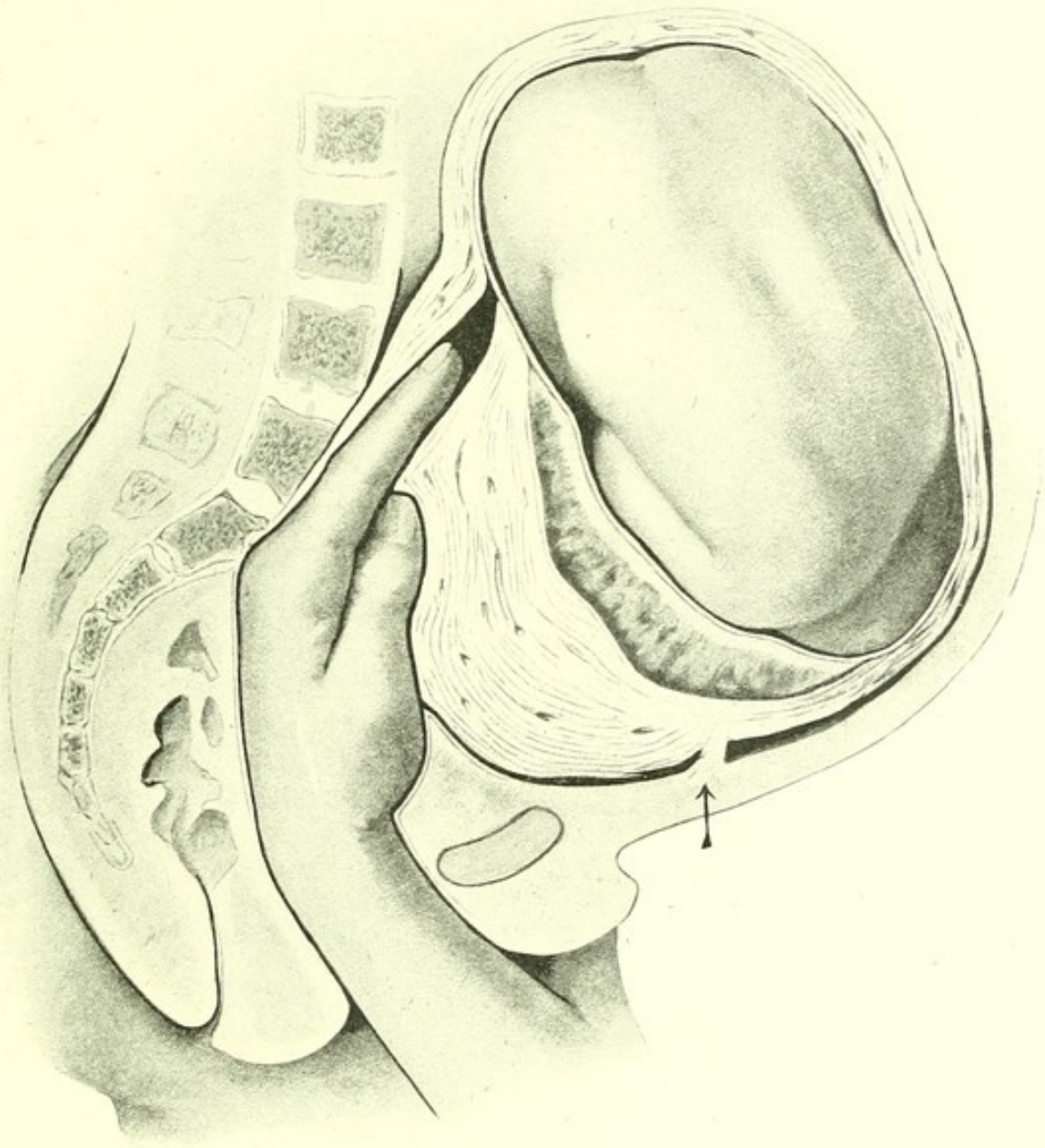


Fig. 132.—Showing the Distortion of the Gravid Uterus which may result from Abdominal Fixation. (Edgar.)

The arrow points to the adhesion between uterus and abdominal wall.

from vaginal fixation. A patient upon whom the operation had been performed by one of our staff was brought into hospital in labour. On admission, the os was found displaced upwards and backwards.

As it dilated, the presenting part refused to engage, and a leg was with difficulty brought down. As it was still found impossible to deliver the child, the operator performed Cæsarean section.

Similar cases have been recorded by Strassmann, Martin, Wertheim, and others. In recent years, however, since it was appreciated that the dystocia in great part resulted from passing the ligatures too high up on the uterine wall, one reads of few cases of difficulty. In Stähler's case,[1] in which great dystocia followed a low fixation, it must be remembered that at the time of the vaginal fixation two myomata were enucleated from the body of the uterus, and consequently the adhesions to the tissues in front were very intimate. Both Martin and Dührssen, in their recent writings, state that no dystocia follows a low stitching of the uterus (vesical fixation).

The effect of hysteropexy or ventral fixation of the uterus on subsequent pregnancy and labour is a matter which is causing a good deal of interest amongst obstetricians at the present time. The matter is still *sub judice*, but it must be admitted, I think, that dystocia results somewhat more frequently than was at first imagined. There are now many contributions to the subject, and several writers in addition have collected and analysed the recorded cases. Noble, in 1896, discussed the subject from 206 collected cases, while recently Andrews[2] did the same from 395 cases which he had gathered from English, American, French, German, and Italian literature. The paper of the latter is a very useful one, for it contains not only a table of the cases, but also a very full bibliography.

The following are Andrews' conclusions:

1. Ventral fixation may be the cause of great difficulties in labour.

2. These difficulties are due to too rigid fixation of the uterus. Rigid fixation of the anterior wall is not followed by so much difficulty as is fixation of the fundus or posterior wall.

3. The method of fixation involving least difficulty in labour is that in which the uterus is attached only to the parietal peritoneum, or peritoneum and subperitoneal connective tissue.

4. In women who may become pregnant after the operation it is not advisable to anchor the fundus or posterior wall of the uterus by firm adhesions, such as would be useful in cases of prolapse in older women; in other words, 'suspension' should be performed in women who may subsequently become pregnant, fixation in older women.

Since Andrews' paper several important contributions have

[1] *Cent. f. Gyn.*, 1902, p. 176.

[2] *Journ. Obst. and Gyn. Brit. Empire*, 1905, vol. viii., p. 97.

appeared—one by Seegert,[1] and two in English, by Herman[2] and Giles.[3] Herman states (p. 11): 'If the operation is properly performed, subsequent difficulty in labour need not be feared; by "properly performed" I mean that the anterior half of the fundus uteri is stitched to the muscle about half-way between the symphysis pubis and the umbilicus.'

I am specially interested in Herman's remarks, as I have for several years performed hysteropexy in the manner he describes, although I have not been in the habit of stitching the fundus quite so high. Up to the present I am not aware of any difficulty having resulted in subsequent labours, although I can speak with certainty of only seven cases. In two of the cases abortion occurred, but they later, in common with the others, carried children to full time. One of the patients complained of very great pain during the early months of pregnancy.

Giles' method of operating is more simple. Three silk-worm gut sutures are passed through the whole thickness of the abdominal wall, then through the anterior wall of the uterus, and out through the abdominal wall on the other side. He says: 'It is advisable that the sutures be passed low down in the anterior uterine wall in women of child-bearing age.' In his cases twelve became pregnant, five miscarried, seven went to term, and of these latter five had normal confinements and two were delivered with forceps.

Amongst the cases of dystocia may be mentioned those of Clark and Lee[4] and Calman.[5] Quite recently, Hocheisen[6] described a case of dystocia at the May meeting of the Gesellschaft für Geburtshülfe und Gynækologie; and Bumm, Nagel, Olshausen, Bröse, all referred to difficulties that they had experienced.

It is perfectly evident, therefore, that ventral fixation may occasionally cause dystocia. Roughly, somewhere about 1·5 per cent. represents the frequency. However, as the subject is still so much under discussion, I do not think it advisable to pursue it further at present.

[1] *Festschrift f. Olshausen*, 1905.
[2] *Journ. Obst. and Gyn. Brit. Empire*, January, 1906.
[3] *Brit. Med. Journ.*, vol. ii., 1906, p. 1188.
[4] Johns Hopkins Hospital, 1905, p. 168.
[5] *Cent. f. Gyn.*, 1906, No. 6.
[6] *Ibid.*, 1906, No. 31, p. 80.

CHAPTER XX

DYSTOCIA THE RESULT OF ABNORMALITIES AFFECTING THE PARTURIENT CANAL (*continued*)

Malformations of the Uterus and Vagina.

It is only within quite recent years that special interest has attached to the occurrence of pregnancy in malformed uteri. In great part, no doubt, this is because the conditions were not appreciated, and because the general and erroneous idea prevailed that malformation of the uterus precluded pregnancy. Many interesting cases are now recorded, however, and every day their number is being added to. As giving an idea of the frequency of the malformation, I may mention that seven cases have been under my personal supervision—three cases of uterus didelphys, one case of uterus bicornis unicollis, one case of uterus subseptus, and two cases of uterus cordiformis.

Naturally, it is quite impossible to discuss in detail the various malformations of the uterus and vagina which may disturb pregnancy. I can only give an outline of the general course these cases run, and illustrate some of the difficulties which have been recorded and are likely to arise.

It will be remembered that the tubes, uterus, and vagina are developed from the Müllerian ducts, and that these two ducts become fused, except the uppermost parts, which go to form the Fallopian tubes. The varieties of malformation encountered, therefore, are very numerous, and depend upon the extent to which development and fusion of the two parts, which should become blended, fail. The illustrations in Figs. 133 and 134 diagrammatically represent the various malformations which may be encountered.

As one would expect, pregnancy in a uterus unicornis is of extreme rarity. Molderhauer's[1] is the only case I know of, although I doubt not others have been recorded.

As regards uterus bicornis with a rudimentary horn, it is quite

[1] *Arch. f. Gyn.*, Bd. vii., p. 175.

otherwise. Many cases of this malformation have been found where the normal half was pregnant, and many others where the rudimentary horn was gravid. Very rarely indeed is there an external communication with the rudimentary horn. Werth,[1] in his hundred collected cases, found a communication in nineteen.

Interesting isolated cases have been recorded in this country by Galabin,[2] Targett,[3] Cameron,[4] etc.

Fertilization in most cases takes place in the following way: The spermatozoa, which pass up the normal side and out of the Fallopian tubes, wander over to the other tube, and pass into it and impregnate the ovum.

A common termination is rupture of the sac. This, according to Kehrer,[5] occurred in 47 per cent., and according to Werth in 45 per cent. Rarely does pregnancy continue to the later months; but Becker[6] has described such a case.

A correct appreciation of the nature of the condition is seldom come to until the abdomen is opened, for the round ligament and tube running from the distal margin of the sac—the feature which distinguishes the condition—are usually impossible to palpate. Targett, however, recognized the condition in his case prior to operation.

The treatment is to remove the sac, which as a rule can be easily carried out, as Galabin, Targett, Doran, and others, have shown; but I cannot linger over such cases, for clinically they do not come under consideration here, as they present features more nearly resembling tubal pregnancy.

The simpler forms of malformation, such as uterus cordiformis and uterus subseptus, are of comparatively little consequence, except in so far that they favour the occurrence of oblique presentations, as we have already seen in Chapter VI.

In the malformations where there are two distinct cavities the disturbances of pregnancy are less frequent than one might expect. (?) In the two cases of uterus didelphys which have been under my care pregnancy continued until term. Labour was but little disturbed. The child was delivered with forceps when its head had reached the outlet. In both cases the vaginal septum was torn. The cases are briefly described on p. 298.

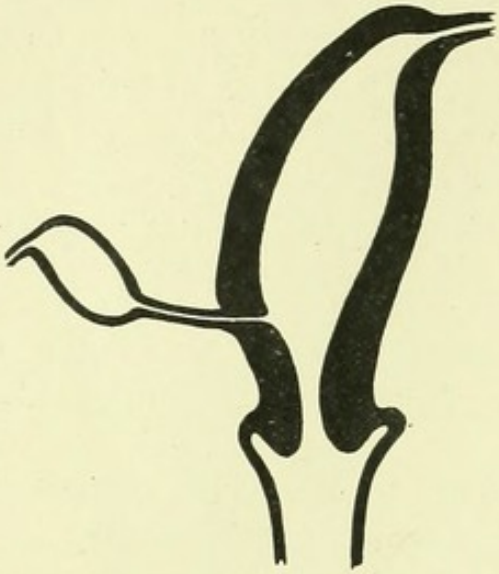
[1] Winckel's 'Handbuch,' Bd. ii., Teil ii., 1904, p. 978, and *Arch. f. Gyn.* vol. lxxvi., p. 48.

[2] Lond. Obst. Trans., 1895, p. 225. [3] *Ibid.*, 1900, p. 276.

[4] *Journ. Obst. and Gyn. Brit. Empire*, 1902, p. 67.

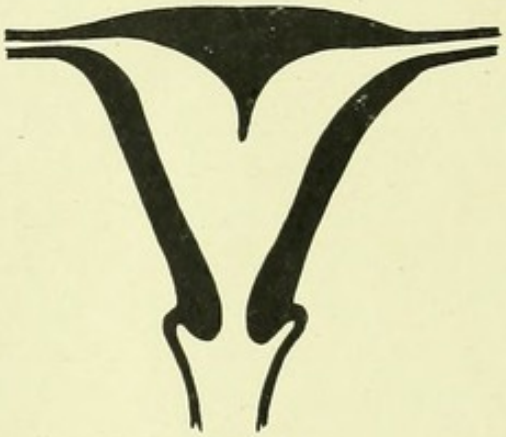
[5] 'Das Nebenhorn der Doppelten Uterus,' Inaug. Dis., 1899.

[6] *Monat. f. Geb. u. Gyn.*, 1905, vol. xxii., p. 587.

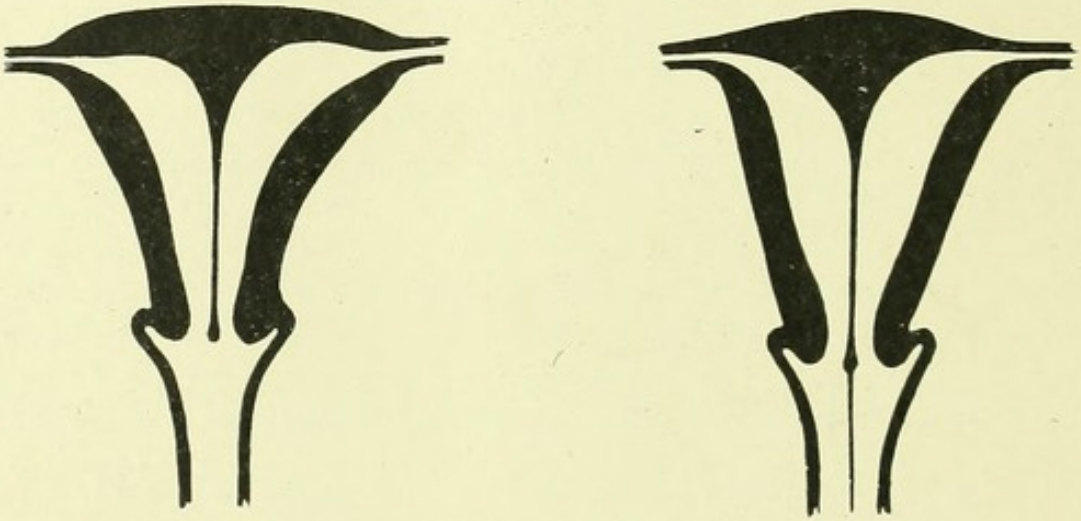


Uterus Unicornis (with rudimentary horn).

Uterus Unicornis.



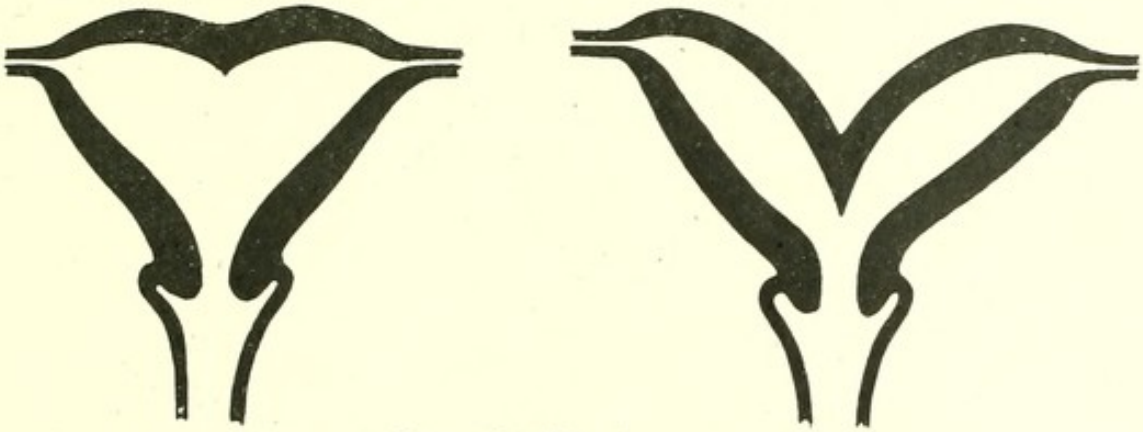
Uterus Subseptus



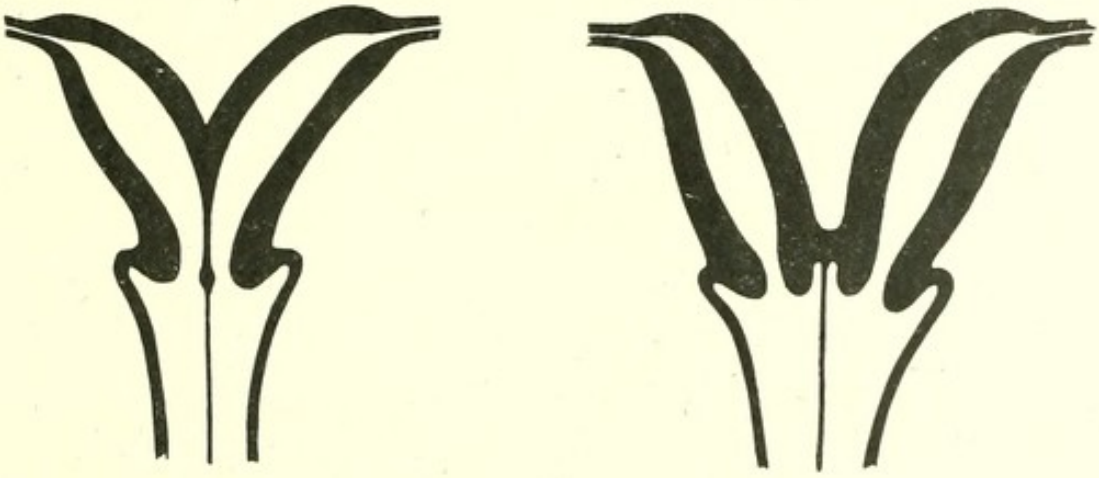
Uterus Septus.

FIG. 133.—Malformations of Uterus.

In the English language the most important paper is by Giles.[1] Since Giles' paper several others have appeared, one of the most interesting being by Guerin-Valmale.[2] This author reviews 46 cases of uterus didelphys. In the 104 pregnancies which occurred in these women, abortion occurred in 19, premature labour in 8, or a total interruption of pregnancy once in 4 cases. Complications, the result of auto-intoxication, seem more frequent than usual, for there were 3 cases of eclampsia in the 104 pregnancies.



Uterus Cordiformis.



Uterus Bicornis Unicollis. Uterus Didelphys.

FIG. 134.—Malformations of Uterus.

The labour is rarely complicated. He writes: 'En somme la délivrance s'effective habituellement avec la plus grande simplicité, sans accidents ou complications serieuses.'

Trapet[3] has reviewed 186 collected cases. He found that the complications and difficulties were not frequent. Menstruation from the non-gravid half was not common, although it occasionally occured quite

[1] Trans. Lond. Obst. Soc., 1895, vol. xxxvii., p. 301.

[2] *L'Obstétrique*, May, 1904, p. 209.

[3] Inaug. Dis., Bonn, 1905; ref. *Cent. f. Gyn.*, 1906, p. 671.

regularly. The decidua which formed in the non-gravid half was usually expelled at or about the time of the delivery of the fœtus, but occasionally it was expelled during pregnancy.

With all varieties of double uterus difficulties may arise. Some of these I will now refer to. I have already mentioned that even the simple form, uterus cordiformis, may be associated with mal-presentations, hæmorrhage, retention of the placenta, etc.

An extraordinary case is that described by Jakesch,[1] where the fœtal head must have been pushed through the septum. Halban reports a case where the birth occurred through the cervical canal of the non-gravid side. But although it must be of extreme rarity to have the uterine septum give way, it is by no means uncommon for the vaginal one to be torn. This occurred in two cases under my care.

Case 1.—The following notes regarding this case have kindly been furnished to me by Dr. Baird, with whom I saw the patient in consultation: 'In August, 1904, about 5 p.m., I was called to Mrs. A——, a primipara, who had nearly reached term. On vaginal examination, I found that the vagina was divided antero-posteriorly by a septum, which extended from immediately above the meatus urinarius to the centre of the perineum and upwards to the cervix. On passing the finger on each side, I judged by the feel that it would be about $\frac{1}{8}$ inch in thickness. The septum was complete, and I could not get my fingers to meet, not even at the cervix. The two passages were completely separate. The right half seemed to become wider and more roomy as the finger passed upwards, while the left got narrower. They both had a vaginal portion projecting into them. On both sides the cervix was obliterated, and the os about the size of a sixpence. On seeing her six hours later, the left os had dilated to about the size of a crown piece. The presenting head by this time had detached the uppermost end of the vaginal septum. A little later the head was found to have projected through the opening into the right vagina. The child descended through the right vagina, but was prevented from escaping by the remains of the vaginal septum. At this stage I asked Dr. Munro Kerr to see the case with me.

'After putting the patient under chloroform, Dr. Kerr divided the septum and extracted a living child with forceps. The placenta was soon after expelled. A vaginal examination was made thereafter, and two distinct uterine bodies were felt. The remains of the vaginal septum were then removed.'

Case 2.—J. McW——, 1-para, was admitted to the Glasgow Maternity Hospital under my care on July 28, 1904, in labour. The pelvis was of normal dimensions. A curious condition was discovered, however—a double vagina and uterus of the variety uterus duplex separatus cum vagina separata. Labour was allowed to proceed. The fœtal head in its descent tore the vaginal septum. No great bleeding took place, however, so nothing was done until the tearing process threatened the parts about the clitoris, when an incision

[1] *Cent. f. Gyn.*, 1897, p. 729.

with a knife freed the last ¼ inch of the anterior attachment of the septum. Spontaneous delivery took place without any rupture of the perineum.

As I have already said, the septum frequently tears during the birth, but for the torn septum to act as a barrier to the head or shoulders, as in the above cases, is not common. Strauch[1] has recorded a case.

Lukowicz's case[2] is of special interest, where the presenting breech rode on the vaginal septum. A similar case has also been recorded by Gardini.[3]

A very rare complication is for the non-gravid half to act as an obstruction. Ranken Lyle[4] has recorded a case where the non-gravid half of a uterus duplex separatus cum vagina separata, and affected by fibroids, necessitated Cæsarean section at term. Both mother and child were saved. V. Braun[5] described one where Cæsarean section was performed because of a tumour impacted in the pelvis, which obstructed delivery and could not be dislodged. Upon removing the tumour, it was found to be the non-gravid half of a uterus bicornis. Wendling[6] has recorded a case where a hæmatocolpos, previously incised, formed again, and acted as a barrier to delivery, until an incision was again made and the accumulated blood allowed to escape. Bäcker's case[7] is of interest, for although a hæmatometra had been existing for some years, the woman had had no trouble at four previous births. At the fifth confinement—the one described by the author—laparotomy was performed, on account of the tumour mentioned obstructing the parturient canal.

Abortion is not infrequent, but rarely gives trouble. Gusserow's[8] experience is most peculiar. A three months ovum became retained in a closed vagina of a uterus didelphys, and could only be removed by dividing the septum. Plural pregnancy has been observed frequently. Nowikow[9] has described three most interesting cases: (1) A multipara delivered of a premature child was discovered to have a swelling towards the left of the abdomen, which was diagnosed as a pregnancy of seven months in the one half of a double uterus. Two months after a full-time living child was born. (2) A multipara had a full-time child. Soon after its birth a three months ovum was discharged. (3) A multipara was delivered of two full-time children at an interval of forty-seven days. Paulin[10] records

[1] *Cent. f. Gyn.*, 1887, No. 43, p. 684.
[2] *Ibid.*, 1886, No. 35, p. 572.
[3] *Anal. d'Obst. et Gyn.*, September, 1899.
[4] *Journ. Obst. and Gyn. Brit. Empire*, December, 1904, p. 438.
[5] *Cent. f. Gyn*, 1895, p. 579.
[6] *Wien. Klin. Woch.*, 1896, No. 2.
[7] *Cent. f. Gyn.*, 1896, p. 883.
[8] *Charité Annal.*, 1900, p. 618.
[9] Ref. *Cent. f. Gyn.*, 1902, p. 861.
[10] Ref. Epit., *Brit. Med. Journ.*, 1905, No 80, vol. i.

a twin labour, the children being born at seventeen days' interval. During the interval there was no lochia, nor any active secretion of milk. Both children were alive, and were suckled by the mother. A distinct septum divided the uterus into two compartments, but there was no sulcus at the fundus.

Trapet[1] has added to the cases collected by Giles and Guérin-Valmale, and has collected from the literature on the subject sixteen cases of plural pregnancy. He describes a new case, in which the children were born at an interval of fourteen days.

Another complication, but of a much more serious nature, is rupture of the uterus. One of the most striking examples of this is a case recorded by Donald and Walls.[2] The case (Fig. 135) was one of uterus bicornis unicollis in which two ruptures occurred, one in the ridge between the uterine bodies and the other in the right anterior wall. The labour, which was the sixth, was very protracted. The fifth labour was specially interesting, for the right horn, which contained the placenta, was incarcerated in the pelvis, and obstructed the delivery. Winter's case[3] is also of peculiar interest, and quite unique as far as I know—complete inversion and rupture of the left half of a double uterus.

It is not to be wondered at that rupture should occur, for the delivery is sometimes difficult, and the double uterus, especially the variety with one cervix, is much weaker in its wall than a normal uterus. Rupture of the 'infantile uterus' is referred to in connexion with rupture of the uterus (Chapter XXXV.).

It is self-evident that the diagnosis of double uterus must frequently be very difficult, and that mistakes are sometimes unavoidable. When two vaginæ or two cervices are discovered, the nature of the condition is at once apparent. It often happens, however, that only one vagina is recognized—the one which has been used for intercourse; also in not a few cases the abnormality is a uterus bicornis unicollis. One of the most common mistakes is to consider the gravid half an ectopic sac, and on several occasions the abdomen has been opened on that account.

In August of last year I had an interesting case of uterus bicornis unicollis, which was sent to me by Dr. Campbell, Partick, with a provisional diagnosis of extra-uterine pregnancy. The woman was a multipara, aged thirty. When I saw her, an abdominal tumour, consisting of two unequal parts, occupied the lower part of the abdomen. The woman gave the history of having missed two menstrual periods, and having had for some six weeks much ab-

[1] Inaug. Dis., Bonn, 1905. [2] *Practitioner*, June, 1903.
[3] *Cent. f. Gyn.*, 1887, p. 814.

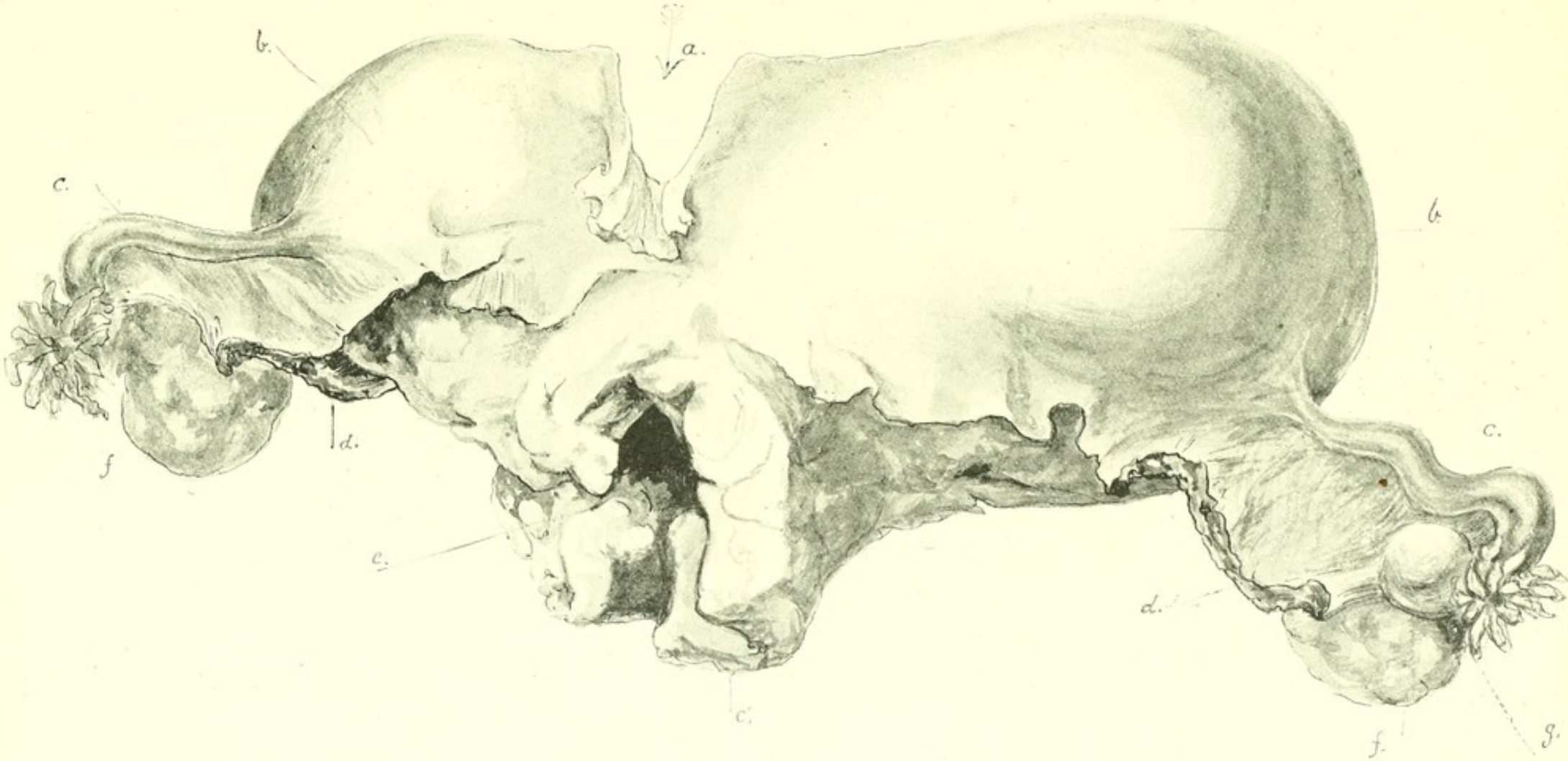


Fig. 135.—Double Uterus with Ruptures at *a* and *c* (Donald).

dominal pain and irregular vaginal hæmorrhages. Extra-uterine pregnancy I dismissed, however, after a careful bimanual examination, and came to the conclusion that I had probably to do with an abortion in either a bicornate or myomatous uterus. The passage of the uterine sound into two distinct cavities showed it was the former. Füth[1] describes a case where the abdomen was opened for a supposed extra-uterine pregnancy, and a gravid uterus bicornis unicollis was discovered.

Theoretically, the position of tubes, ovaries, and round ligaments should decide the diagnosis, and undoubtedly it often does; but one cannot always make certain of the exact nature of the structures felt between the two examining hands. Still, as in all other pelvic conditions, care, time, and reflection will usually result in a correct diagnosis.

As regards treatment, it is equally difficult to generalize. We have already seen that in cases of pregnancy in a rudimentary horn the latter may be removed and the other half of the uterus left behind, and Doran is even able to record a case where pregnancy followed. But with any other condition I question if any operative treatment is likely to improve matters.

I think it wise to leave the cases of double uterus alone, for in most cases labour is not greatly disturbed. Even the serious cases I have described have many of them been made more so by the methods of treatment adopted. As a matter of fact, the uterus cordiformis—the simplest of all malformations—is the one which most frequently gives trouble, for it is associated so generally with a transverse presentation.

[1] *Cent. f. Gyn.*, 1905, No. 27, p. 874.

CHAPTER XXI

PREPARATIONS FOR OPERATION—PREPARATION OF OPERATING-ROOM—INSTRUMENTS AND APPLIANCES—OPERATOR'S HANDS—PATIENT—ANÆSTHESIA

The ideal room for an accouchement is naturally the labour-room of a modern maternity hospital, whose floors and walls can be washed down from time to time, and whose furniture consists of a few wash-hand basins and a labour-couch. But midwifery work in general cannot be carried out in such a room, seeing that confinements are conducted in private dwellings, where there is little choice of the apartment.

Fortunately, the dangers of infection from the atmosphere of a room are comparatively slight. The only exception is in the case of a room into which sewer-gas escapes from a set-in basin badly trapped or from a water-closet ventilating into the room. Such errors in sanitation, however, are now fortunately comparatively rare, and cases of poisoning such as Playfair[1] and others have described are almost unknown. One may therefore dismiss the question of the room.

More important is the bed upon which the patient lies. This should always be well protected by mackintoshes covered by clean sheets. These conveniences, however, in the houses of the poor are often not available, so that it was my custom in doing district work to carry with me a piece of thin jaconet.

As regards the extremely poor and destitute, it is apparent that they cannot be satisfactorily attended in their own homes; consequently, they should, when at all possible, be transferred to an institution suitable for such cases.

Even amongst those in comfortable circumstances, there is a tendency to employ and use up at a confinement any old linen and clothing that is available. This, of course, is quite permissible if

[1] 'The Science and Practice of Midwifery,' 9th edition, vol. ii., p. 365.

such articles are thoroughly cleansed beforehand, but, unfortunately, that is hardly ever done. I feel convinced, however, that if nurses and practitioners would impress upon patients the importance of having clean garments for the confinement, the majority of patients would respond to such a suggestion, and have everything ready that was required. It entails little, if any, expenditure of money, and should be as easy for those with only very limited means as for those in comfortable circumstances.

Instruments.

All instruments and appliances must be sterile. In a hospital that, of course, is easily accomplished, but even in private practice the sterilization of them is not difficult.

Metal Instruments are sterilized by boiling. Prior to doing this they should, if not previously washed, be scrubbed with soap and water. This scrubbing with soap and water is best done immediately after the instrument is soiled, for dry blood-clot is difficult to remove. The sterilizer generally seen in hospital is that of Schimmelbusch, but an ordinary fish-kettle does quite as well. Very commonly some sodium carbonate is put into the water; it has the effect of raising the temperature, and so increases the germicidal power of the water. When removed from the boiling water they should be placed in trays or some convenient dish, and covered over with saline solution. If the operation is in a hospital or nursing home it is unnecessary to immerse them in strong antiseptic solutions, as such solutions irritate any mucous membrane or raw surface with which they are brought into contact. The only advantage of a weak antiseptic solution such as carbolic 1 in 60 is that it does not rust the instruments. When the instruments have to be sterilized at home they should be wrapped up in a sterilized towel after boiling. Before use I always put them in a solution of carbolic (1 in 30). I never attempt aseptic midwifery in private practice. During the operation soiled instruments should be immersed occasionally in an antiseptic solution.

Knives should be sterilized by boiling, the blades being protected by gauze, for otherwise the edges are blunted. A common practice for sterilizing knives is immersing them in 1 in 70 alcohol, but this is not quite sufficient unless they are immersed in it for some time.

Trays and Dishes containing the instruments should be sterilized. In the Maternity Hospital we do this by immersing them in a strong solution of 1 in 500 bichloride of mercury; but a large copper tank, in which they can be boiled, is better. In private houses all basins, ewers, or other dishes should be well washed with soap and water and carbolic solution (1 in 20).

Rubber Instruments without joints, such as the douche-tubes, gloves, Barnes's bags, can be quite satisfactorily sterilized by boiling. Champetier de Ribes' bag, however, I am in the habit of sterilizing by immersion in perchloride of mercury, 1 in 1,000, for twenty-four hours. I always keep one ready for use in a sterilized towel. Bougies for induction of labour are best sterilized by soaking in the same solution, although, if required in a hurry, they may be boiled with safety; the only objection to the boiling is that it roughens the smooth surface of the instrument.

Swabs, Sponges, Dressings.

The materials used for swabbing in the Glasgow Maternity Hospital are cotton-wool and gauze sponges in the indoor department, and carbolized tow in the outdoor. We never use ordinary marine sponges for abdominal work, although there is a good deal to be said in their favour, as they are so soft and absorbent. They are difficult to sterilize, however. Gauze and cotton-wool swabs, along with all dressings, are sterilized in the steam sterilizer.

In private obstetric practice gamgee is the material most employed for sponging, and it is generally used as it comes from the maker. Used in that way gamgee is not without danger, as it is not sterile. A simple device is to boil it, and then run off the water and let it dry in the kettle, or wring it out of biniodide of mercury, 1 in 1,000, and use it wet. Undoubtedly it would be better if a supply of sterilized gauze was one of the requisites for the accouchement.

For abdominal operations the gauze swabs are arranged in bundles of ten. I find that usually about fifty are required for a Cæsarean section, and about ten or fifteen less for any ordinary abdominal section. They may be used dry or soaked in a normal saline solution. It is a good precaution to have tapes attached to all swabs that are pushed into the abdominal cavity, and to fasten a pair of forceps to the ends of each tape. The swabs must, of course, be carefully counted before the abdomen is closed.

The interest in dressings is not so great now as formerly. In hospital and private nursing homes sterilized gauze is the only dressing I employ, unless the wound is being drained or is septic, when I employ an antiseptic dressing. For packing the uterus or any cavity I usually employ iodoform gauze (5 to 7 per cent.). In domestic practice, where asepsis is almost impossible, one of the antiseptic dressings, such as the double cyanide gauze, is better for packing cavities, as iodoform gauze is not a good drain.

Ligatures and Sutures.

Silk.—Silk should be loosely wound on glass spools or plates; there should not be too much on one spool. It is readily sterilized by boiling in water for twenty to thirty minutes. It may then be preserved in a solution of carbolic, 1 in 30, or, better, biniodide of mercury and 70 per cent. alcohol 1 in 1,000. Before use it may be washed, but it is more conveniently manipulated when taken directly from the alcohol solution. It is advisable when using silk to employ the finest variety that will serve the purpose. Personally, I try to use silk as little as possible; indeed, for the last year or more I have used nothing but catgut.

Several operators speak highly of Pagenstecher's celluloid thread. Moynihan, for example, prefers it to silk. We used it for a short time in the Glasgow Maternity Hospital, but did not find it possessed any advantages over silk. It is sterilized by boiling in the same way as silk. In an emergency, and when neither of these materials mentioned is available, sterilized linen thread is quite a useful material for ligaturing.

Silk-worm Gut.—Silk-worm gut is readily sterilized by boiling for twenty to thirty minutes. It may be kept in either the carbolic or biniodide solutions already mentioned. But it must be washed well in water, otherwise it breaks very readily. It is a most useful suture, and I employ it always for the abdominal wound and the perineum in the manner I will describe when considering these wounds.

Catgut.—The sterilization of catgut is too big a subject to discuss in detail. Much has been written regarding it, and there are a great number of methods recommended. At the present time the one most favoured is by means of iodine. Claudius some three or four years ago recommended this method. The ordinary commercial catgut is steeped for eight days in a solution of iodine, 1 part; potassium iodide, 1 part; and water, 100 parts. Before use, Claudius recommends its being thoroughly well washed to remove the excess of iodine. Several operators have recently advocated the addition of alcohol. Scott Riddell[1] contributed an interesting article on the subject, and reported certain investigations carried out by McDonald where a solution of tincture of iodine 1 part and proof spirit 15 parts was employed. It appears that this solution is an excellent germicide, and that anthrax spores and *Bacillus mesentericus* were killed in three and six days respectively.

Iodized catgut appears not to be absorbed too quickly, standing midway between the ordinary catgut sterilized by the older methods

[1] *Brit. Med. Journ.*, April 6, 1907.

and chromicized catgut. At the present moment the most modern operators speak very highly of iodized catgut, but the last word regarding the sterilization of this most perfect ligature has not yet been spoken.

For some years in the Glasgow Maternity Hospital the catgut was prepared by boiling in alcohol under pressure in a Jellett or Robson metal vessel. I was not quite satisfied, however, with the catgut prepared in that way. A very convenient preparation is Van Horn's, made up in sealed glass tubes. The smaller sizes up to No. 2 I have found very satisfactory, and although one is prejudiced against employing catgut not made under one's own direction, I feel satisfied that the smaller sizes of Van Horn catgut can be used with perfect safety. Now that there is such a simple method as the iodine one for sterilizing catgut, there is no reason why one should not sterilize the gut for oneself.

Preparation of the Operator and Assistants.

In ordinary domestic obstetric practice, the most the accoucheur can do is to clothe himself in a sterile gown, and this many of us are now in the habit of doing. For abdominal work in hospital and private nursing homes many operators go further, and wear caps and masks, and quite rightly, for the head of the operator and his assistant frequently come in contact, and both breathe over the wound large quantities of organisms.

In preparing for an abdominal operation or for an ordinary accouchement, the preparation of the hands of the operator and his assistants is the most important part of their toilet. That being so, it is not to be wondered at that it has been so much discussed and written about. It would be quite impossible to consider this subject in detail. I would refer those who are specially interested in it to two monographs—one a translation by C. Heron Watson of Haegler's most important work, 'Cleansing, Disinfection, and Protection of the Hands,' the other a small but very excellent book by C. Leedham Green, 'The Sterilization of the Hands.'

Although it is somewhat disappointing to think that it is impossible to sterilize the hands completely by any known device, it is a matter of great satisfaction to learn that the simplest of all methods of cleansing them is the best. Haegler writes (p. 35): 'It follows, therefore, from these examinations, that the principal provisions for a successful and mechanical cleansing are hot water, soap, and a scrubbing instrument to be used during the washing, and a rough towel with which to rub the hands.' As regards the hot water, the

important matter is that the water should be running or frequently changed, as otherwise one rubs into the skin the organisms which have been already removed.

Different soaps have been recommended from time to time, such as alkaline soap, green soap, marble dust soap. It does not, however, appear to be of very much importance which of them is used, nor does it seem of any advantage to combine the antiseptic with the soap.

Haegler is a strong advocate of the brush, and found none of the substitutes were so good; the same brush, however, should not be used all the time. It is advisable to employ two nail-brushes at least, one for the first part of the scrubbing, and the other for the second part. In addition to the soap and nail-brush, fine white sterile sea-sand is, according to Leedham Green, an advantage, and can, of course, be used in hospitals or private nursing homes.

The cleansing of the nails is of great importance. I have never cared for the sharp metal nail-cleaner, but prefer a bone one and gauze. Haegler for the nails found the best results obtained with silk threads. He states (p. 65): 'The wiping out of the space under the nail with a rough but pliant medium is far more efficacious than is the work of the nail-cleaner, and the efficacy of the thread is increased by the progressive maceration of the epidermis.' Silk threads, however, are very liable to cut the skin, and they are not easily used.

Having completed the scrubbing of the hands, which should occupy about seven to ten minutes, the next consideration is the antiseptic that should be subsequently used. There are three generally employed in practice: carbolic acid, mercury (either the biniodide or bichloride), and alcohol.

In the early days of antiseptic surgery great importance was attached to the washing of the hands in antiseptic solutions, and many varieties of antiseptics were suggested and tried. The only two, however, which have stood the test of time are carbolic acid and mercuric chloride or iodide. The former was employed very extensively by Lister, and is still favoured by some surgeons, including Sir Hector C. Cameron and Sir William Macewen of Glasgow University. To the large majority of modern surgeons, however, carbolic acid is anathema. Without doubt, as Lister pointed out long ago, carbolic acid has a marvellous power of penetrating and combining with fats. For everyday practice, therefore, the thorough cleansing of the hands with soap and water for seven minutes, and the subsequent steeping of them in carbolic acid, 1 in 20, for two minutes is quite sufficient.

In the face, however, of recent investigations on the sterilization of the hands and skin generally, one is forced to admit that a more thorough cleansing of the skin is obtained by the use of alcohol and mercuric iodide. Mercuric chloride and iodide, the great rivals of carbolic acid, have again come to be freely employed since the value of alcohol as an antiseptic has been demonstrated.

Much has been written and varied have been the views expressed regarding the value of alcohol as an antiseptic. Without doubt, however, it is a most valuable addition to the means we previously had for cleansing the hands. It removes fats, and so permits the mercuric solution penetrating the tissues. It also dehydrates, and thus hardens the epithelium and acts as a germicidal agent. It appears to be of most value at 70 per cent., the stronger solutions being distinctly feebler in their action.

As regards the mercuric salt employed, the iodide possesses certain advantages over the perchloride; it is stronger, penetrates better into the tissues, and irritates the skin less. It may be combined with the methylated spirit, or used in an aqueous solution after the washing with alcohol. Haegler believes the latter is better, but Leedham Green has found the alcoholic solution of the mercuric iodide more efficacious.

As far as I can judge from the writings of those most competent to express an opinion about the matter, alcohol and mercuric iodide, 1 in 1,000, is better than carbolic acid, 1 in 20; but the aqueous solution of the mercuric salt is not so good as the carbolic.

In domestic practice, if methylated spirit can be obtained, and the operator is prepared to take the time that the alcohol and mercury process involves, that is the best method. If, however, methylated spirit cannot be obtained, carbolic acid, 1 in 20, is better than mercuric iodide alone, and, consequently, is probably the best method of cleansing the hands in ordinary general practice.

In the Glasgow Maternity Hospital we have employed the following method for the last six or seven years—it is practically Fürbringer's method slightly modified: (1) The hands are scrubbed with nail-brushes, soap, and hot running water for ten minutes, the nails being cleaned with a nail-cleaner and gauze. (2) After being rubbed over with turpentine, they are washed in methylated spirit. (3) They are then soaked and scrubbed with mercuric chloride or biniodide for three or four minutes. (4) Lastly, they are rinsed with a weak lysol solution, which removes the mercuric solution on the surface and acts as a lubricant.

Without doubt our hands occasionally suffer from this treatment, but to a less extent since we abandoned using a strong lysol solution.

The hands stand the various antiseptics very differently, but if they are well washed and rubbed over with glycerine and water and dried after any manipulations or examinations, they remain fairly smooth. My own hands bear the treatment referred to much better than if I use carbolic and strong lysol solution, but others find the mercuric salts very trying. The biniodide is, however, very much less severe on the hands than the perchloride; I cannot understand, therefore, why it is not more generally used.

Without doubt this exhaustive cleansing of the hands is very irksome, and occupies a considerable amount of time; therefore the busy practitioner is apt to scamp it. I cannot, however, see how it is to be avoided if the mortality and morbidity in child-bed is to be lessened. As you are aware, in domestic practice it is as high to-day as ever it was, while in maternity hospitals it has been reduced to an extraordinary extent. Indeed, in cases not interfered with before admission to hospital septic manifestations are almost unknown.

Rubber Gloves.—In recent years a further means of protection against conveying infection is the employment of rubber gloves. The advantages of impermeable gloves every one admits. The silk variety are of no value unless used over the rubber. The objection urged against them that the tactile sense is impaired is not the experience of those who employ them. For the last two years I have used them in every abdominal operation, and have found no inconvenience from them, provided they were well fitting. I cannot, however, speak so emphatically in their favour in connexion with my obstetric work, for although in ordinary vaginal examinations and deliveries with forceps I have had no inconvenience from them, I have found that I could not obtain a satisfactory hold of the child's leg in version, for example, and that I could not grasp hold of portions of adherent membrane when these were retained in the uterus. Indeed, in these latter operations I have sometimes required to remove the gloves before I could carry out the manipulations necessary.

The general practitioner might often, I think, with advantage employ gloves, and I am glad to find that some of my friends have commenced doing this. I would recommend their use in two ways, either employing them for all septic work, and so preventing the hands from being contaminated, or using them in all obstetric work. The latter method, however, is hardly practicable.

It must be remembered that the employment of gloves in no way lessens the necessity for thorough cleansing of the hands beforehand. The same precautions must be taken with the hands whether gloves are used or not; gloves are only an additional protection against conveying infection.

The difficulty in putting on rubber gloves may be overcome in two ways: the gloves may be filled with sterile water, when the hand can be very easily introduced into them and the water squeezed out; but it is better that they should be applied dry, so that now in hospital before an abdominal section I thoroughly dry my hands with a rough towel, then rub them over with sterile chalk, when the gloves can be easily pulled on. As I have already stated, they are easily sterilized by boiling, and if one uses them only in operating upon septic cases and douching out a septic uterus, etc., the thicker varieties are quite satisfactory, and stand much longer than the thinner.

Assistants.—The fewer hands coming directly in contact with the parturient canal or the abdominal wound the better, for every additional one increases the risk of infection being introduced. In obstetric practice the accoucheur is really the only one whose hands enter the parturient canal, the most that is required of the assistant being the holding of an instrument, such as the blade of the forceps or a vulsellum. In abdominal work, however, it is necessary to have one assistant directly helping the operator and two nurses, one looking after the swabs, the other after the instruments, ligatures, etc. The assistant and nurses should prepare themselves for the operation as carefully as the operator, and should wear gloves. It is a great comfort to an operator to feel that the hands of those assisting cannot introduce any infection. I am sure that the nurse threading ligatures and pulling the catgut or silk through her fingers, and the other nurse wringing the sponges or swabs, are decided dangers if the hands are not gloved. One may, of course, dispense with nurses altogether, in which case the swabs are taken directly from the sterilizing drum by the assistant and the needles are threaded by the operator. I have found this inconvenient, however, and so I prefer employing two nurses as I have described.

Preparation of the Patient.

Vulva and Vagina.—We have seen how the hands are to be cleansed, so that all operations and manipulations may be performed with as little risk as possible of the patient being infected by the operator's hands. But, even when such cleansing of the hands is carried out, there remains another weak spot in the precautionary measures taken against infection—namely, the toilet of the vulva. No modern surgeon would dream of performing any operation without first thoroughly cleansing the field of operation, yet the accoucheur is in the habit of performing all manner of manipulations in the vagina with only a very cursory and superficial cleansing of the vulva, an

area which is the most septic in the whole body. Without doubt a large proportion of the septic complications following parturition is due to the organisms from this area being pushed in by the operator's hands or instruments.

It will be admitted by every one that the most thorough cleansing of the vulva and surrounding parts is obtained when the pubes is shaved and the parts are washed with soap and water and carbolic or alcohol and mercuric solution.

At the present time there is a great objection to such an extensive toilet, but I feel convinced that the time will come when it will be a matter of routine practice. If the importance of such a cleansing were explained to patients, I feel sure they would make little objection to it, for, after all, the discomfort of the proceeding would occur only two or three times, at most, in a woman's lifetime. But I need not enlarge or pursue this subject further—it is not at present within the range of practical obstetrics. The most that can be done in domestic practice is to cut the hair short, carefully wash the parts with soap and water, taking care that all the crevices about the labia and clitoris are thoroughly cleansed, and then finally swab the parts with 1 in 30 carbolic solution, or 1 in 1,000 biniodide of mercury and alcohol.

But while it must be admitted that a thorough cleansing of the vulva is as important in obstetric practice as is the thorough cleansing of the abdominal wall in surgical work, one cannot say the same regarding the cleansing of the vagina. In recent years very extensive investigations regarding the organisms that infest the vagina have been made by a number of different observers, Krönig, Menge, Döderlein, and Williams being specially worthy of mention. It certainly would appear that the healthy vagina of pregnant and parturient women is free of pyogenic organisms, and that in consequence auto-infection does not occur. But the practical point is how to know that the vagina is healthy. Undoubtedly, when a purulent abundant discharge is present one can say it is not so, but there are quite a number of cases in which no one could tell, except by bacteriological examination, whether or not pyogenic organisms were present. While I am certainly not an advocate of the universal ante-partum douching of parturient women, I do think it is a wise proceeding to wash out the vagina carefully in all cases of operative interference, except those simple cases where the head is at the outlet and has simply to be helped through the vulvar orifice.

For cleansing the vagina it is not sufficient to simply introduce the nozzle and wash out the canal. The operator must, with his fingers, go all over the mucous membrane, and this naturally is best done with

the hand protected by a rubber glove. Soft soap and lysol, 1 per cent., is the best material for doing this, for it is not possible to scrub the mucous membrane of the vagina with rough gauze. In quite recent years a number of obstetricians, including Ahlfeld, Hofmeier, Pinard, and Schauta, have been favouring the more general cleansing of the vagina by douching in labour, and their results do not seem to indicate that infection is more frequent. Indeed, their figures, as compared with those of others who have not adopted such a course, are better, as can be seen by the table given by Herff.[1]

Post-partum douching I only employ in cases of hæmorrhage, and where the placenta or membranes have been removed manually, and as far as can be judged at present that is the general attitude assumed towards douching after delivery.

The preparation of the abdominal wall, when the peritoneal cavity has to be opened, is a much simpler matter than the cleansing of the vagina and vulva, and there is no question regarding the necessity of its being thorough. In the Glasgow Maternity Hospital, and in private, I prepare the abdomen as follows: If immediate operation is necessary, it is washed with soap and water and a soft nail-brush for five or six minutes, and then with turpentine and 70 per cent. alcohol. After the alcohol has been removed, a large compress, soaked in 1 in 20 carbolic, is applied for a quarter of an hour. This is removed, and the skin again cleansed with soap and water and alcohol immediately before the operation begins.

When two or three days are available for preparing the patient, the skin is treated differently, and I rely then upon frequent washings of the abdomen with soap and water and alcohol, a dry sterilized dressing being applied in the intervals. Some hours before the operation a compress of 1 in 40 carbolic is applied, and on the operating-table, before proceeding to open the abdomen, my assistant goes over the skin again with soap and water and alcohol.

Since I adopted these methods of cleansing the skin and of cleansing the hands, and since I and my assistants and nurses have used gloves, I can truthfully say that I have not seen a single sign of pus in any of the cases in which the operation was undertaken for non-septic conditions. Occasionally, I must admit, the patient has once or twice suffered from carboluria.

In addition to all the precautions taken against infection which have been already detailed, the lower bowel and bladder should be evacuated. The bladder, of course, is easily emptied by a catheter if the patient cannot evacuate it herself. It is a good rule, however, to

[1] Winckel's 'Handbuch,' 1906, Bd. iii., Teil ii., 792.

use the catheter as little as possible, for, in spite of every precaution taken against conveying organisms into the bladder, these latter are sometimes carried in and slight cystitis set up. It is my custom, therefore, in all cases where the catheter has to be frequently passed after operation, to put the patient on small doses of urotropin and to run into the bladder 2 or 3 ounces of weak boracic solution after each catheterization. I feel sure that since I have adopted these prophylactic measures vesical catarrh has been less frequent.

When time permits, the bowels should be thoroughly evacuated by a full dose of castor oil or some other laxative, but in obstetric practice one frequently has not time to do this, and so has to be content with clearing out the lower bowel by means of a soap and water enema

Prior to any operation necessitating the administration of chloroform the diet of the patient should be restricted, but in obstetric practice this is seldom practicable. There is no doubt that careful dieting, and especially the establishment of a good diuresis before the administration of chloroform, lessens the sickness which so commonly follows the administration of an anæsthetic.

Anæsthetics in Parturition.

The anæsthetic employed in obstetric practice in this country is almost exclusively chloroform. It is very easily administered, and, as every one admits, is most safe in pregnancy and parturition. In spite, however, of what may be said to the contrary, chloroform does favour post-partum hæmorrhage, and very decidedly so if the administration has been continued for any length of time, and surgical anæsthesia has been induced. In my experience chloroform distinctly inhibits retraction of the uterus after the birth of the child. The amount of hæmorrhage may not be of any consequence, but the ballooning up of the uterus with blood-clot accumulating between the membranes and placenta and uterine wall interferes with natural separation and expulsion of the placenta, and so favours laceration and retention of portions of the membranes. Some may say that this latter complication is the result of the accoucheur hastening the delivery of the placenta, which he is probably tempted to do in cases where anæsthesia has been prolonged. I am quite satisfied, however, that is not the full explanation, for I have given the placenta infinite time to separate and become expelled, and yet have had trouble with retained membranes.

The effect of chloroform upon the parturient varies; sometimes it distinctly inhibits the uterine contractions even when given in small amount, but on other occasions, especially if the parturient is nervous

and excited, small doses, by quieting her or by removing some reflex irritation, act as a stimulant to the uterus. Every one is familiar with the relaxation that follows the administration of chloral or chloroform if the soft parts are unduly rigid.

As regards the child, there is only danger to it when the anæsthesia is very prolonged. It is quite certain, however, that a considerable amount of the anæsthetic gets into the child's circulation, for it is frequently very drowsy for some time after its birth.

Spinal Anæsthesia.—Since the introduction of spinal anæsthesia secured by the injection of 1 to 2 grammes of a sterilized 2 per cent. solution of cocaine into the spinal cavity, other preparations, such as eucaine, stovaine, novocaine, etc., are under experimental trial. The one at present most in favour is Bier's formula :

Stovaine	0·04 gramme.
Adrenalin	0·00013 ,,
Sodium chloride	0·0011 ,,
Distilled water	2·0 grammes.

Thus, each dose contains 4 centigrammes of stovaine.

The skin being sterilized, a long, hollow needle is introduced into the spinal cavity at a point between the third and fourth lumbar vertebræ, half an inch to either side of the middle line. The needle is pushed in an upward and inward direction, and the escape of a few drops of cerebro-spinal fluid indicates that the spinal cavity has been reached. The syringe containing the solution is now attached to the needle, and about 1 c.c. of cerebro-spinal fluid allowed to mix with the stovaine solution. The fluid is then slowly injected. The puncture is sealed with sterilized collodion. In the few cases in which I have employed spinal anæsthesia I have been thoroughly satisfied.

CHAPTER XXII

VERSION OR TURNING

In this chapter I will only discuss the methods of performing version, as the manner of extracting the child and the difficulties in doing this have been already considered in Chapter V.

The operation of version has for its object the substitution of the head or the feet for some other presenting part. If the head is brought to present, we speak of 'cephalic' version; while if a lower limb is brought down we speak of 'podalic' version. It is of extremely ancient date, and was extensively practised by Hippocrates, who recommended cephalic version for all presentations other than those of the head. Ætius, Celsus and others, at different times, pointed out the fallacies of the Hippocratic teaching and the advantages of podalic version; but, supported by Galen, it, for the most part, continued in favour till the sixteenth century, the one ever famous in obstetrics by reason of the great revival in midwifery initiated by Ambrose Paré. Paré was the first to clearly describe and point out the possibilities and advantages of podalic version, and from his time until the obstetric forceps became common property podalic version was widely practised in cases where immediate delivery was deemed necessary. About a hundred years later an alteration in the technique of the operation was suggested by Portal—viz., the bringing down of one leg instead of both, as was the custom up till then; but, apart from that, there was no great modification of the operation until 1807, when Wigand described and recommended version by external manipulations.

But even the briefest of references, such as this one is, to the history of version would be incomplete did I not mention the name of Braxton Hicks, who will ever be honoured on account of his method of version by combined internal and external manipulations, which he described in 1860.[1] Full details of the operation are also to be found in the London Obstetrical Society's Transactions,[2] in the Appendix to which paper Hicks justifies his claim to having first

[1] *Lancet*, July 14, 1860.

[2] Vol. v., p. 219.

clearly described this method of version. It is perfectly true Wigand suggested the employment of one hand internally, but his reference to that hand is so casual that it is impossible to believe that he really meant it to be much used. Hohl, Wright, Schmit, Lee, and others, referred to similar manipulations, but Hicks, by reason of the clear manner in which he described all details, really deserves the greatest credit.

In certain conditions the operation of version is one of choice; in others, it is the only course open. In transverse presentations, for instance, it is the only treatment to be considered; but in placenta prævia, accidental hæmorrhage, contracted pelvis, accouchement forcé for any danger threatening the mother, it may be said to be an operation of choice. The position it occupies in the treatment of these conditions is discussed in detail when each is being considered. Here I shall simply summarize the matter.

The indications for the operation of version may be placed in the following groups :

1. **Malpositions and Malpresentations of the Child.**—Thus, in all transverse presentations, and in brow and face presentations under certain conditions, version is indicated. Mento-posterior face and brow presentations, recognized early in labour, are considered by many to be best treated by version, although a few favour the alteration of the presentation into an ordinary vertex by the method of Thorn (p. 39). In recent years quite a number of obstetricians (Pinard, Hegar, Spencer) have expressed themselves in favour of converting a breech into a vertex presentation by external version. I have frequently done this in the last two weeks of pregnancy, and, personally, am of opinion that it is sound treatment. It is incorrect to say that one makes the presentation worse and brings about a transverse if one fails, for when the fœtus cannot be completely turned it can always be pushed back into its old presentation. The object of the treatment is to lessen the fœtal mortality, which, in primiparæ especially, is very high. It is quite absurd for those who are opposed to this treatment to say that it is a reversion to the treatment of Hippocrates, for Hippocrates performed the operation during labour, and with his hand in the uterus.

2. **Flat Pelvis.**—Personally, I do not consider a flat pelvis an indication for version, except in cases of scolio-rachitic pelvis where the occipital end of the head is towards the small side of the pelvis, and in posterior parietal presentations. The subject is fully considered in connexion with contracted pelvis (Chapter XII.).

3. **Dangers threatening the Mother.**—Amongst these the most striking are placenta prævia and accidental hæmorrhage. As a

step in the operation of accouchement forcé it is also frequently performed.

Very occasionally the operation is necessary in displacements of the uterus and in double monsters (Chapters XIX. and IX.).

4. **Dangers threatening the Child.**—Prolapse of the cord is the most important indication under this head. The subject, however, is discussed under Prolapse of the Cord (Chapter XX.).

There are three methods of performing version, by any one of which the head (cephalic version) or the lower limbs (podalic version) may be brought to present. These are: (1) By purely internal manipulations—Internal version; (2) by purely external manipulations—External version; (3) by combined internal and external manipulations—Bipolar version, or version after the method of Braxton Hicks. Each of these methods we must now consider, but before doing so, a word regarding the relative merits of cephalic and podalic version.

As previously stated, until the middle of the sixteenth century cephalic version was almost exclusively practised. As a result of Paré's teaching, podalic version came into favour, and completely replaced cephalic. Following, however, the great improvements of Wigand, Hicks, and others, cephalic version has once again come more into favour. The method is suitable for rectifying oblique presentations, and even breech presentations, recognized early in labour. It is, however, not suitable for cases of hæmorrhage, and the majority of obstetricians would also say that it was not suitable for cases of contracted pelvis. Personally, however, I have frequently changed a breech into a head in cases of moderate pelvic deformity, for I believe the chances to the child are infinitely better if it comes head first.

Internal Version.

This is, as we have seen, the oldest method. For its performance the os must be sufficiently dilated to allow of the introduction of the hand. The vulva, lower abdomen, and upper parts of the thighs, having been thoroughly cleansed, and the bladder and rectum emptied, the patient is ready for operation. She should then be brought to the edge of the operating-table or bed, and have the vagina thoroughly well washed out.

The position of the patient during the operation may be either the dorsal or the left lateral, but on the whole the lateral position is better; at least, that is so in cases where the child lies dorso-posterior in the uterus. When, however, the child lies dorso-anterior, the left lateral position is of slight advantage only if the operator is ambidextrous and can use his left hand, which adapts itself better than

the right to the curve of the sacrum (Fig. 136). Another advantage of the lateral position, especially if the patient is rolled well round on her breast, is that the presenting part slips away by gravity from the brim; this allows the hand to be passed into the uterus more readily. After the foot has been seized, and extraction has to be proceeded with, the dorsal position is more suitable, as one can employ the external hand better in conjunction with the internal when the patient is in that position. If one employs the dorsal position from the first, it is better to seize the limb or limbs with the hand which

FIG. 136.—Internal Version, showing the Advantage of using the Left Hand, as it accommodates itself better than the Right to the Curve of the Sacrum.

corresponds to the side the limbs are on. That is to say, if the limbs are on the left side, one employs the right hand; if they are on the right, the left hand.

But much more important than the position of the patient, which, after all, is very much a matter of choice, is that the patient be anæsthetized before any attempts at version are made. Especially does this apply to the operation of internal version when the waters have drained away. Much injury is done by the operator getting excited and pushing his hand into the parturient canal when the patient is only half under the anæsthetic.

When the operator has determined that his whole hand is to

be introduced into the uterus, he should separate the labia with the fingers of the one hand, and cautiously pass the other hand in the form of a cone up towards the feet, keeping the back of the hand directed against the uterine wall. The hand should be passed right through the membranes if they are still intact; the forearm dams back the liquor amnii. This is much better than passing the hand up between the membranes and uterine wall until the limb is reached, as used to be the teaching, because by so doing there is greater danger of infection, seeing that any organisms present are implanted upon the raw uterine surface instead of inside the amnionic sac. From time to time during uterine contractions all manipulations must be desisted from, and the open hand allowed to lie passively against the surface of the child.

There is seldom much difficulty in getting hold of a foot; indeed, it only occurs when the waters have drained away, and the child is grasped and doubled up by the contracting uterus. In such cases it will generally be found best, instead of getting mixed up with limbs all huddled together, to pass the hand right up to the breech, and come back along a thigh and seize one or both feet.

It sometimes happens, in cases in which the waters have long drained away and the uterine wall is closely applied to the child, that the child is more readily turned if both feet are seized.

The difficulty of differentiating a foot from a hand is not great. A foot is always to be distinguished from a hand by the presence of the heel; other differences, such as the length of fingers, mobility of thumb, etc., are not to be relied upon. The heel is the landmark one should search for; never bring down a limb until the heel is felt.

Having reached the lower limbs, one or both feet is then seized. As stated elsewhere, Paré and Guillemeau recommended the bringing down of both feet, and that continued to be the practice for nearly two centuries, even although Portal, in the middle of the seventeenth century, clearly demonstrated the advantage of bringing down only one. It is only in comparatively recent times that it has been the general practice to bring down one foot. I have already pointed out the advantages of doing so (Chapter V.), and have recommended that only when the delivery has to be completed with all speed should both be seized.

Theoretically, it is not altogether a matter of indifference which foot one takes, although in practice I must admit it is a good enough rule to grasp the first foot one encounters. In all cranial presentations the anterior leg is the one to seize. This holds good also in transverse presentations when the back of the child is anterior; but not in dorso-posterior positions, then the posterior or superior leg is preferable.

A good working rule, therefore, is: *Seize the nearest foot in all cases except oblique dorso-posterior positions.* The advantage of following this rule is that the anterior leg is brought down against the symphysis, whereas if one took the other foot, one would bring down the posterior leg and the anterior buttock would catch on the

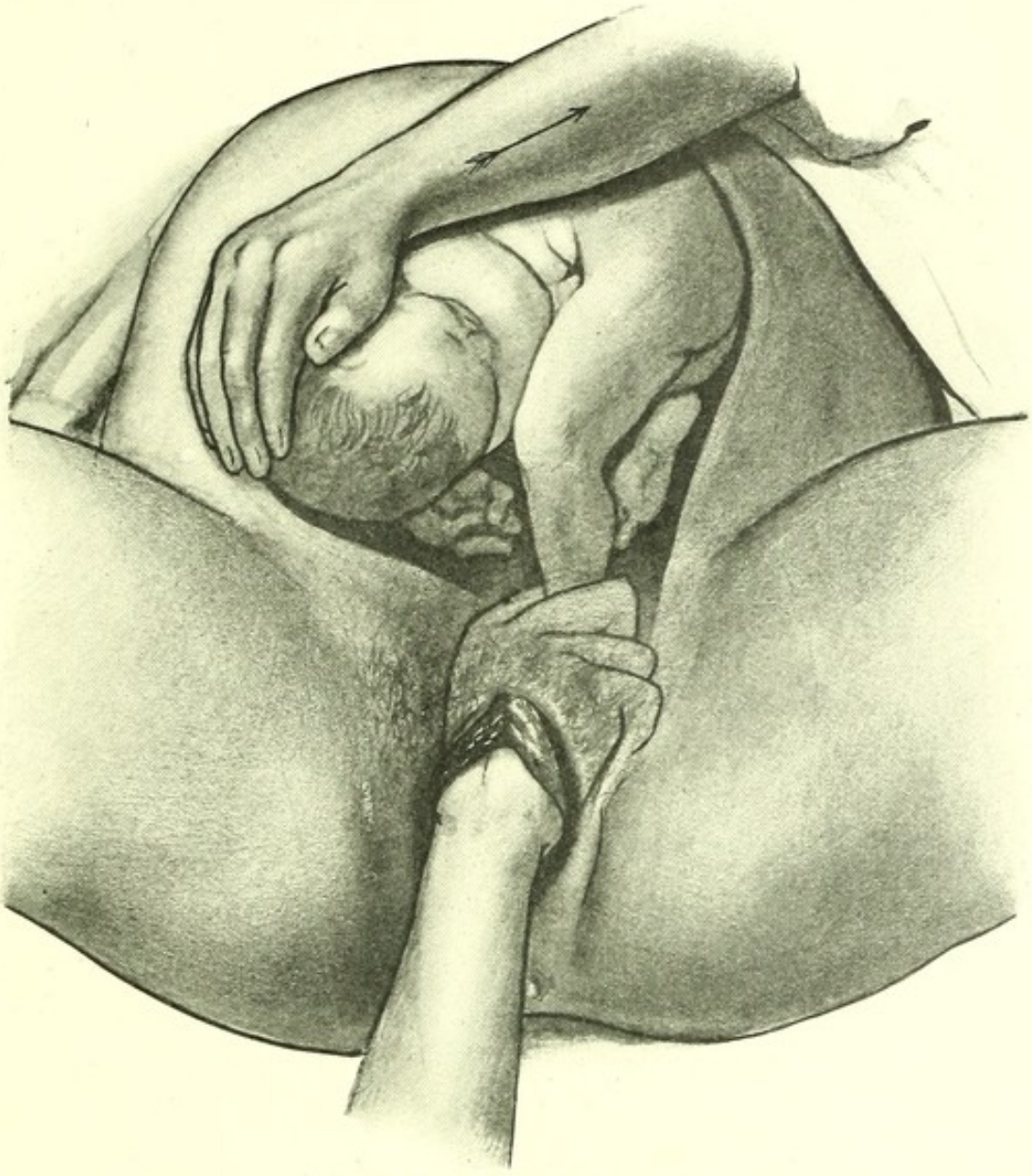


FIG. 137.—Internal Version.

Version is being completed. The accoucheur is pulling down the leg, while his assistant is pulling up the head. It will be observed that he has seized the leg furthest away, because the position is an oblique dorso posterior one.

symphysis, which we have already seen (Fig. 28) is a great disadvantage and causes delay in extracting the breech.

The foot, being seized, should be brought down through the cervix. The carrying of this out is often facilitated by an assistant pushing or pulling up the head (Fig. 137). The operator may himself do this, but his spare hand is better employed steadying and pushing down the

breech, for the external hand should always act in consort with the internal.

The operation of version is seldom difficult if the membranes are intact or have only recently ruptured. It becomes increasingly

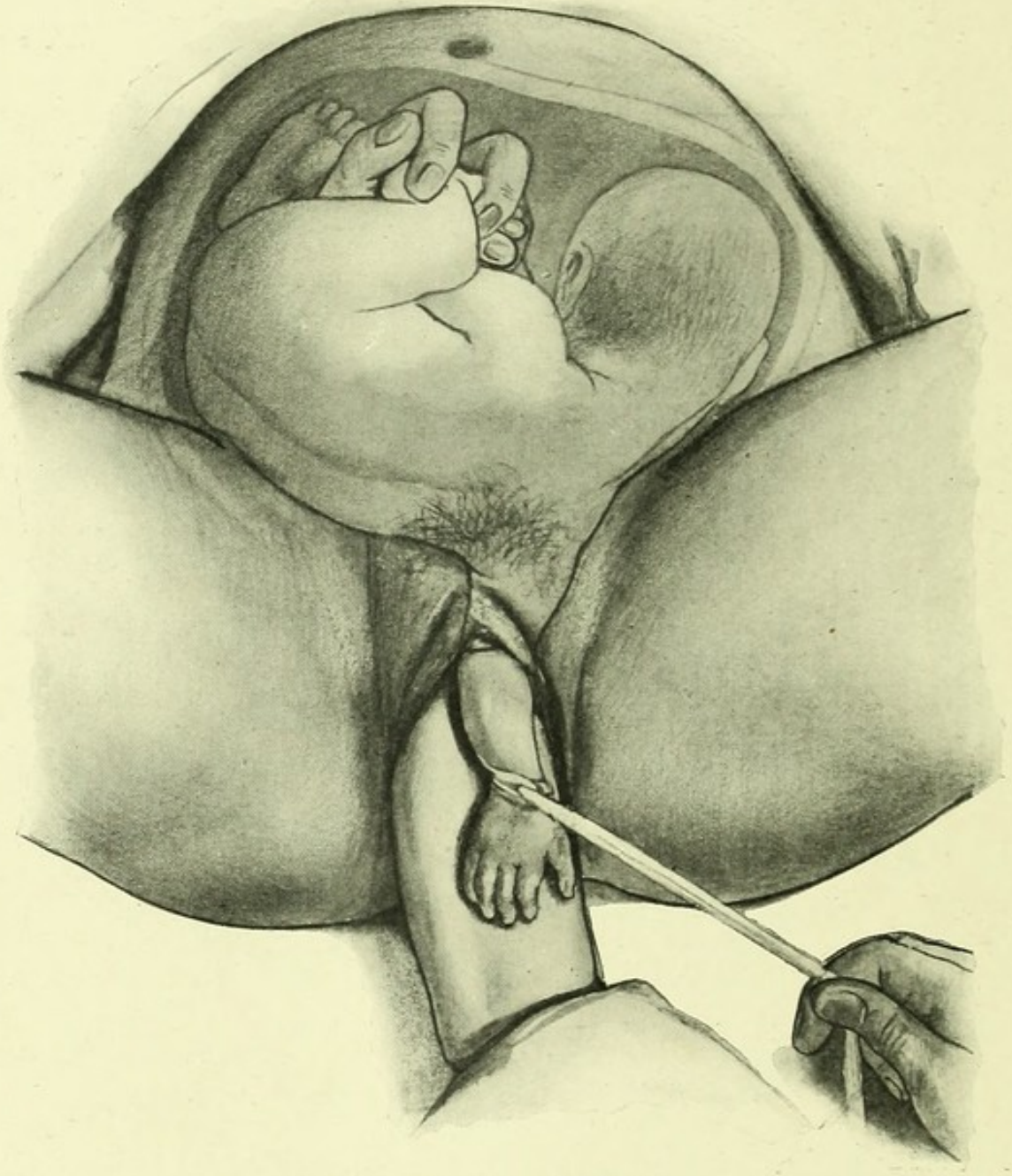


FIG. 138.—Internal Version.

A fillet has been passed round the prolapsed arm, in order to prevent it slipping up after version is completed. The accoucheur is seizing hold of a foot—the wrong one in this particular position of the fœtus (see text).

difficult and dangerous, however, after the liquor amnii has drained away, and great caution must be exercised in attempting the operation in such cases. It must never be performed in head presentations if the retraction ring is well defined, nor in cases of impacted transverse

presentation; forceps or craniotomy in the former and decapitation in the latter are the operations which should be had recourse to.

In transverse or oblique presentations the lower arm not infrequently prolapses. The particular arm can always be recognized by shaking hands with the child (Fig. 54). When the arm has prolapsed, it may sometimes be pushed up, but this is often impossible and quite unnecessary, for the arm slips up as the leg is pulled down. A very useful manœuvre is to apply a loop of gauze round the wrist of the fœtus (Fig. 138). In doing so care must be taken not to fasten it too tightly. This loop of gauze or fillet so applied is of great service later in the labour in preventing the arm from slipping up along side of the head. It must only be used to prevent the arm slipping up. If, however, in spite of all one's efforts, the arm should slip up, it must be brought down in the ordinary way and not by pulling upon the gauze, for that might result in its fracture.

It sometimes happens, especially when the waters have drained away, and there is difficulty in turning the child, that version is facilitated by a manœuvre generally ascribed to Siegemundin. It consists in passing a fillet over the foot and then exerting traction on the fillet with the one hand, while the other hand is passed into the vagina and pushes up the presenting shoulder or head (Fig. 139). When such a manipulation is necessary, it usually means that the uterus is firmly retracted over the child, and so the operation is not free of danger. An alternative to this method is the bringing down of the other foot, which will usually be found behind the one which is down, since one always tries to bring the anterior thigh down close behind the symphysis.

In attempting to bring down the second foot the hand must be passed cautiously into the uterus behind or in front of the leg already down, according as it is the anterior or posterior one which is presenting. In cases of doubt one can readily determine which foot is down from the position of the great toe. With the two feet together the great toes are in apposition. Both feet being seized and steady traction made upon them, version can generally be completed, unless the uterus is grasping the child very firmly.

As can readily be understood, there is in these manœuvres a great strain put upon that part of the uterus against which the head rests, and especially is this the case when, labour having been long in progress, the lower uterine segment is much thinned out. Either of the manœuvres, if carried out very cautiously, will result in the safe delivery of the child without any damage being done the mother, provided the head is within the body of the uterus. Should, however, the head be in the lower segment below the retraction ring, there is

the greatest possible danger in employing either of them, but more especially the second. Indeed, I would almost go the length of saying that they are never justifiable, because of the great danger of the

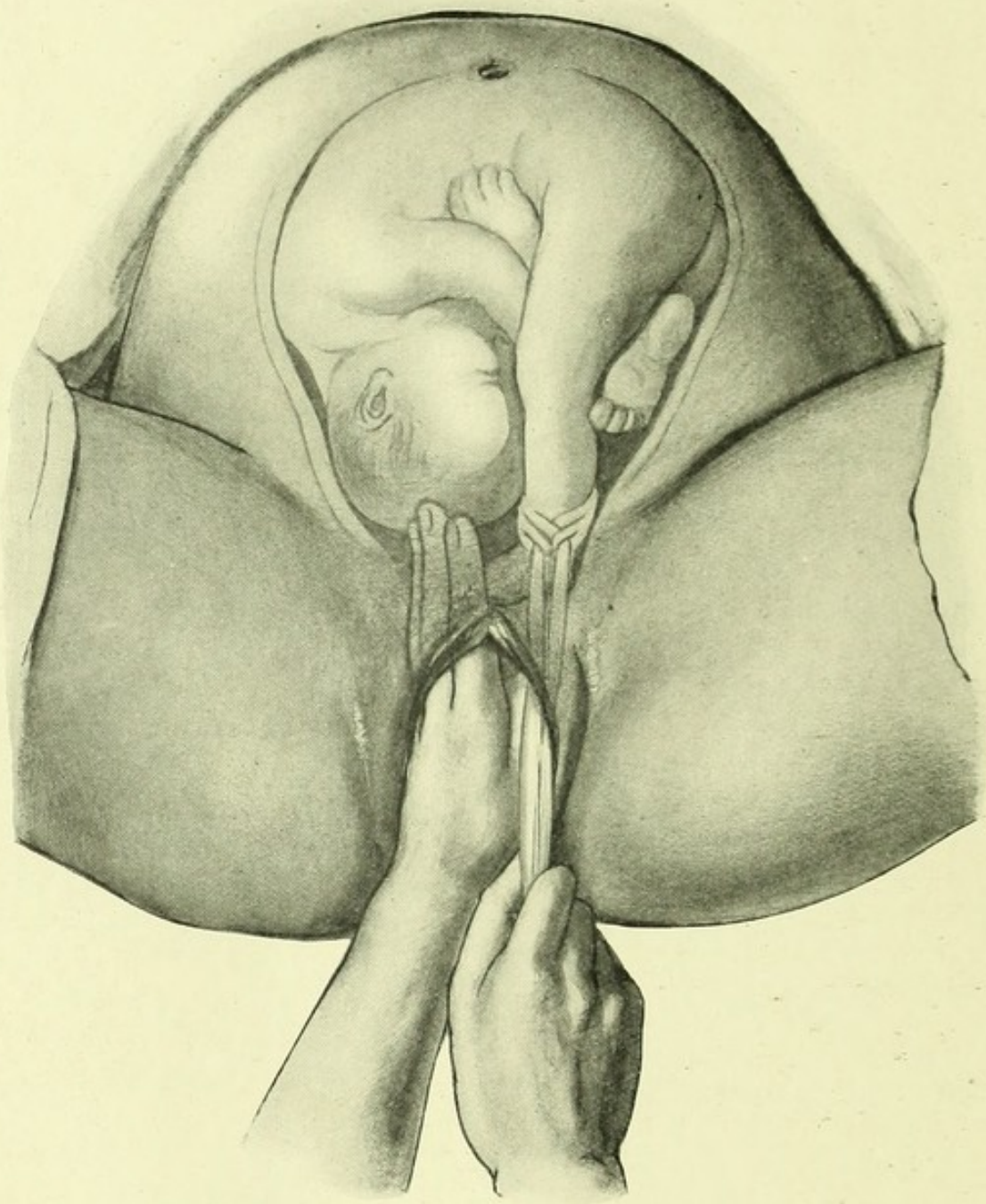


FIG. 139.—Internal Version.

A manœuvre sometimes employed when there is difficulty in completing version. A fillet has been passed round the leg which has been brought down. The accoucheur pulls upon this, while with his other hand he pushes up the head or shoulder.

uterus and vagina being ruptured. Besides, they are almost profitless, as the child is dead, or on the point of dying in the vast majority of cases.

I am well aware that Budin and others have recommended in such cases, when the head is below the retraction ring, that the hand should be passed up between the uterine wall and the child's head, the retraction ring being pushed back and the child's head allowed to glide out of the lower segment. I have succeeded in doing this under deep anæsthesia, but it is a manœuvre very often impossible, and, unless one has had extensive practice in difficult obstetric operations, is attended with considerable danger.

Internal cephalic version, the operation of Hippocrates and his disciples, has practically been given up. If by any chance it should

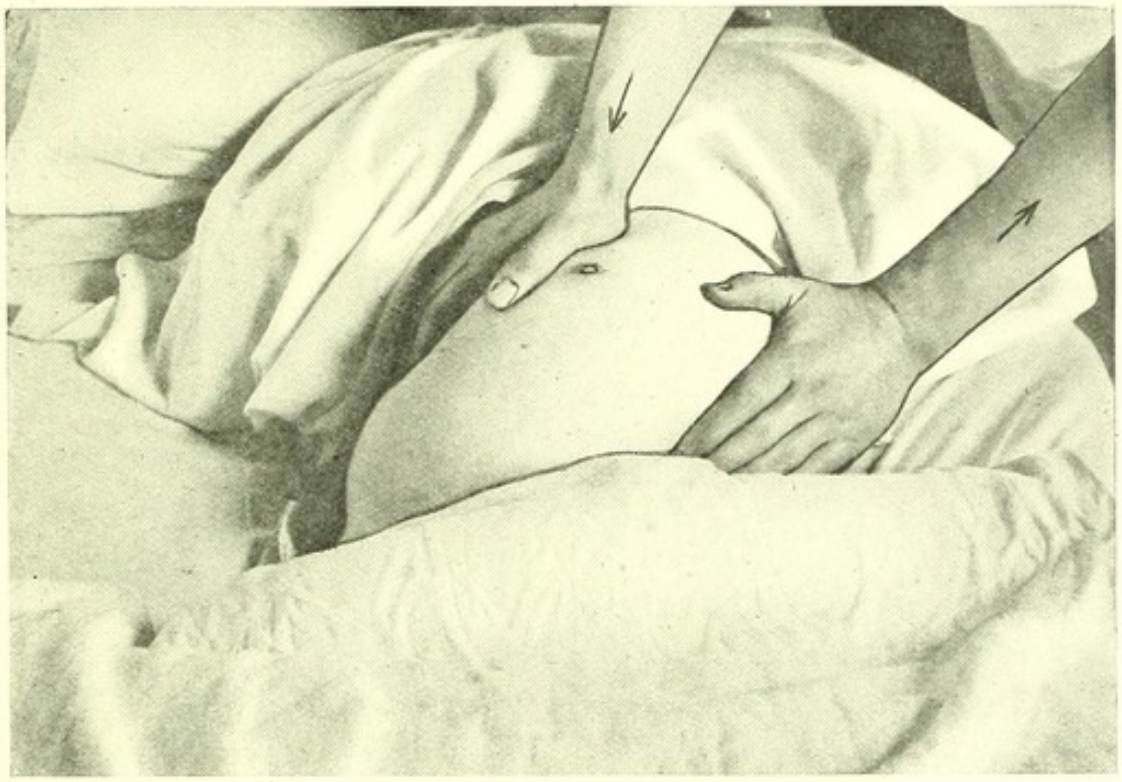


Fig. 140.—External Cephalic Version.
The accoucheur has located the head with the right, and the breech with the left, hand.

be deemed advisable to have recourse to it, the head should be grasped and pulled down while the breech is pushed up to the fundus by the external hand.

External Version.

Following strictly in chronological order, we have now to consider the method of version known as External Version. To Wigand, as we have seen, is due the credit of first describing this method, although others had undoubtedly long before casually referred to it.

It is an operation possible only under favourable conditions. If the membranes have ruptured, if the liquor amnii is very scanty, and if the uterine wall is so rigid that the fœtal parts cannot be grasped,

external version is impossible. After some experience of the operation, however, it is surprising how comparatively seldom such conditions are encountered in pregnancy. Even at term in multiparæ one can often perform it; but in primiparæ it is always difficult and often impossible. The operation has this advantage—it can be performed early in labour or even during pregnancy before the cervix is obliterated, and I have upon several occasions converted breech into cranial presentations at the thirty-sixth or thirty-seventh week by this method. So much, indeed, am I in favour of this form of version that in many cases in which version by Braxton Hicks'

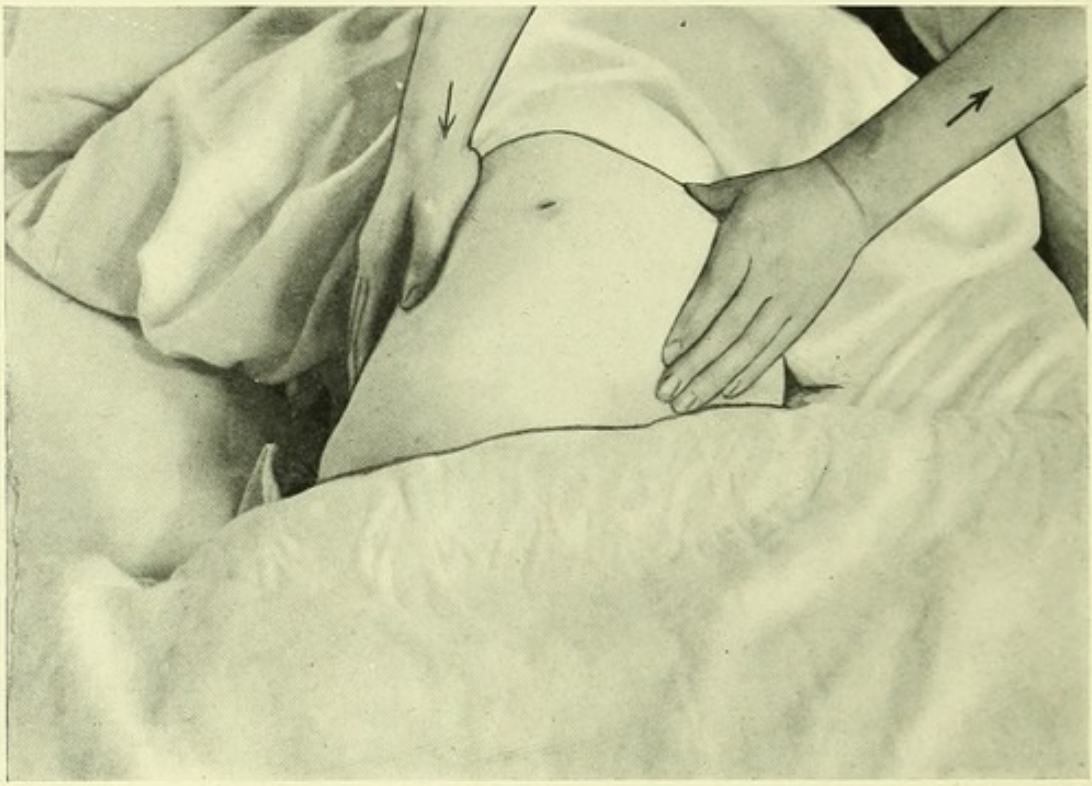


Fig. 141.—External Cephalic Version.

he accoucheur is pushing the fœtal head downwards with his right hand, while he is pulling the breech upwards with his left.

method might be chosen—as, for example, in placenta prævia—I actually perform the operation by external manipulations, and only employ the fingers in the vagina to pull down a foot after the breech has been brought over the os.

In some women, more especially multiparæ, the operation may be performed without an anæsthetic; but if the patient is a primipara, has rigid abdominal and uterine walls, and has reached term, an anæsthetic is usually necessary. It will generally be found best to have the patient lying upon her back, with the shoulders slightly raised, although sometimes lying upon one or other side helps a little the rotation, and certainly favours dislodgment of the lower pole.

This postural treatment, the principle of which is to place the mother on the side to which the head or the breech is directed, according as one wishes a head or a breech presentation, is occasionally of value.

The first step in the operation after the patient has been anæsthetized is to carefully palpate the position of the different parts of the child (Fig. 140). After that has been done, occasionally all one has to do to alter the presentation is to grasp one end of the fœtal ovoid with each hand, and pull one pole and push the other in the direction wanted (Fig. 141). To succeed in turning the child as easily as that is exceptional. As a rule, an assistant is necessary.

Fig. 142.—External Cephalic Version.

In cases of difficulty the accoucheur uses his two hands to drag the one fœtal pole upwards, while his assistant pulls down the other pole.

The operator and assistant stand facing each other, and it is an advantage that they should be on different sides of the patient. Each takes an end of the fœtal ovoid and pulls it towards himself (Fig. 142). Sometimes, however, the child is turned best by reversing this and pushing the part away, or even by operator and assistant facing the patient and pulling down and pushing up the end each is responsible for. The position of the child will usually indicate the direction in which pressure is to be exerted. In transverse presentation always, and generally in all cases where one pole is substituted

for another, it will be found that the child slides round best when pushed in the shortest way to the desired position. Once or twice, however, I have found the child go round better when rotated in the longest way. One thing, of course, must be remembered—no manipulations must be made which would tend to extend the child.

Having turned the child, one must try to maintain it in the

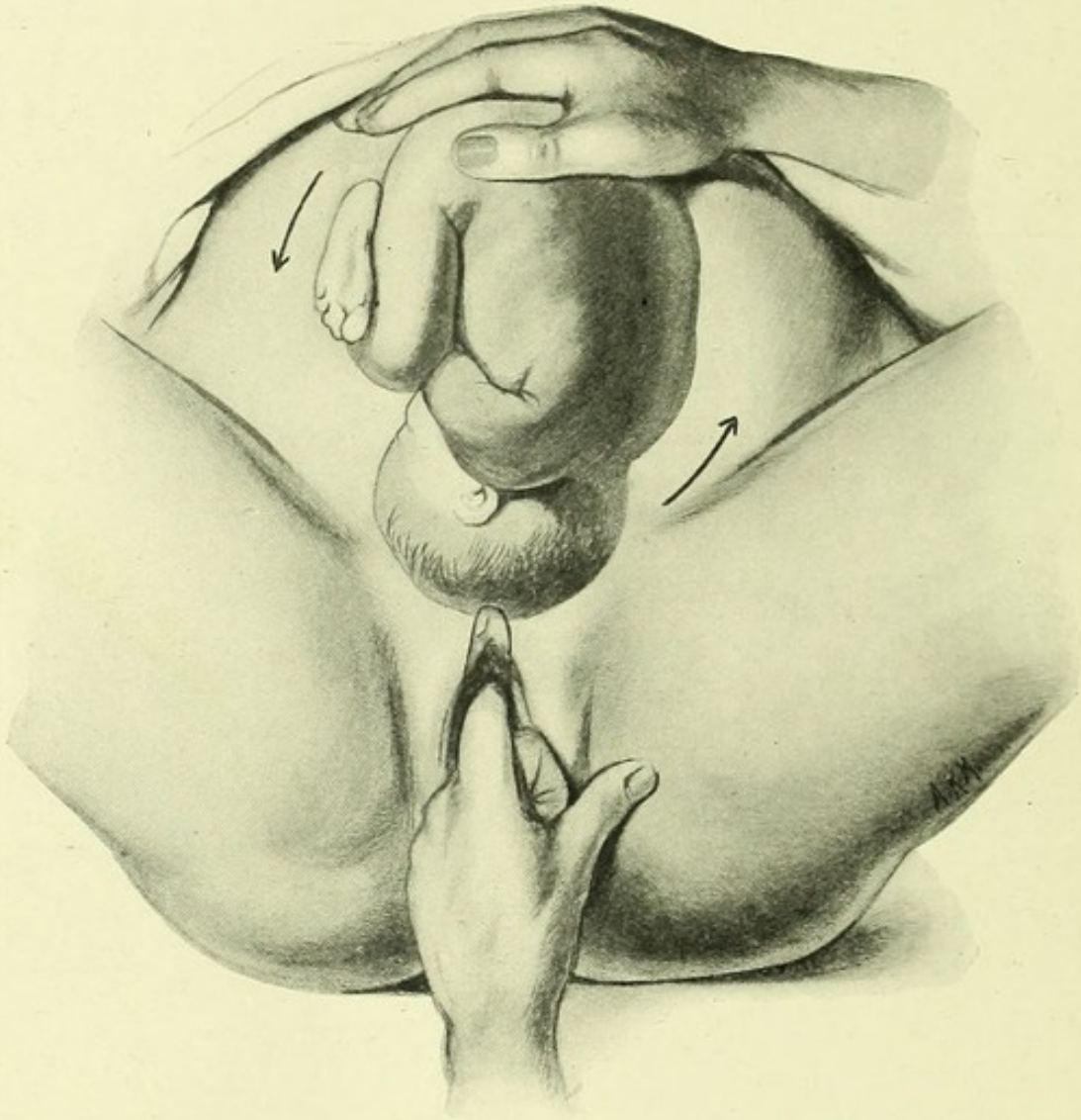


FIG. 143.—Bipolar Version.

The accoucheur, with one or two fingers of the one hand through the cervix, is pushing the head away from the pelvic brim, while with his other hand he is pushing down the breech.

favourable position in which it has been placed. Unfortunately, however, this is not always possible, especially if the previous presentation has been transverse. Where it has been longitudinal, it is not so difficult. If it is the head which has been made to present, then it should be pushed down into the pelvis and a firm binder applied. If the patient is in labour, it is well to rupture the membranes.

A very interesting paper on the subject of External Version was delivered recently by Pollock to the London Obstetrical Society.[1] This author, although admitting the difficulties and frequent failures of external version, referred to the method in very favourable terms, and stated that he had found the Trendelenburg position of great advantage. Carried out in this position, he referred to the method

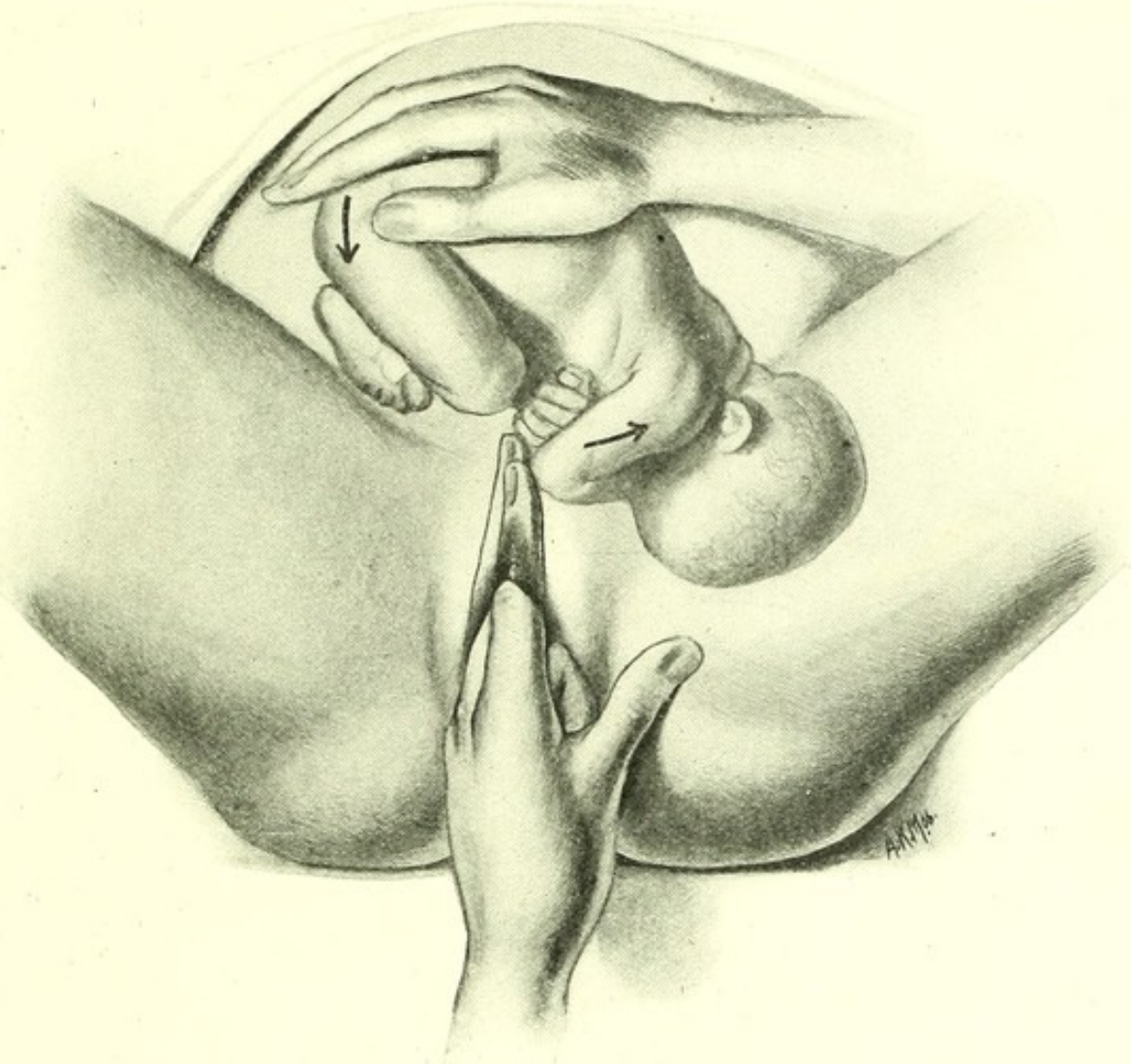


Fig. 144.—Bipolar Version.

A further step in the operation. The head and shoulder of the fœtus are being pushed away with the internal hand, while the breech is being pushed down with the external.

as 'fundal external version.' As Spencer pointed out in the discussion which followed, postural treatment is of great antiquity, and I have repeatedly referred to the advantages of the Sims position in certain cases, where, for example, one wishes to dislodge the presenting part from the pelvis.

[1] Lond. Obstet. Trans., vol. xlviii., for 1906.

Bipolar Version.

This method, as we have seen, was elaborated and perfected by the late Braxton Hicks, and the operation is very rightly referred to under his name. One may bring either the head or the breech to present. The illustrations indicate the manner in which the manipulations are carried out. It is better to have the patient upon her back and anæsthetized. The parts about the vulva having been thoroughly cleansed, the suitable hand is introduced into the vagina

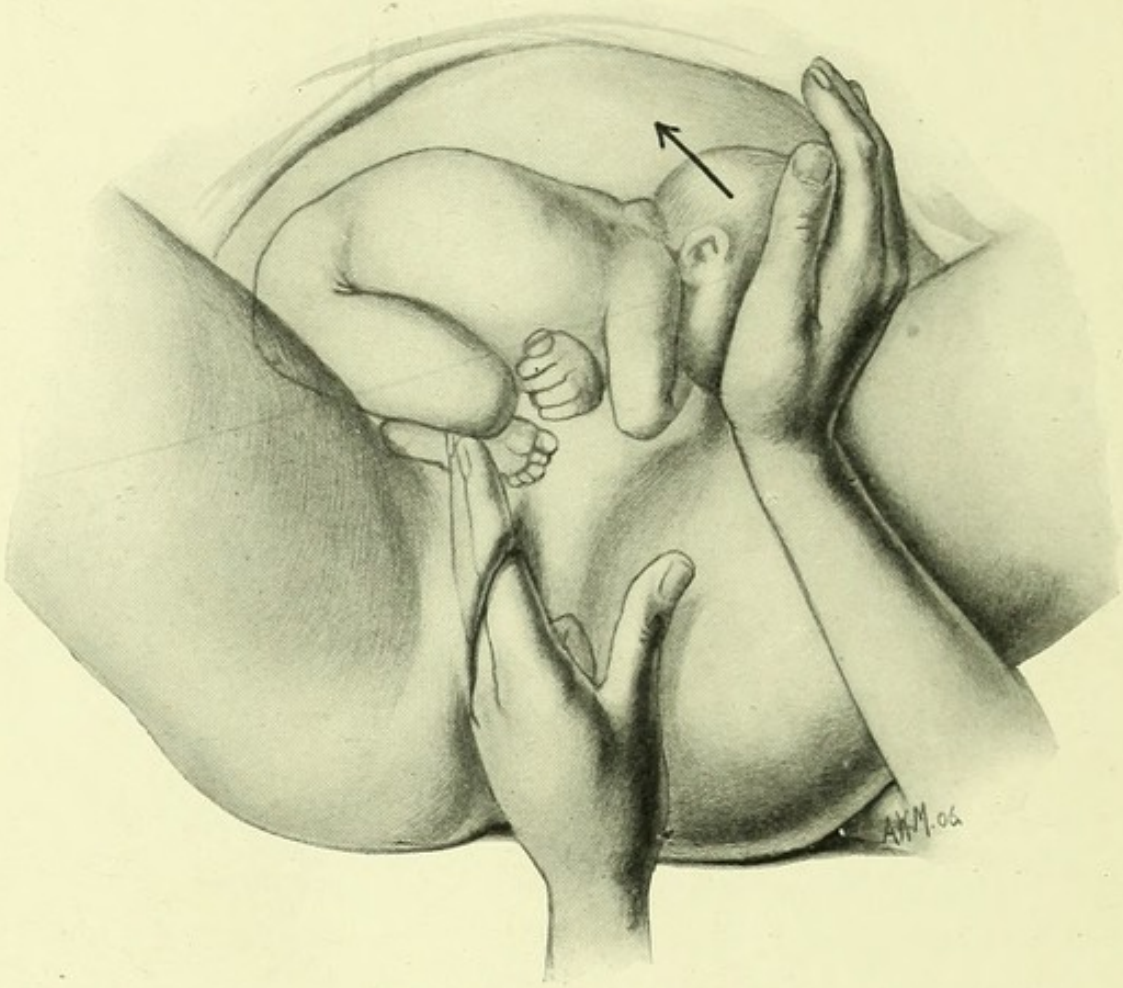


Fig. 145.—Bipolar Version.
The feet of the fœtus having been brought over the os, the accoucheur is now able to seize one.

and two fingers are passed through the cervix (Fig. 143). These push the presenting part away, while the external hand presses or pulls down the other fœtal pole (Fig. 144). It is important to employ the suitable hand internally, so that the arms are not crossed during the manipulations. An assistant can often render great help by pulling up the pole which is being pushed away by the operator's internal hand.

In order to carry out the operation, the fœtus must be fairly movable in the uterine cavity; consequently, the membranes must be

unruptured, or only recently ruptured, and the os must be dilated to permit at least one finger being passed through the cervix. It is surprising how occasionally, long after rupture of the membranes, it is still possible to perform version by Hicks' method. When the feet are brought over the os, one should be pulled down into the vagina (Fig. 145). There is sometimes a little difficulty in getting hold of the foot, but the external hand, by steadying and pushing

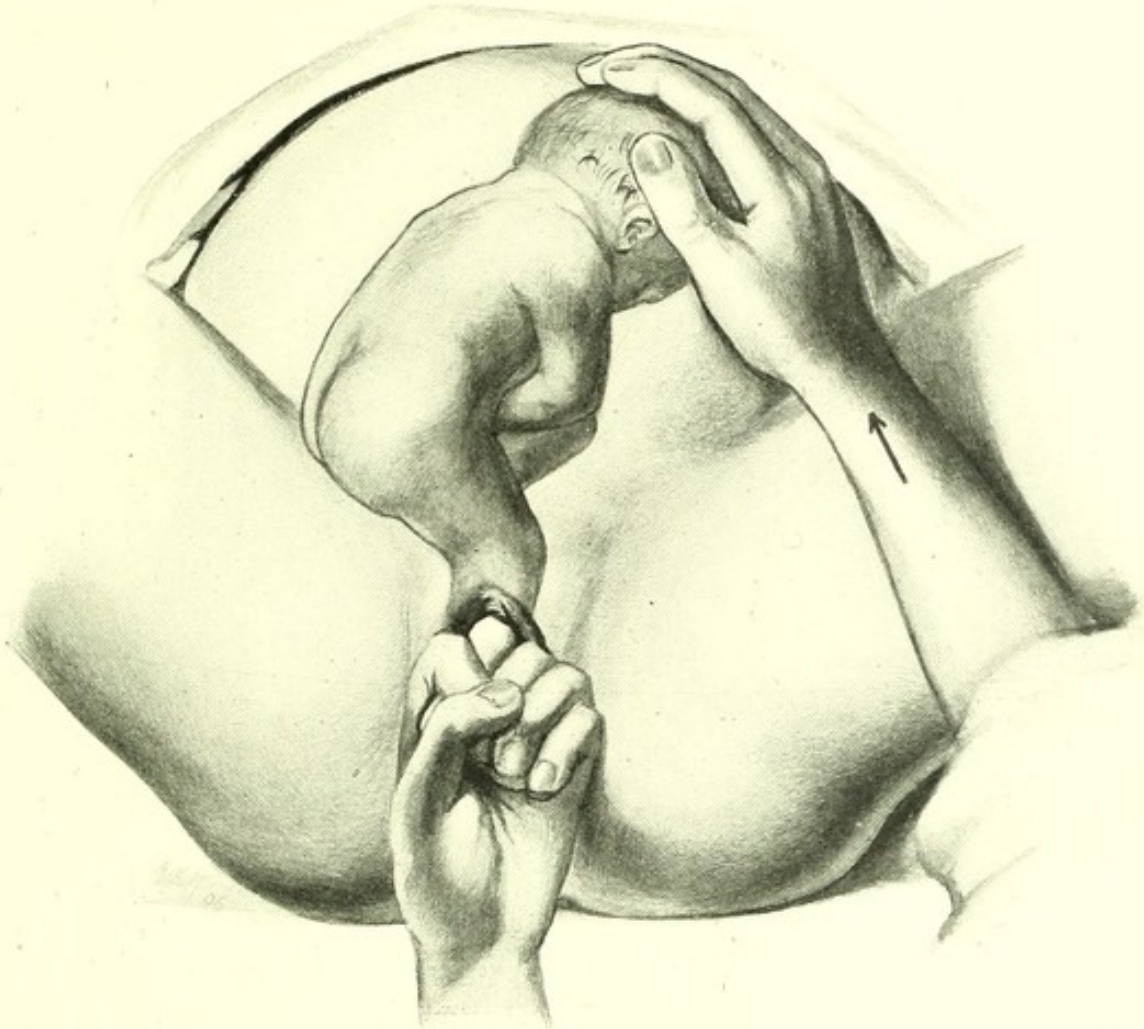


FIG. 146.—Bipolar Version.

The accoucheur, having seized the foot, is bringing it down through the vulva.

the leg down, will generally bring it within reach of the internal fingers (Fig. 146). Personally, I do not care to bring down the leg by hooking my finger into the bend of the knee, for, if the presentation has been originally cranial, it is not easy to make sure that it is the leg which is over the internal finger. I never like to bring down a limb in such cases until I feel the heel. With one finger only through the cervix, the foot is not easily brought down, but by getting it over the os, then suddenly withdrawing the finger in the cervix, it will sometimes slip down. Not infrequently I have

succeeded in bringing the foot down by grasping it with long pressure, or, if the fœtus is dead, with vulsellum forceps. Of course, if the cervix admits two fingers, there is no great difficulty in seizing the foot.

At one time I employed this method to the exclusion of the external, but in recent years I have had recourse to it only when external version has failed. On many occasions one accomplishes as much by purely external manipulations, and with less chance of rupturing the membranes. Naturally, after the membranes have ruptured, the method of Braxton Hicks will succeed for some time after external version is impossible. The indications for the operation are many, but placenta prævia is one of the most important. Its value in that complication is fully discussed elsewhere (Chapter XXXIII.).

CHAPTER XXIII

FORCEPS

A TREATISE on practical obstetrics is not the place to detail the history of the forceps. It is quite fitting, however, that I should consider how axis-traction rods came to be added to the instrument, and should attempt to estimate the value of this last modification.

History and Mechanism of Axis-Traction Forceps.

Tarnier will ever be honoured as the inventor of axis-traction forceps, and deservedly so. But long before Tarnier described his

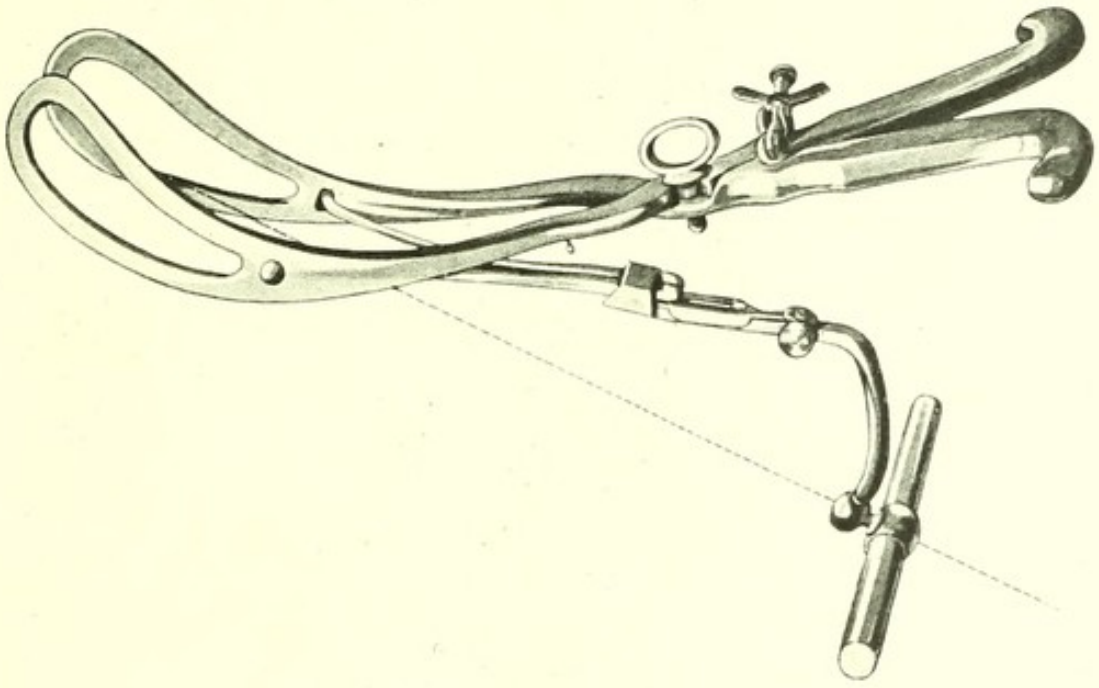


FIG. 147.—Tarnier's Axis-Traction Forceps.

instrument in 1877 (Fig. 147), it had been fully appreciated that, even with the long double-curved forceps, traction in the axis of the pelvis was impossible, and that a great deal of the force exerted by the operator was lost by the head being pulled against the anterior

pelvic wall. Levret, Smellie, and Baudelocque, for example, in order to obviate this, gave directions how traction was to be made as far back as possible.

With the object of obtaining traction in the axis of the pelvis, many alterations and additions to the ordinary double-curved forceps have been suggested. One of the earliest—that of Saxtorph and his pupil Stein—was bands through the fenestræ of the blades. A century later this suggestion reappeared in the recommendation of Poullet to pass cords through holes made immediately below the

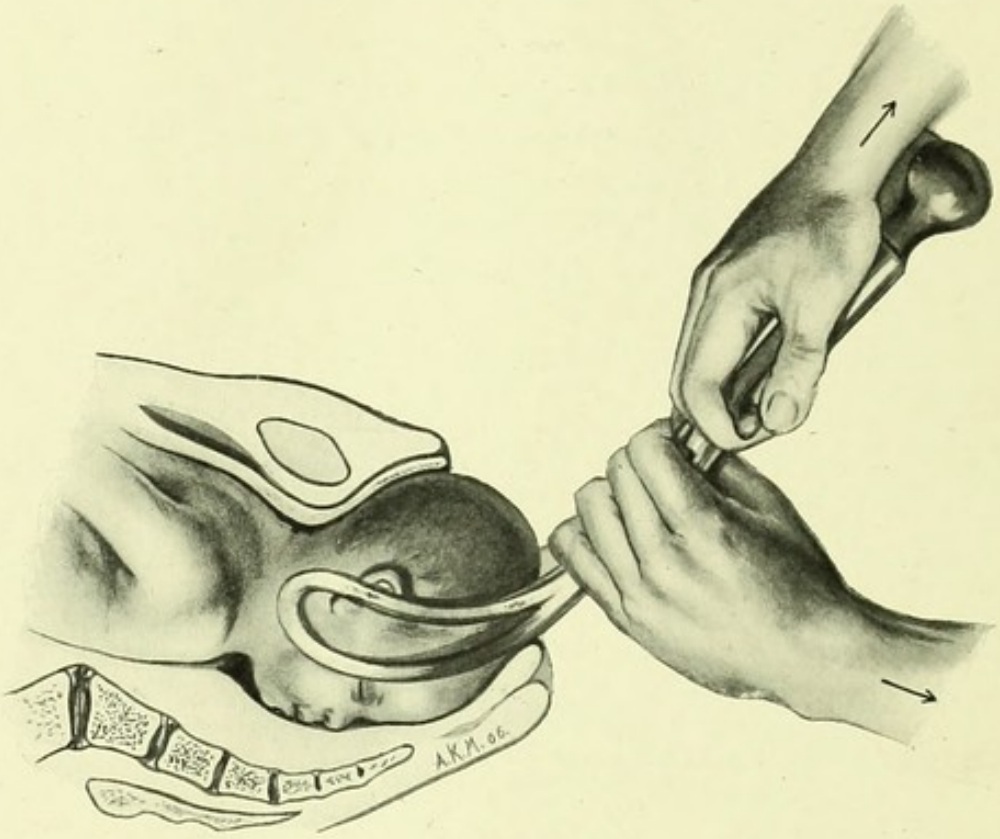


Fig. 148.—Pajot's Manœuvre.

The accoucheur pulls on the handles of the forceps with his right hand, while with his left he pulls on the shanks.

fenestræ. The manœuvre commonly known as Pajot's (Fig. 148) was described by Osiander, a pupil and assistant of Stein, although it was really first suggested by Saxtorph. Until quite recently it was very generally employed, and is still made use of by some of the older obstetricians.

As far as can be ascertained, the suggestion of having special traction handles was first made by Hermann of Berne in 1844 (Fig. 149). But, as Milne Murray very rightly pointed out, the rods in Hermann's forceps were employed on the same principle as Osiander and Pajot effected their manœuvres. Hermann's device

seems to have been forgotten, if, indeed, it ever became very generally known.

An important step in the evolution of the instrument was Hubert's

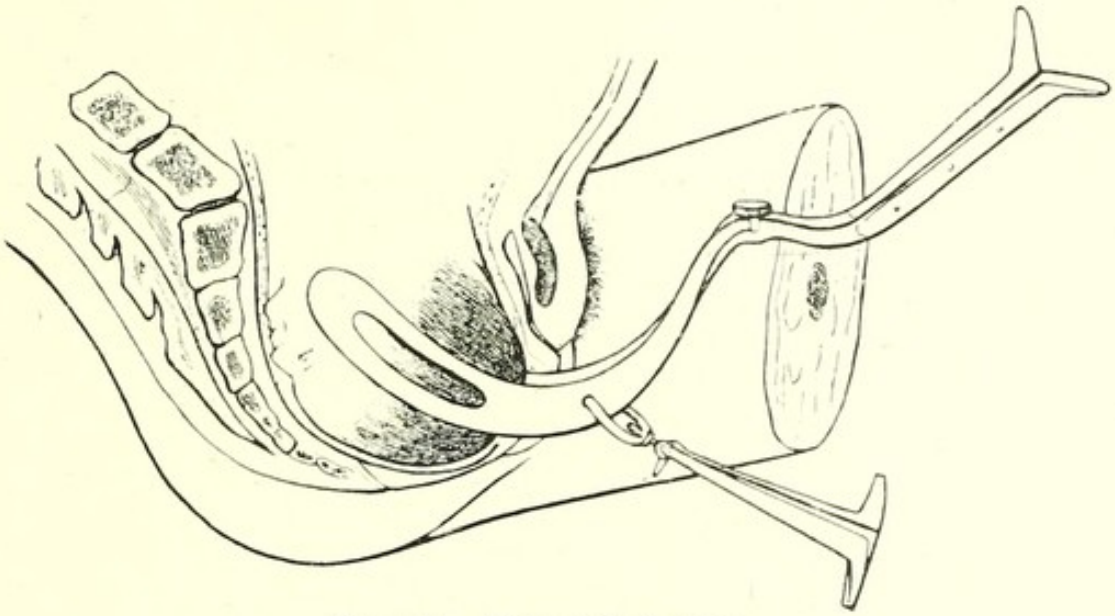


FIG. 149.—Hermann's Forceps.

traction bar, described in 1860, for, undoubtedly, by it traction could be exerted in the axis of the pelvis. Still later, curving the ends of

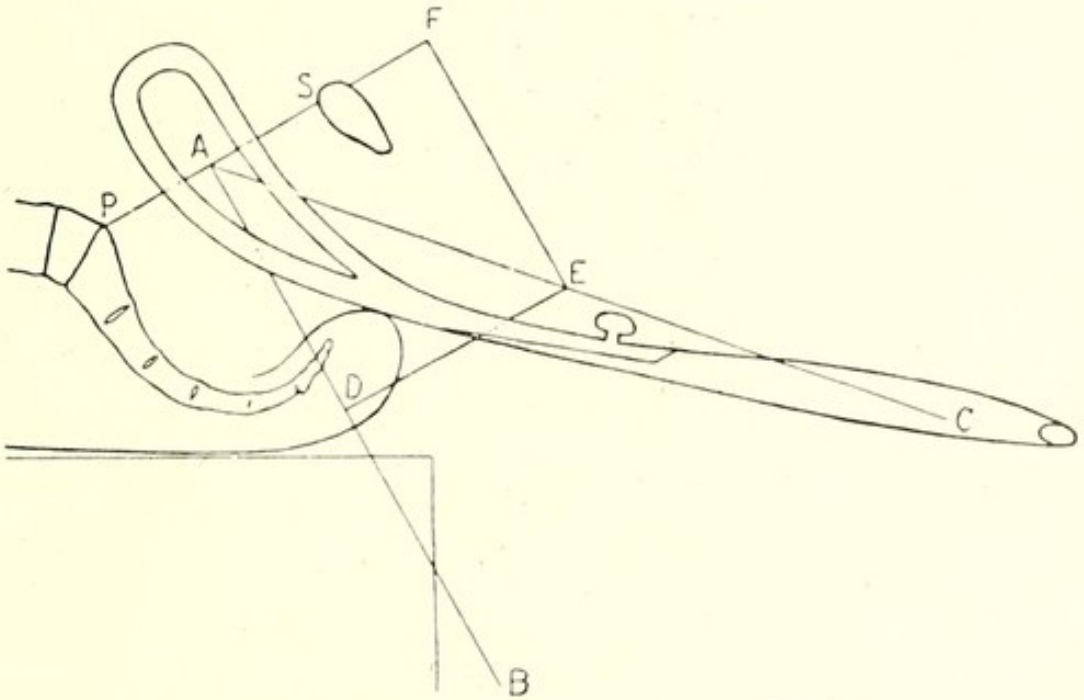


FIG. 150.—Defects of Ordinary Forceps. (Tarnier.)

A, E, C, Line of traction ; A, D, B, ideal line of traction, and very nearly obtained in the best form of axis-traction forceps ; A, S, F, force wasted against the symphysis pubis.

the handles, and a detachable traction handle applied either to the upper or lower ends of the handles, were recommended, and sometimes employed.

The mechanics of axis-traction forceps was very carefully considered by Tarnier[1] and Milne Murray.[2] To those interested in the subject I would heartily commend the writings of those two authorities. Here I will only say a word or two about the matter.

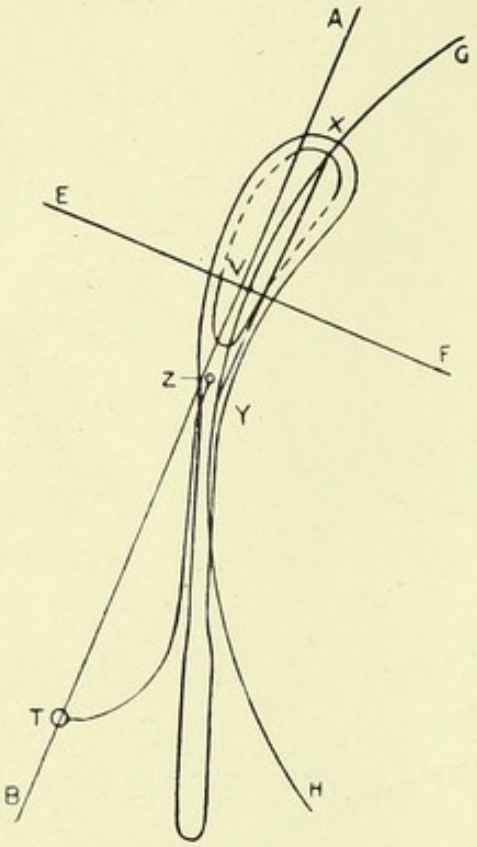


Fig. 151.—Mechanical Construction of Tarnier's Forceps. (Milne Murray.)

X, Centre point of blade tip ; Y, junction of blade and shank ; X, Y, cord of arc of blade ; E, F, bisects cord at right angles ; G, X, V, Y, H, circle whose centre is on E, F, and of which X, V, Y is an arc ; A, B, tangent to arc at V ; V, theoretical position for attachment of traction rods ; Z, best practical position for ditto ; Z, T, traction rods.

It is perfectly evident to every one employing the ordinary forceps, with the head high in the cavity, that a large amount of force is lost against the anterior pelvic wall. Tarnier (Fig. 150) estimated that nearly half the traction force is lost. With axis-traction forceps this is in great part saved. Another important point, demonstrated by Murray more especially, was that the ideal attachment of the traction rods is just below the fenestræ of the blades (Fig. 151). Thus, such forms as Neville's (Fig. 152), where they are attached to the upper part of the handles, and the older forms in which there is a pelvic curve connected with the lower end of the handles, although better than forceps with no traction rods, are less satisfactory than Tarnier's and its modifications.

That this should have been proved mathematically is very interesting, for it agrees with the practical experience of my colleagues and myself in the Maternity Hospital. For several years I used exclusively Neville's forceps, but I found it much less efficient than such forms as Murray's and Simpson's. On many occasions, when I was in the habit of employing forceps above the brim, I failed to deliver with Neville's forceps, and succeeded with Murray's. Of all varieties of axis-traction forceps, then, Tarnier's and the various modifications of it—Simpson's, Murray's, Cullingworth's, and Bonnet's, etc.—are the best, theoretically and practically.

The English modifications of Tarnier's forceps, excepting Bonnet's, have the traction rods attached to the outside of the blades. In

[1] Trans. Inter. Med. Congress, London, 1881, vol. iv.

[2] Trans. Edin. Obst. Soc., vol. xvi., etc.

Tarnier's and Bonnet's, however, the rods are inserted on the inside. The advantage claimed for the latter is that the vulvar orifice is not so much stretched.

It is a convenience to have the rods detachable (Fig. 153), for after one has become familiar with the forceps, and the head just requires a little help over the perineum, the instrument can be

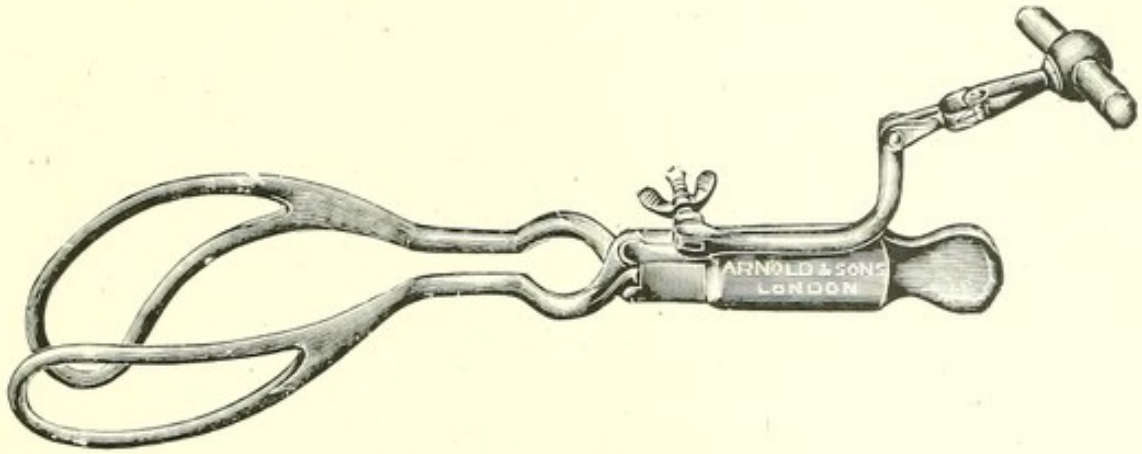


Fig. 152.—Neville's Axis-Traction Forceps.

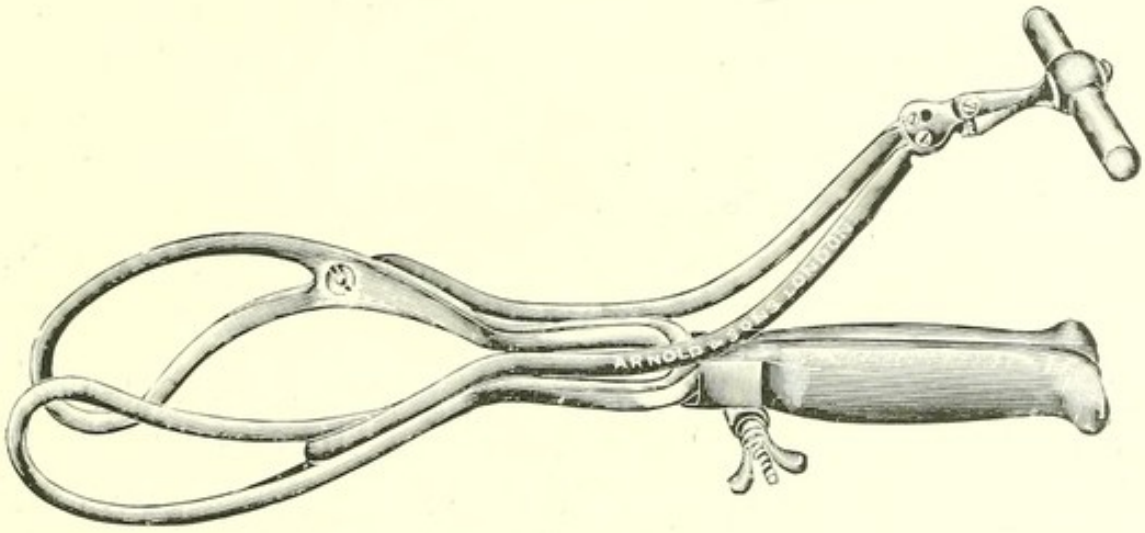


Fig. 153.—Milne Murray's Axis-Traction Forceps with Detachable Handles.

applied without the rods. I have never been able to appreciate the great advantage of axis-traction forceps at the outlet.

Some years ago Murray, recognizing the fact that the pelvic axis varies in different individuals, devised a form of forceps in which the direction of traction could be altered to suit the obliquity of the particular pelvis. He described it as an adjustable axis-traction forceps (Fig. 154). The idea was without doubt sound enough in theory, but it was too theoretical; the instrument was cumbersome

and troublesome of application, so that, in common with others, we gave up employing it in the Glasgow Maternity Hospital.

We have, then, in the modern axis-traction forceps an instrument perfect in construction as far as our present knowledge goes. We must not forget, however, that we are constantly employing it in a canal whose axis and capacity varies, and to a body—the fœtal head—whose position, size, and consistency often differ from the normal. That being so, it behoves us ever to employ forceps with care and judgment, and, above all, never to forget the limitations of this wonderful and useful instrument. These limitations I shall refer to later.

At this stage some may ask, Is an emphatic pronouncement in favour of axis-traction forceps justifiable? Personally, I have no

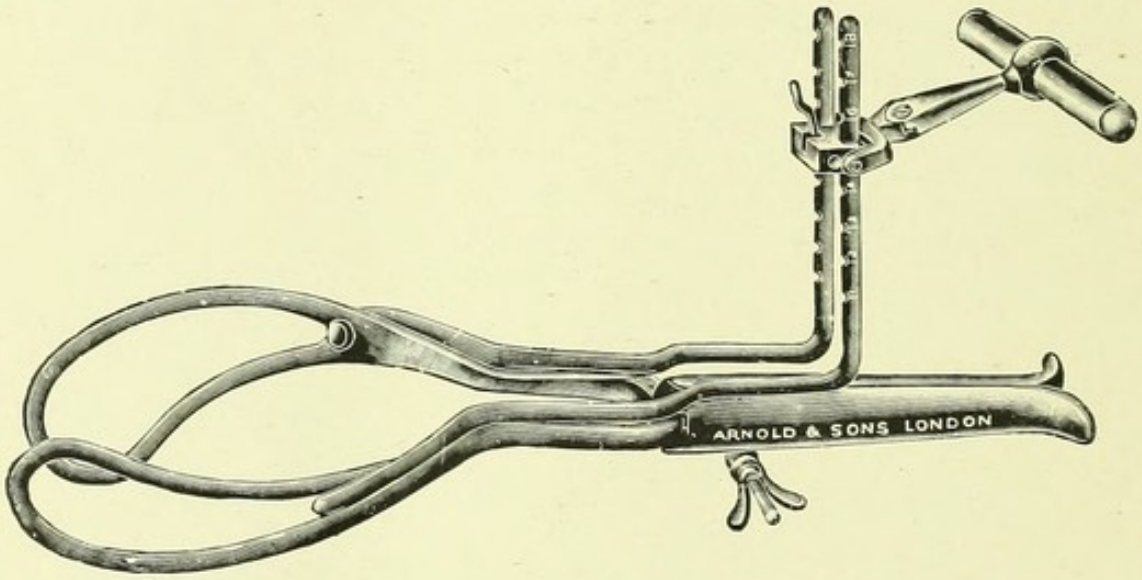


Fig. 154.—Milne Murray's Axis-Traction Forceps with Adjustable Traction Handle.

hesitation in answering in the affirmative, although many obstetricians in England, America, Germany, and France question this. All are agreed that in theory axis-traction forceps is superior, and nearly every one admits that in practice, with the head high in the pelvis, delivery is easier. Those who object to the general employment of axis-traction forceps argue that, as one seldom encounters cases requiring the instrument, the simple double-curved forceps is sufficient. But such reasoning is unsound, for how is it possible that experience sufficient for difficult cases can be gained unless one has employed and become perfectly familiar with axis-traction forceps in simple cases? From my own experience I can say with all truthfulness that with a little practice axis-traction forceps is just as easily applied as the ordinary double-curved instrument.

Action of the Forceps.

Before proceeding further, we must consider how the forceps acts. Until recently it was the custom to attribute five actions to the forceps: (1) Tractor; (2) compressor; (3) lever; (4) rotator; (5) stimulator of uterine action.

The last—the so-called 'dynamic' action—is often observed in cases of forceps delivery at the outlet. Quite recently I had a case where the head had been delayed several hours at the outlet owing to uterine inertia. I had no sooner introduced one blade than strong contractions followed, and the labour was completed without further interference. But one never relies upon this action in practice.

Then, again, few make much use of forceps as a 'rotator,' say in occipito- or mento-posterior positions, while the 'lever' action, used to any extent, is unwise. We still employ a slight pendulum movement occasionally, but never to the extent of levering down first one side and then the other. There remains, therefore, only the two actions, 'traction' and 'compression.'

First and foremost, the forceps is a *tractor*. Applied in the normal direction to a normal head, it is only a compressor to the extent of allowing a sufficiently firm grasp of the head. Barnes[1] says: 'The blades are held in close apposition to the head by the soft parts and the pelvis of the mother. . . . In many cases this outer pressure upon the bows of the blades is enough to serve for traction.' But that, of course, only applies if traction is very moderate, and if little resistance has to be overcome.

The amount of traction which can be exerted by the forceps, especially the axis-traction forceps, is enormous. I have seen accoucheurs with their feet up against the couch, applying all their strength. I have occasionally exerted a considerable amount of force myself, although I believe this is seldom justifiable. The instrument is then, as a rule, being used badly or is unsuitable, and some other operation should be substituted.

The cases in which I have required to exert most force have been where the head was large, and the occiput was posterior. When it is simply a large head, without any malformation or malposition, and there is no pelvic deformity, traction must be continued until delivery is completed. Theoretically, if the head is of unusual size and great traction is required to effect delivery, symphysiotomy should be performed. As a matter of fact, in practice, however, the extreme difficulty will not occur if the head is given plenty of time to mould, the forceps

[1] *Op. cit.*, p. 23.

is carefully applied, and traction is made in the axis of the pelvis. The same applies to occipito-posterior positions—by rotating the head extreme traction is unnecessary.

It is when the pelvis is deformed that the great danger of exerting too much force arises. In such cases, if one or two strong pulls, with the patient in the Walcher position should the pelvis be flat, fail to bring the head past the brim, no further attempts should be made. A head which has been allowed to mould, and which does not come through after one or two attempts, should be extracted after symphysiotomy or craniotomy.

As regards the forceps as a *compressor* of the fœtal head, I have already pointed out that the blades applied to the sides of an ordinary-sized head compress it but slightly. That, at least, is true of the ordinary double-curved forceps, but when one takes the axis-traction forceps, which has a 'butterfly' screw, the compression is very much greater. If this screw is tightened, even with the blades applied exactly over the sides of the head, compression is quite decided. Much greater is it, of course, when the forceps grasps the head obliquely or longitudinally, as it must do when it is employed with the head lying transversely or obliquely at the brim.

There are two important points to be considered here: The first is the amount of safe compression, the second is the effect compression in one diameter has upon the other diameters of the head. Unfortunately, the first question cannot be answered, for there is no means of estimating and measuring the compression exerted; and, again, different children bear compression differently. Personally, I have found that, with Murray's forceps applied transversely to a normally sized head, and with the butterfly screw not very tightly screwed up and occasionally loosened, a forceps delivery which takes more than fifteen to twenty minutes is attended with decided asphyxia. Some years ago I was in the habit of keeping the forceps on and taking a very long time to deliver primiparæ, with the object of preserving the perineum intact. In that latter respect the results were highly satisfactory, but I can remember once or twice losing the child. Now I do not take so much time, and if the birth has been very protracted I remove the forceps when the head is passing through the vulvar orifice.

Besides continuity of compression, the amount of traction exerted must be considered, for the amount of compression is in proportion to the amount of traction. Barnes[1] says: 'The pressure is equal to about half the traction; thus, if you exert a traction force of about 50 pounds, the pressure on the head is about 25 pounds.' This amount of pressure must be often exceeded if Duncan's conclusion is

[1] *Op. cit.*, p. 27.

correct.[1] 'We may, therefore, I think, safely venture to assert as a highly probable conclusion that the great majority of labours are completed by a force not exceeding 40 pounds.'

A word about the other question—the effect compression in one diameter has upon the others. The earliest experiments are those of Baudelocque, and it is noteworthy that his results agree in great part with those of Budin and Murray a century later. Baudelocque[2] made a number of experiments upon dead infants, and, amongst other conclusions, he came to the following: 'Lastly, that the diameter which crosses the direction in which we compress the head, far from augmenting in the same proportion as the other diminishes, does not usually increase a quarter of a line, and sometimes decreases.' This, of course, has reference to the effect compression in the antero-posterior direction has upon the transverse diameter of the head. What Baudelocque did not appreciate, however, was that the vertical diameter of the head was affected by compression.

It was Budin, and later Milne Murray,[3] who, while confirming Baudelocque's conclusions, pointed out that antero-posterior compression of the head resulted in an increase in the vertical diameter. In a few experiments which I carried out in the Maternity Hospital I came to exactly the conclusions indicated by Budin and Milne Murray.

Indications for Forceps.

The indications for interference with forceps may be arranged in the following groups:

1. Faults in the forces.
2. Faults in the passage.
3. Faults in the child.
4. Dangers threatening the life of the mother.
5. Dangers threatening the life of the child.

Many prefer to divide the indications between the last two groups, and, in a sense, of course, these embrace the others; but I find the more extended classification allows one to explain better when forceps should be employed.

Faults in the Forces.—Once a patient has reached the second stage—the application of forceps before cannot be considered—I see no object in allowing labour to continue indefinitely, even if the patient and child are bearing the labour well. My practice, therefore,

[1] 'Researches in Obstetrics,' p. 319.

[2] 'A System of Midwifery,' translated by Heath, 1790, vol. ii., p. 377.

[3] *Edin. Med. Journ.*, 1888, vol. xxxiv., part i., p. 417.

is to terminate labour by forceps after the second stage has lasted three to four hours, even although both maternal and fœtal pulses are normal. The operation is perfectly simple, for the head, with few exceptions, has already reached the outlet. Indeed, if it has not advanced so far, one should suspect the existence of some abnormality, such as malposition of the head, pelvic deformity, etc., which has been overlooked.

Many writers maintain that simple delay is no reason for interfering, and that one cannot place a time limit upon the duration of the second stage. In theory that may be sound enough, but in practice it causes prolongation of the patient's sufferings; besides, it is surely better to anticipate disturbances in mother and child. The early application of forceps in the second stage merely as a matter of convenience is quite unjustifiable, for undoubtedly, if the child is pulled from high up in the pelvis, the risks of lacerating the vagina and perineum are greatly increased. But the other extreme of waiting until there are indications in the maternal and fœtal pulses, no matter how long the delay in the second stage may be, is also unwise, and those who follow such a teaching will be disappointed with the results.

In Winckel's new treatise[1] Wyder discusses this matter, and favours delay until indications of disturbances in mother or child arise. Olshausen and Veit,[2] however, place less restriction upon the use of the instrument in cases of enfeeblement of the forces. The general opinion of English operators is that given by Herman,[3] who, while opposed to early interference in uterine inertia, thinks it unwise to delay indefinitely the employment of forceps.

Before leaving the subject of uterine inertia as an indication, let me again emphasize the importance of making sure that this really is the cause of the delay, as it rarely is the true cause, if the head is arrested high in the pelvic cavity.

Faults in the Passage.—Cases of this group test most the judgment of the accoucheur. The forceps, especially the axis-traction forceps, is an instrument of enormous power. By means of it one can overcome obstructions in the parturient canal, but there is a limit to the traction force which should be exercised. The power which can be exerted with one's forearms is a fair measure of the force which may be safely employed. For the operator to place his feet against the bed and exert all his strength is not obstetrics. It means that he is operating unskilfully, or that he has chosen the wrong operation. I

[1] Bd. iii., Theil i., p. 497. [2] 'Lehrbuch der Geburtshülfe,' Auf. v., 1902.
[3] 'Difficult Labour,' p. 357.

cannot too strongly discourage this employment of extreme force, a procedure far too general in this country.

As regards the vagina, obstruction is uncommon except at the lower part. Malformations, cicatrices, tumours, etc., are occasionally encountered; but they are very rare, and if they are of sufficient extent to cause a decided obstruction it is never justifiable to deliver by simple traction. Incisions and, if these are not sufficient to allow of the ready passage of the child, removal of the tumour or Cæsarean section are the methods of delivery which should be had recourse to.

At the perineum there is sometimes slight difficulty, especially with muscular women, who, it has often been remarked, have not the easiest labours. But, apart altogether from muscularity, certain individuals have peculiarly rigid tissues — elderly primiparæ, for example. I have sometimes seen it well marked, however, in quite young primiparæ.

When uterine contractions are strong and regular, rigidity of the muscles of the pelvic floor may be removed by anæsthesia. Short of this, a full dose of opium is often sufficient. If the forces are still unable to expel the head unaided, forceps must be applied. In cases where the pelvic floor does not relax under anæsthesia, it is often necessary to exert a considerable amount of force with the instrument. Extensive laceration of the perineum will then frequently result, so that it is advisable in such cases to incise the vulvar orifice (Episiotomy).

But the most troublesome cases of forceps delivery are when the bony pelvis is at fault — not only because considerable manual dexterity is necessary, but because great judgment is required in deciding when the pelvic deformity is too great for forceps. This matter, however, is of such extreme importance that I have considered it in a separate chapter.

Faults on the Side of the Child. — Amongst the fœtal abnormalities which may call for forceps may be mentioned large size of the head, except malformations such as hydrocephalus, malpresentations such as occipito-posterior presentations or facial presentations, and difficulty with the after-coming head in breech presentations.

Dangers threatening the Life of the Mother.—In this group come to be mentioned such conditions as eclampsia, dyspnœa from heart disease, advanced phthisis, or any condition in which, after the os is fully dilated, rapid delivery is deemed necessary. Short of these serious conditions, however, forceps is indicated if the maternal temperature and pulse begin to rise in the second stage, if the patient

becomes restless, if the vagina becomes dry and hot, but only occasionally and with great care if Bandl's ring is distinct.

Dangers threatening the Life of the Child.—Some children are more affected by a labour than others. One must, therefore, auscultate the fœtal heart from time to time if there is any delay in the second stage, and even in the first stage if the membranes have ruptured prematurely. The normal fœtal heart rate is about 130. A progressive decrease in pulse-rate indicates danger, and if it falls to 100 or lower no time should be lost in delivering the child. Even more serious than simple slowing is irregularity. Increased rapidity usually proceeds slowing, although not necessarily. One must remember that during a uterine contraction the fœtal heart-beats become slower, but they should return to the normal again immediately after the contraction passes off. If they do not do so, then the child is in danger, and should be extracted as soon as possible.

When one waits for distinct indications on the part of the fœtus before applying forceps, the extraction must not be too prolonged, for the circulation of the fœtus is already embarrassed. The extraction must be rapid, and one must risk rupturing the perineum.

Conditions which must be Fulfilled if Forceps are to be Applied.

Before one proceeds to apply forceps, the following conditions must be fulfilled: (*a*) the os must be fully dilated; (*b*) the membranes must be ruptured; (*c*) the presentation must be a suitable one; (*d*) there must not be too great disproportion between the head and the pelvis; (*e*) the head must be engaged.

(*a*) **The Os must be Fully Dilated.**—It is very questionable if the application of forceps before the os is fully dilated is ever justifiable. Even when it is of the greatest importance to effect speedy delivery, it is generally better to incise the cervix, for the tears produced by dragging a head through an undilated os are ragged and may be very extensive and, what is still more important, cause great shock to the patient. I have tried once or twice to gently drag a child through an imperfectly dilated os, but I have generally lacerated the cervix. The reason for this is that the cervix, if not fully dilated, contracts whenever one pulls on the child's head. Therefore, I always incise the cervix if I wish to deliver with all speed.

There is no doubt that the untimely application of forceps is responsible for a large number of the cases of laceration of the cervix and its resulting evils; I say a large number of the lacerations, for, undoubtedly, extensive laceration may sometimes occur after spontaneous delivery.

In contracted pelvis the expansion of the cervix often appears to be arrested short of complete dilatation, owing to the bony canal preventing descent of the head, and so it is a little difficult to say when the os is fully dilated. In such cases the cervix is soft and relaxed, and gives the impression that it will offer no resistance to the passage of the head. Later, of course, a secondary narrowing may occur, from the lips of the cervical canal becoming œdematous owing to long-continued pressure. Interference should anticipate such an occurrence.

(*b*) **The Membranes must be Ruptured.**—I do not for a moment believe that any great disaster would follow the application of forceps over unruptured membranes, for I can hardly think that dragging on the membranes could, as is stated, cause separation of the placenta. Be that as it may, however, the membranes should be ruptured before forceps are applied.

(*c*) **The Presentation must be a Suitable One.**—A word only is necessary with regard to this condition, for the subject has been fully discussed elsewhere. The forceps may be employed in all vertex and face presentations, but not in brow presentations. For delivering the after-coming head forceps are also very useful (Chapter V.).

(*d*) **There must not be Too Great Disproportion between the Fœtal Head and the Parturient Canal.**—That is to say, the fœtal head must not be too large, as in cases of hydrocephalus, nor the parturient canal too narrow, as in cases of decided bony deformity. The test of this is a careful bimanual examination of head and pelvis. That has been fully detailed and considered (Chapter XII.).

(*e*) **The Head must be Engaged.**—In most respects this condition is embraced by the previous one. Forceps is absolutely unjustifiable in contracted pelvis if the head is still movable. Occasionally I have employed the instrument with the head movable at the brim when immediate delivery was urgent, as in cases of heart disease or eclampsia, but only when the pelvis was normal.

Preparation of Patient and Method of applying the Forceps.

Prior to the application of forceps it is of the greatest importance that the patient should be carefully prepared for the operation. Especially must every precaution be taken to prevent the possibility of any septic infection occurring. The hands of the operator and his instrument must be sterilized, and the vagina, vulva, and surrounding parts of the patient thoroughly cleansed. The manner of carrying out these steps has been fully described.

Next to care in preventing septic infection, a thorough evacuation of the bladder is of the greatest importance. I am perfectly certain that many of the cases of partial incontinence following parturition—cases by no means uncommon—are the result of pulling the child out of the vagina with the bladder still containing a considerable quantity of urine. The bladder should be emptied by catheter just before the introduction of the blades, for only by that means can one be perfectly sure that it is thoroughly evacuated. This is an easy matter, except in those cases where the head is low in the vagina and actually pressing upon the urethra. In the latter the head must be pushed up a little way to allow the catheter to pass.

The emptying of the bowel is also necessary, not only because it is extremely disagreeable to the operator to have fæces escaping while he is delivering the child, but because their escape while vaginal manipulations are being carried out is an actual danger to the parturient.

It is also desirable to have the patient under an anæsthetic. In the case of a primipara, at the time the head is escaping surgical anæsthesia is an advantage, for a patient half under struggles and tosses about so much that it is very difficult to control her and prevent perineal rupture.

In this country the common position for the patient to assume is the left lateral. In simple forceps delivery I employ this decubitus. It is, however, advisable that the accoucheur should also accustom himself to operate with the patient on her back, the position preferred in all other countries except Great Britain. It is largely a matter of custom which position is chosen in the simpler cases of forceps delivery; but when the instrument has to be applied with the head at the brim, and especially with the pelvis deformed, the dorsal decubitus is better, not because the operation is easier in that position, but because the blades can be applied more exactly. Besides, in contracted pelvis it is often an advantage to drop the legs, and put the patient in what is known as the Walcher or 'hanging-leg' position (Fig. 171). A very exhaustive discussion regarding the value of this position took place at the International Congress in Amsterdam in 1899.[1] It was generally admitted by all, with the exception of Bar, that an increase of about 1 centimetre (0·4 inch) resulted. Those interested in the subject will find it fully considered by Fothergill.[2]

In the Walcher position the weight of the hanging legs depresses the fore-part of the pelvis, when there of necessity results an increase of the conjugata vera. The conjugate at the outlet is diminished,

[1] *Cent. f. Gyn.*, No. 35, 1899.

[2] *Brit. Med. Journ.*, 1896, vol. ii., p. 1290.

however ; consequently, after the head has passed the brim the position should be changed to the lithotomy one. Apart altogether from actual measurements made on the cadaver, practical experience confirms the advantage of the position. Upon several occasions I have delivered with forceps in the Walcher position after failing in the lateral or dorsal. My colleagues in the Maternity Hospital have had similar experiences.

There is another distinct advantage which the dorsal decubitus possesses in cases of ' high forceps.' If a patient deeply anæsthetized is rolled round on her side, the head, although well engaged, slips out of the brim, because the body of the child falls over to the more

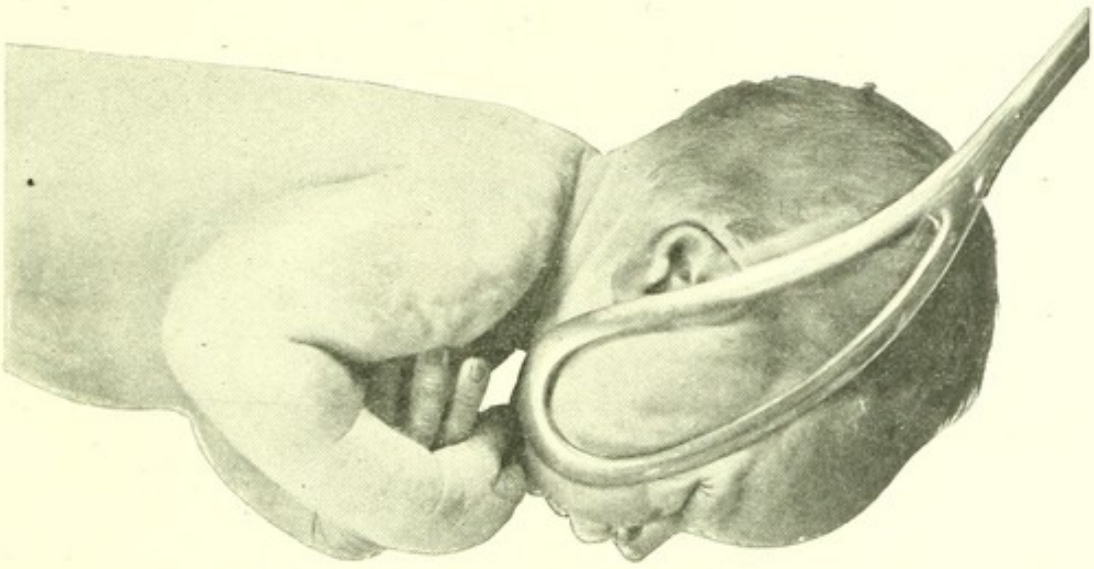


Fig. 155.—The Ideal Position of the Blades with respect to the Fœtal Head.

dependent side. The operator has, therefore, to apply the instrument to a movable head, and may pull it into a position other than that in which it was moulding and trying to pass.

We must now consider an important question—the relationship of the blades to the maternal pelvis and fœtal head. Should the blades be applied relatively to the pelvis or relatively to the fœtal head ?

The blades of any of the ordinary varieties of forceps are so constructed that they are in perfect position when they grasp the head transversely (Fig. 155) and are placed transversely in the pelvis (Fig. 156). If the head of the child always lay in the pelvis, with its antero-posterior diameter in the antero-posterior diameter of the pelvis, this would be readily secured ; but the long or antero-posterior diameter of the head does not always occupy the conjugate—indeed, only at the lower part of the cavity does it do so. At the brim it is in the oblique or transverse diameter of the pelvis ; consequently,

in such cases the blades cannot grasp the head transversely and lie transversely in the pelvis.

If one applies the forceps to a dried pelvis it is at once evident that each blade has a certain range of what may be called 'safe movement,' and that the limits of this are the ileo-pectineal eminence and the sacro-iliac synchondrosis on each side (Fig. 157). With the head lying in the oblique diameter, therefore, it is still possible to get a transverse grasp by applying one blade over these two points. Hence the old rule in such cases: 'Apply the blades in the opposite oblique diameter to that in which the head lies.' When, however,

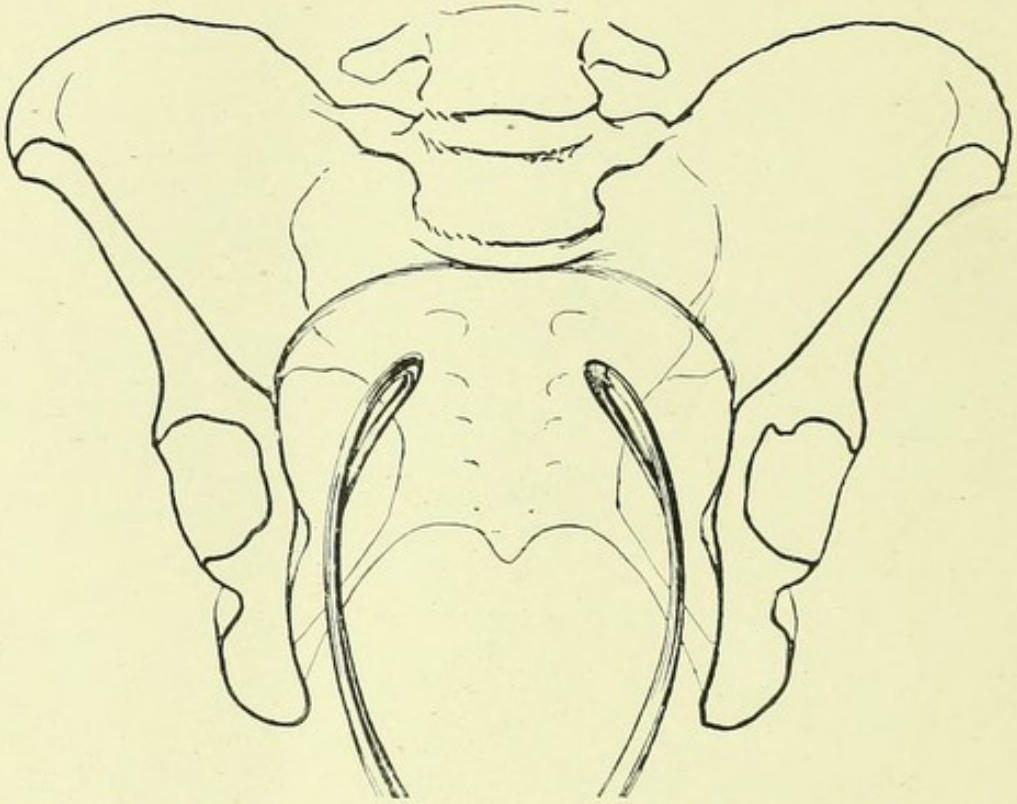


Fig. 156.—The Ideal Position of the Blades relatively to the Maternal Pelvis (Bumm).

the long axis of the head occupies the transverse diameter of the brim, as in flat pelvis, it is obviously impossible to apply the blades transversely to the head, unless, of course, one moves them beyond the ileo-pectineal eminence and the sacro-iliac synchondrosis, and places them in the conjugate diameter of the pelvis. I shall refer to such cases when speaking of contracted pelvis.

In advocating a deliberate grasping of the child's head and the placing of the blades against the head, I am simply returning to the teaching of the older obstetricians, Levret, Smellie, and Baudelocque. Pushing in the blades to the side of the pelvis and trusting to the grasp being satisfactory is of quite recent date, and although it is very generally followed, and is the method of application recommended by

such writers as Barnes, Galabin, and Playfair, I have always taken exception to it.[1] I need only mention the cases where, by applying the blades in the casual way mentioned, the instrument repeatedly slips off the head, until finally a satisfactory grasp is obtained. Would such a satisfactory grasp not be more likely to be obtained if the blades from the first were applied deliberately to the child's head in the direction deemed best? I am not alone in advocating a more careful and deliberate grasp of the head; some of the most distinguished obstetricians of the present day—as, for example, the late Milne

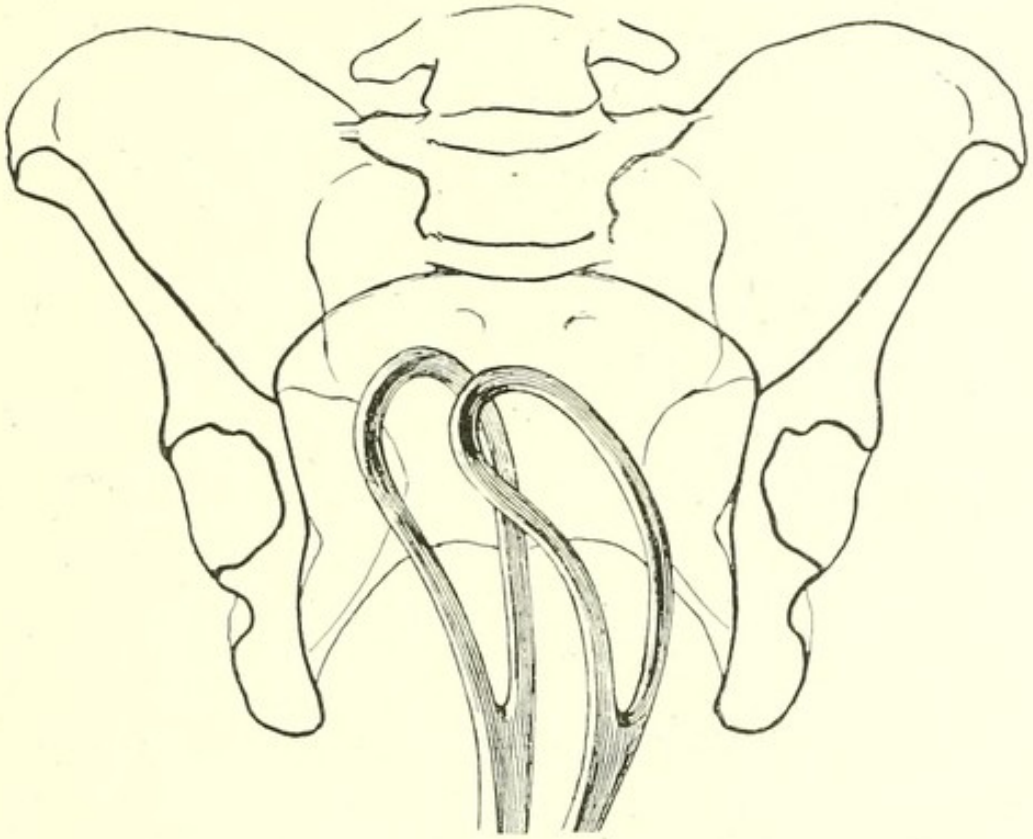


FIG. 157.—Showing the Range of Safe Movement of the Blades relatively to the Pelvis (Bumm).

Murray, Clarence Webster, Whitridge Williams, Pinard, Farabœuf, the late Varnier, and Nagel—do so.

We have now reached the stage when I may describe how the forceps are to be applied, and in so doing I shall first take a simple case where the head is low down in the pelvis, and afterwards consider the more difficult and complicated cases in detail.

With the woman in the left lateral position, I believe it best to use the left hand internally for guiding both blades, and the right for holding and introducing them. When, however, the dorsal decubitus is employed, each blade is best guided into position by the hand

[1] *Lancet*, September 24, 1898.

which most naturally applies itself to the side of the maternal pelvis; thus, for the right blade the operator's left hand is best, and for the left his right.

Having determined the exact relationship of the long axis of the head to the bony pelvis, the left blade is introduced by passing it over the fingers of the left hand, which is in the vagina (Fig. 158). The blade must be kept closely applied to the side of the fœtal head, and carefully guided inside the os externum. Having done this, the handle is depressed and carried well back. This has the effect of bringing the blade over the most suitable part of the child's head. It

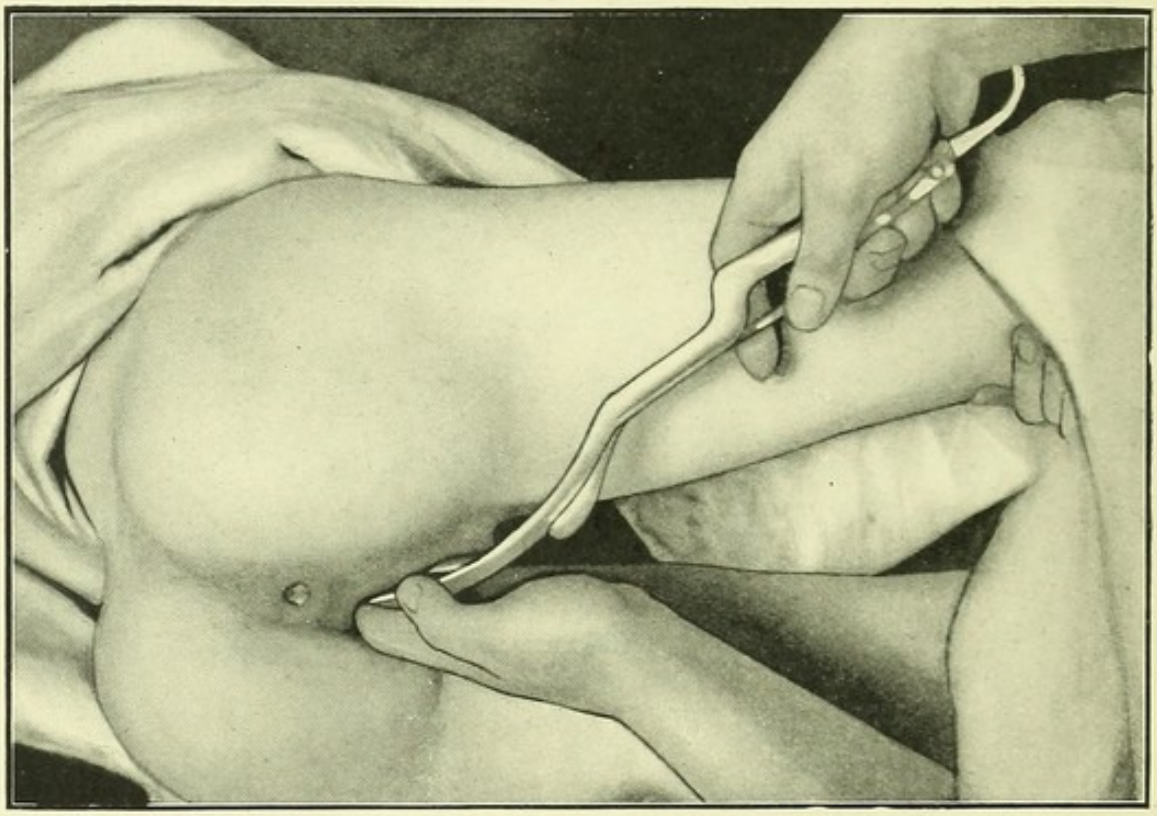


Fig. 158.—The Application of the Lower or Left Blade.

The blade and traction rod are held as indicated.

also takes the blade out of the operator's way, especially if there is an assistant available to steady it. It is evident from the illustration that the traction rod is not the least in the way, being held along with the handle by the right hand.

The second blade may be introduced as was the first, only above and to the right side of the pelvis, opposite to the other. But that method is not nearly so satisfactory as the one generally employed (Fig. 159). In the latter the blade is passed first into the hollow of the sacrum, and is then rotated into position opposite the first. Some operators introduce the first blade in this way also. The operator

holds it with the traction handle well out of the way and resting on the dorsum of his hand. By neglecting this little precaution all the trouble with the axis-traction forceps arises. He grasps then the handle with the traction rod resting on the dorsum of his hand, and under the guidance of his other hand he slips the blade into the hollow of the sacrum. Having placed it over the forehead of the child, he rotates it round into the position desired, opposite the first (Fig. 160), and he finds that without any difficulty the blades lock (Fig. 161). Difficulties with locking hardly ever occur when the head is low down. If by any chance they should, a little gentle manœuvring

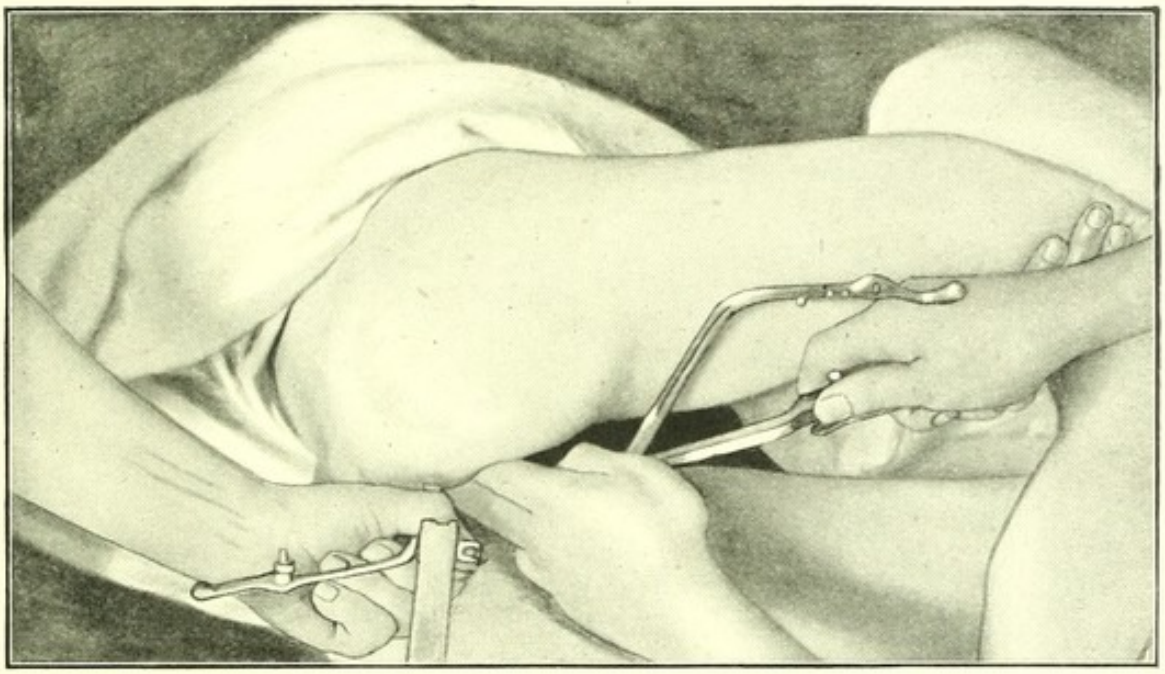


FIG. 159.—The Introduction of the Upper or Right Blade.

The lower or left blade is held well back while the right or upper is carried into the hollow of the sacrum. The traction rod, it will be observed, is not in the way ; it rests on the dorsum of the operator's right hand.

or reintroducing the blades will right the matter. The instrument being locked, he then brings the traction rod of the right blade, which until now has been in front, into position alongside of its fellow by pushing it back over the shank of the blade. The butterfly screw is then tightened, and the traction handle attached to the bars (Fig. 162). As I have said before, the butterfly screw must be slackened from time to time, as a continuous pressure endangers the child.

One knows when a good grasp has been obtained by the blades of the forceps being applied to the head in the manner already illustrated (Fig. 155). But if the operator has not troubled about how they lie relatively to the head—as is unfortunately the custom with so many—it will be evidenced by the blades locking readily, and by

there being very little separation between the ends of the handles. In high forceps, with the head in the transverse or oblique diameters, separation of the handles is unavoidable; but with the head low down it always means that the forceps is wrongly applied, or that the child's head is lying in a different position than was supposed. If the handles are widely separated, the blades should be removed, and a careful examination of the position and attitude of the head again made before they are reapplied.

In delivering with forceps, one should do so with the expenditure of the minimum of force, and to accomplish this one should always try

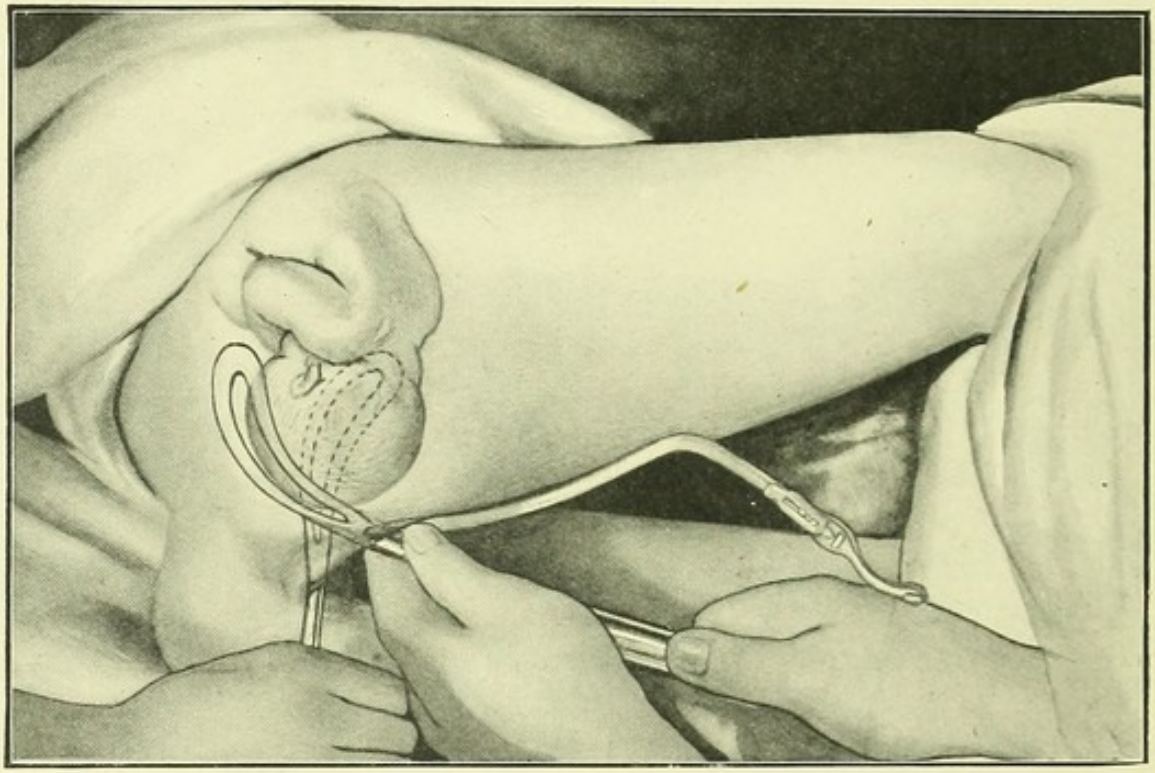


FIG. 160.—The Rotation of the Right or Upper Blade from the Hollow of the Sacrum on to the Part of the Child's Head desired.

Observe the traction rod is not causing the operator any inconvenience.

to pull the head in the direction it would be driven naturally. In a normal delivery the occiput is pushed lower and lower down, and slowly rounds the symphysis pubis. The occiput does not become arrested at the symphysis pubis, and if it does, premature extension of the head occurs, with the result that a larger circumference of the head is brought across the vulvar orifice, and rupture of the perineum follows. Now, with forceps, especially the ordinary variety, such a mistake is very liable to occur if traction is directed too soon forwards. With axis-traction forceps this is not so likely if one allows the handles to guide one as to the direction in which to pull. The traction

rods should be kept close to the handles as the latter come further and further forwards (Fig. 163). They must not actually touch the handles, otherwise they might press them forwards. In such a way the head is slowly guided over the perineum (Fig. 164). Traction, however, must not be continuous, but must be exerted during the uterine contractions, or, if they are very infrequent, at short and regular intervals.

I have sometimes found that the head, if small, moves within the blades, and when one pulls upon the forceps, the handles pass at once

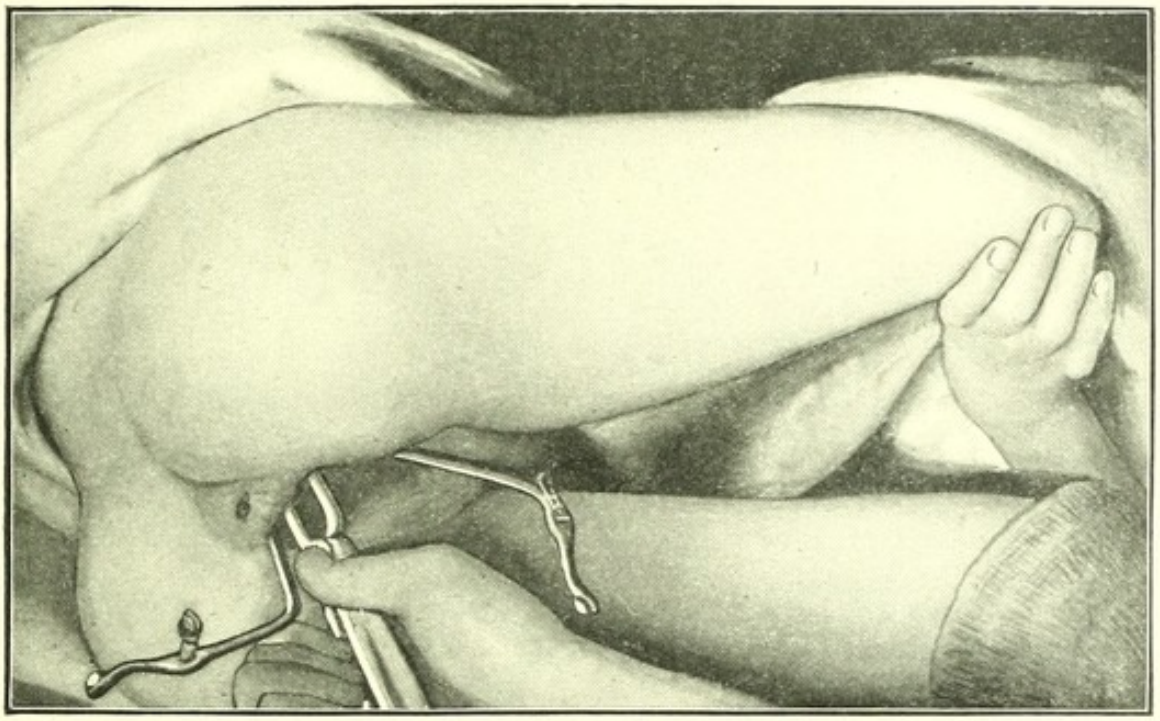


FIG. 161.

The blades are now locked. The traction rod of the right blade is still in front. It is now carried back over the shanks beside the left one.

forwards. In such cases, were one to follow the handles, traction would be made too soon forwards, with the result that the occipito-frontal circumference would be brought through the vulvar orifice and the perineum ruptured. The best course in such a condition is to help the occiput down with one's fingers, or retard the forehead by pressing it from behind.

In most cases I do not remove the blades before the head escapes. The advantage of leaving the blades on while the head is escaping is that by means of them the too rapid birth of the head can be controlled. The only objection to keeping them applied—the amount of room they take up may be neglected—is that, if the head is imperfectly grasped, or if it slips within the forceps, a longer diameter than the suboccipito-frontal is thrown across the vulvar orifice.

The Edinburgh school attach great importance to keeping the blades on when extracting a child, and their teachers have frequently referred to the advantages of axis-traction forceps in preserving the perineum from rupture. Glasgow and other British schools do not attach so much importance to this.

If delivery is completed without the blades, the head must never be pushed out with the hands, unless the occiput is prevented from catching on the symphysis. Also, the mistake must not be made of taking the blades off too soon, and so allowing the head to slip back.

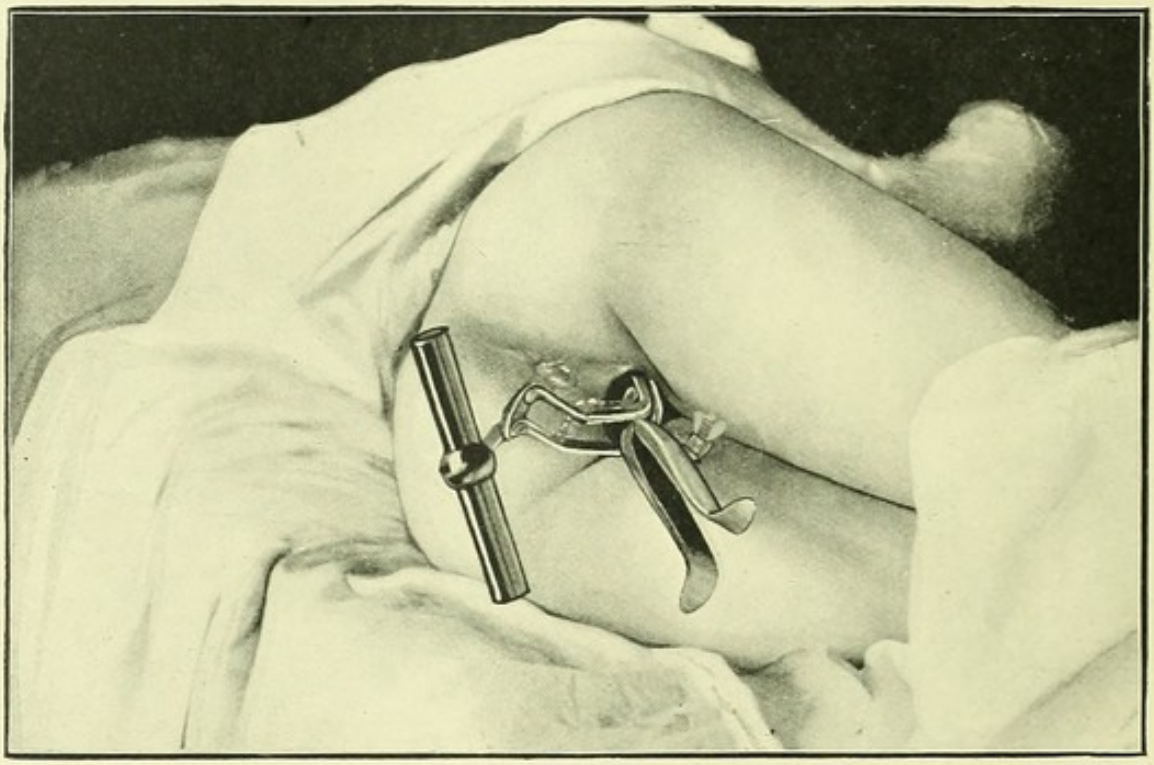


Fig. 162.

The blades are locked and the traction bars are in position. The blades are slightly gaping, and the butterfly screw is not more than just biting.

Details regarding the management of the escape of the head and the preservation of the perineum will be found in the chapter on Perineal Rupture. During the extraction the nurse should hold up the woman's right leg. As can be seen from the illustration (Fig. 164), the leg is maintained extended, so as to relax the perineum to the greatest possible extent.

The Head High in the Cavity, but lying in the Oblique Diameter.

When forceps have to be employed with the head high in the pelvic cavity, without doubt there is something to be said in favour

of placing the patient in the lithotomy position. As I have already mentioned, in that position the blades can be more exactly applied to the head, if necessary, the Walcher or hanging-leg position can be made use of, and the weight of the trunk maintains the child's head fixed in the pelvic brim. Barnes says: 'Placing the woman in the dorsal position facilitates extraction.'

In order that the head, situated high in the pelvis, may be grasped laterally, the blades must lie in the opposite oblique diameter to that occupied by the long axis of the head (Fig. 157). To accomplish this

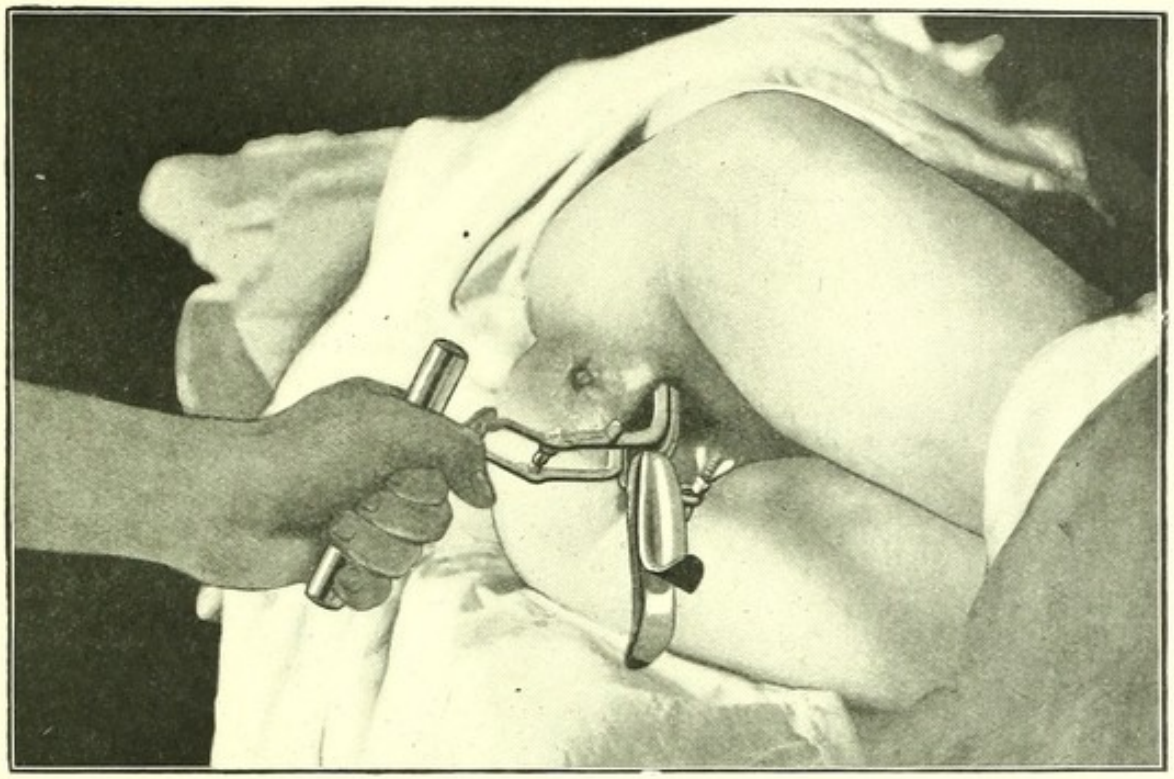


Fig. 163.—Traction Downwards and Backwards.

The traction rods are all but touching the handles, which guide one as to the direction in which traction should be made.

the blades must be carefully placed over the sides of the head, not just casually pushed in at the sides of the pelvis.

With the patient in the lateral position one proceeds as follows: An assistant steadies the child by pressing upon the fundus uteri. The operator then passes his left hand into the vagina and determines the exact position of the head. The fingers here must be placed well inside the margin of the cervix, and the blades carefully guided through the os. The left or under blade is passed either directly up towards the sacro-iliac synchondrosis, or carried into the hollow of the sacrum and rotated on to the side of the child's head. It is then held in position by an assistant. The second, upper, or right blade is best introduced if passed into the hollow of the sacrum and rotated into

position. One must make sure that it is carried well forward opposite the ileo-pectineal eminence. The handles are then locked, sometimes with a little difficulty, but usually fairly easily, if the first is held in position and both are pressed well back. If the difficulty is extreme, it is advisable to remove the blades and reintroduce them. The traction bars are applied as already described.

I must admit that in the high operations the traction rods of the axis-traction forceps are sometimes a little trouble, but if the rule I have laid down is followed, of keeping the rod of the right or upper

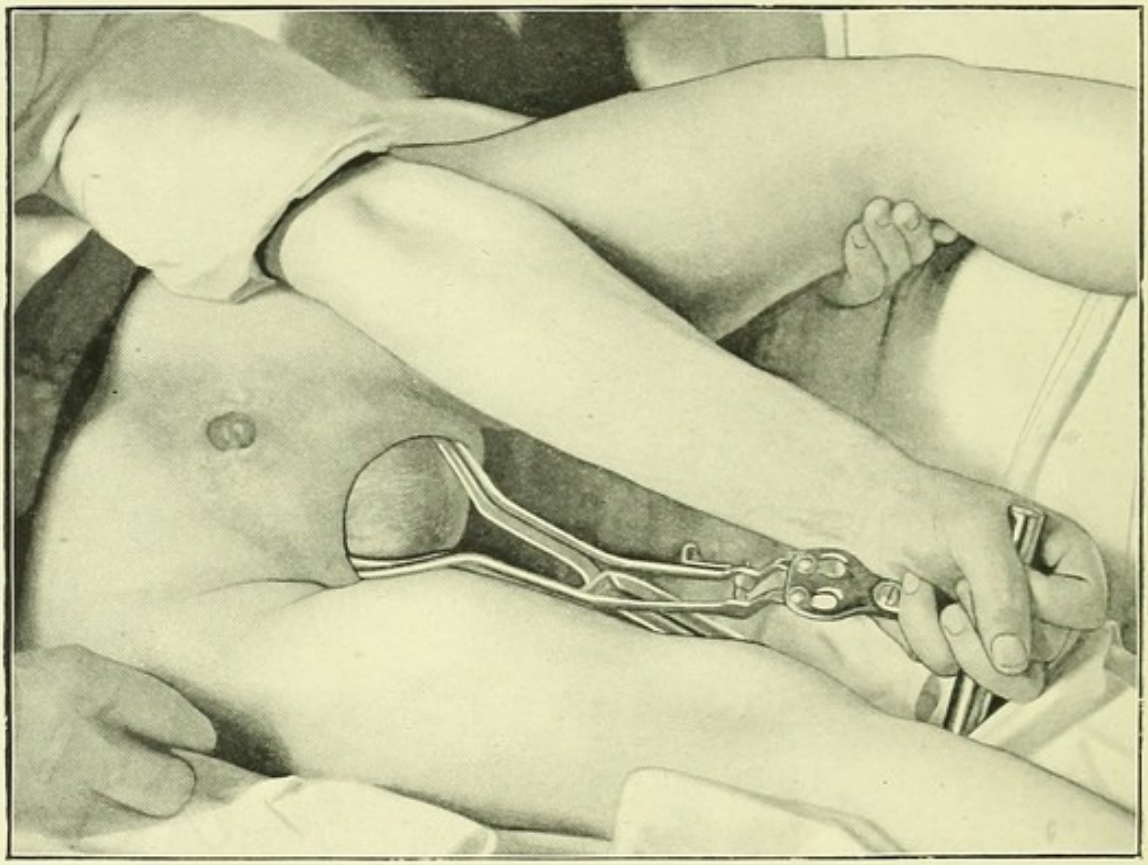


FIG. 164.

The head is being extracted. The traction rods follow the handles as the latter pass forwards and upwards between the parturient's thighs.

blade well forwards until the blades are locked, a very little practice will render the manipulations easy.

Before proceeding to traction it is a wise precaution to make sure that the cervix is quite free, and that the blades are in the position desired. One or two tentative efforts at traction having then been made, the delivery should be proceeded with.

Traction must be in the right direction—viz., in the axis of the pelvis. As I have already described, the handles, as the head descends, are one's guide. Traction must also be made during the uterine contractions, or, if they are absent, at short intervals.

If the patient is a primipara, some time will be required to bring the head down through the whole length of the canal. This may have an injurious effect on the child, especially if the mistake is made of keeping the butterfly screw tight.

Occasionally I have found it advisable to remove the blades at the outlet and reapply them, for although theoretically delivery may be completed with the grasp first obtained, in practice, when the head reaches the floor, a better grasp may often be secured by removing the blades, rotating the head, and then reapplying the blades.

Occipito-Posterior Position of the Vertex.

This position of the vertex was considered in detail when malpositions of the child as a cause of dystocia was being discussed (Chapter IV.). I gave it then as my experience that rotation by means of the hand could be effected in somewhere about 70 per cent. of cases, and that it was a most desirable proceeding, as it rendered the delivery of the head infinitely easier and safer for mother and child.

It sometimes happens, however, that rotation is not possible, or that the malposition is overlooked until forceps has been applied. I have already referred to this, and indicated how one must suspect the position if there is much difficulty in delivering a head at the outlet, and especially if the vulvar orifice gapes without the perineum distending. I cannot agree with Barnes when he writes[1] against manual rotation of the head, nor when he states with regard to forceps that 'delivery is nearly as easy as when the instrument is applied to an occipito-anterior position.' My experience in delivering primiparæ where the occiput remains persistently posterior is that a considerable amount of force is required, and that frequently a very extensive tearing of the perineum results.

When rotation fails there is nothing for it but the employment of forceps. In this position of the head, and in this position alone, straight forceps may be of use, and there are some of my colleagues who carry that instrument solely for the cases under consideration. The ordinary forceps, however, with or without the traction handles, is quite suitable, for if rotation does occur it is a simple matter to remove the blades and reapply them. It has been recommended to apply the blades with the pelvic curve directed backwards, so that if rotation occurs the blades are in proper position.

Seldom do I try to rotate with the forceps, but if I feel the instrument slipping round and the occiput coming to the front, as it some-

[1] *Op. cit.*, p. 60.

times does, I encourage it to do so. Williams, Edgar, and many others, speak very highly of actually rotating the instrument after having pulled the head down and encouraged flexion.

In occipito-posterior positions the blades are introduced in the manner already detailed. It is most important that the blades should lie about equidistant from the occiput and sinciput, otherwise they are liable to slip off suddenly when traction is exerted.

In persistent occipito-posterior positions, the head should be delivered in the same way as Nature effects delivery. The sinciput in the region between the anterior fontanelle and the glabella is pressed

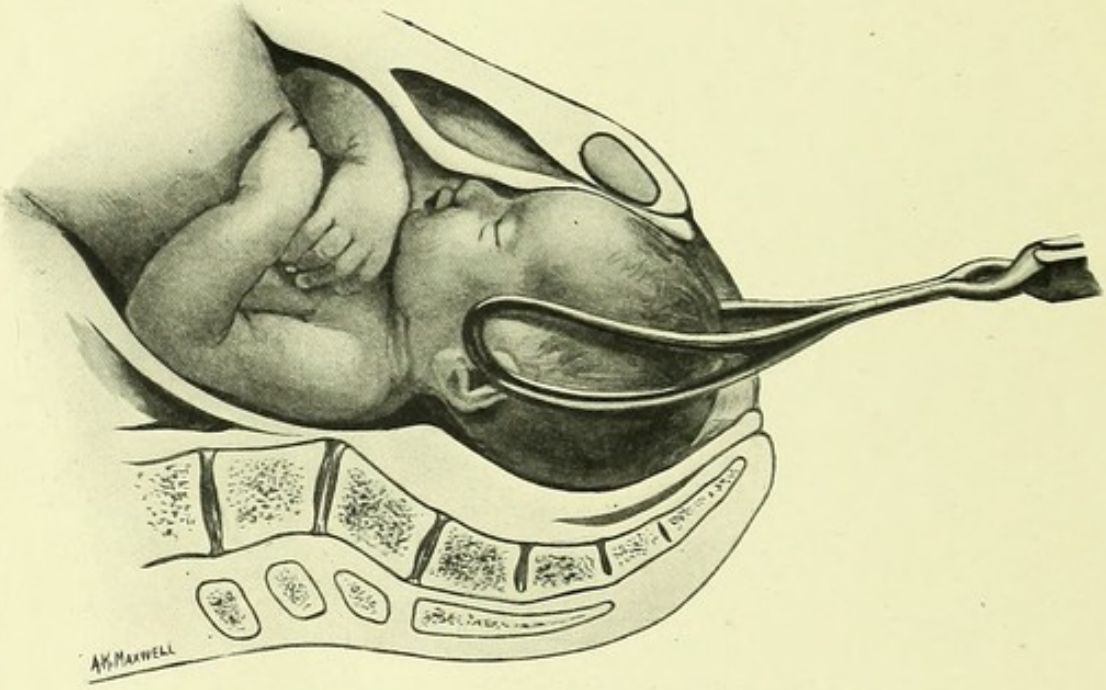


FIG. 165.—Forceps in Persistent Occipito-Posterior Position of Vertex.

against the symphysis, while the occiput distends and finally sweeps over the perineum (Fig. 165). The producing of flexion has the great advantage that it gives the head up to the last a chance of rotating, and once or twice when I thought all hope of rotation was past I have found it occur. It is a mistake to bring the occiput too far down before bringing it over the perineum. Traction should therefore be made downwards, then more and more forwards, until the occiput is born. The face then slips down from behind the symphysis. Very generally I make a lateral incision through the margin of the vaginal orifice, in order to avoid perineal tearing.

Face Presentations.

Forceps may be employed in face presentations, and with very satisfactory results, provided the head has passed the pelvic brim and the chin is forwards.

With a normal pelvis the indications for the operation and the conditions which must be fulfilled before the instrument is applied are in the main identical to those which obtain in vertex positions. If, however, the pelvis is deformed, forceps is not a suitable instru-

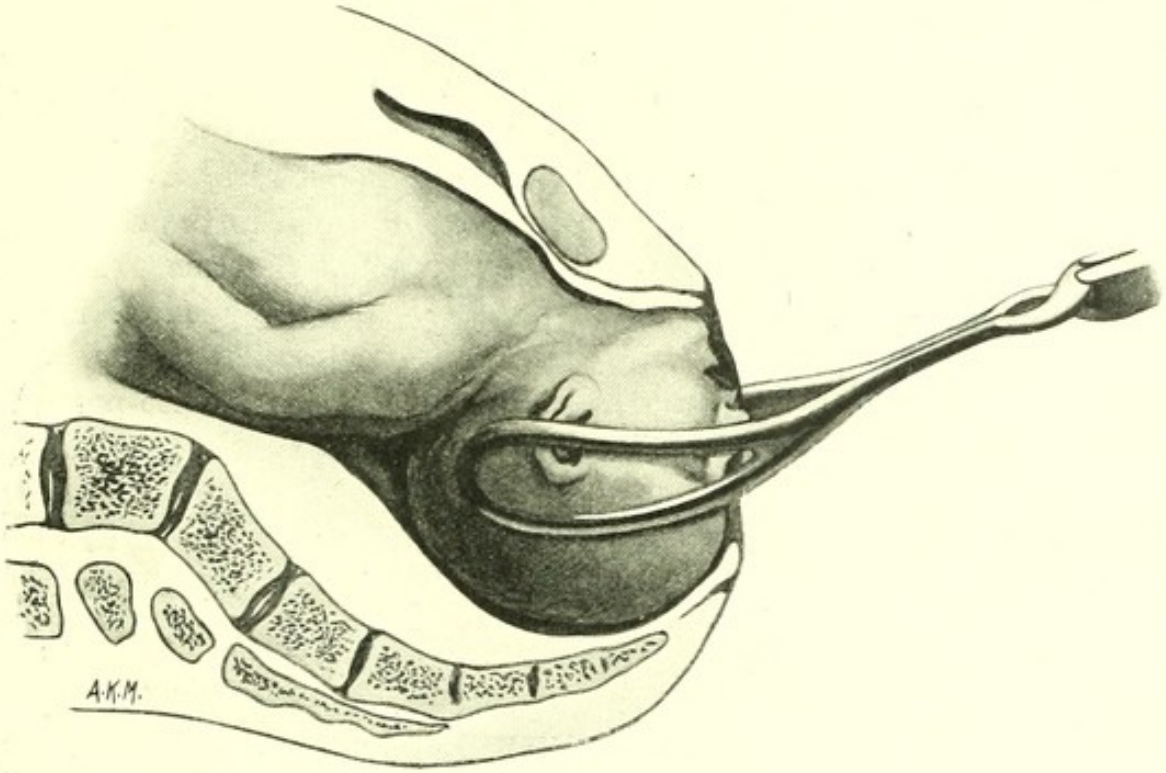


Fig. 166.—Forceps in Face Presentation.

ment. Nor, indeed, is it advisable to attempt manual correction of the position. Version, if that is still possible and the pelvis is not too deformed, is probably the most suitable treatment.

The position of the blades in a facial presentation is as the illustration indicates (Fig. 166). The manner in which the blades are inserted and placed over the sides of the face is, for the most part, as has been already described. Special care must, however, be taken not to injure the face, and to see that the blades lie over the sides of the head in a direction approaching the occipito-mental diameter. Consequently, the handles must not be pushed too far back.

In delivering the head one must prevent too early descent of the occiput, for if that occurs before the chin comes below the pubes the head becomes impacted in the pelvis. Traction is directed, therefore, to bringing the chin below and then round the symphysis. In cases

where the pelvis is normal, or only slightly deformed, our results from forceps delivery in facial presentations have been very satisfactory to both mother and child.

Turning now to *mento-posterior* cases, I must differ from Williams and Edgar and many French and German operators who refer to forceps as being unsuitable and profitless. A little time ago we had a case which proved that, although theoretically such an opinion may be correct, in practice it is not so. The patient had been in the second stage for some hours, and it was necessary, both in the interests of mother and child, that the delivery should be completed. Having had previous experience of the face rotating under the influence of traction, my house-surgeon made traction under my direction, with the result that the chin came round to the front and a living child was delivered without difficulty. Lewers[1] a few years ago described a similar experience in two cases, and in the discussion which followed Spencer mentioned three in his practice. A most valuable paper by Reed on the subject recently appeared in the *American Journal of Obstetrics*.

If one fails to deliver the head in a persistent mento-posterior position with forceps, recourse to symphysiotomy is not commendable, even if the pelvis is of a normal capacity, for the child's chances of surviving are not good. In such cases, if I could not rotate the chin forwards, I would without hesitation perforate the head. The subject of mento-posterior position of the face is fully considered in Chapter IV.

Brow Presentations.

I consider forceps unsuitable in brow presentations. In the two cases in my own practice in which such treatment was employed, on one occasion by myself many years ago, and on the other by my house-surgeon recently, the results were most unsatisfactory. After very severe traction the children were delivered, but both were dead. Contrast that with the result obtained in another case, where the brow was converted into a vertex position, and a child weighing 12 pounds was delivered alive after several fruitless attempts had been made with forceps outside the hospital (Chapter IV.).

After-coming Head.

It is my practice always to have forceps ready in breech presentations, and to apply them if after two attempts with traction and suprabubic pressure I fail to deliver the after-coming head. My reasons for pursuing such a course have been already given when

[1] Trans. Lond. Obst. Soc., 1899, vol. xli., p. 280.

considering breech presentations. I never employ the axis-traction forceps, as the rods are apt to get in the way, especially the one belonging to the right or upper blade.

In carrying out the operation it is an advantage, if an assistant is available, to get him to hold the trunk of the child a little forwards, so that it may be out of the way. The introduction of the blades is

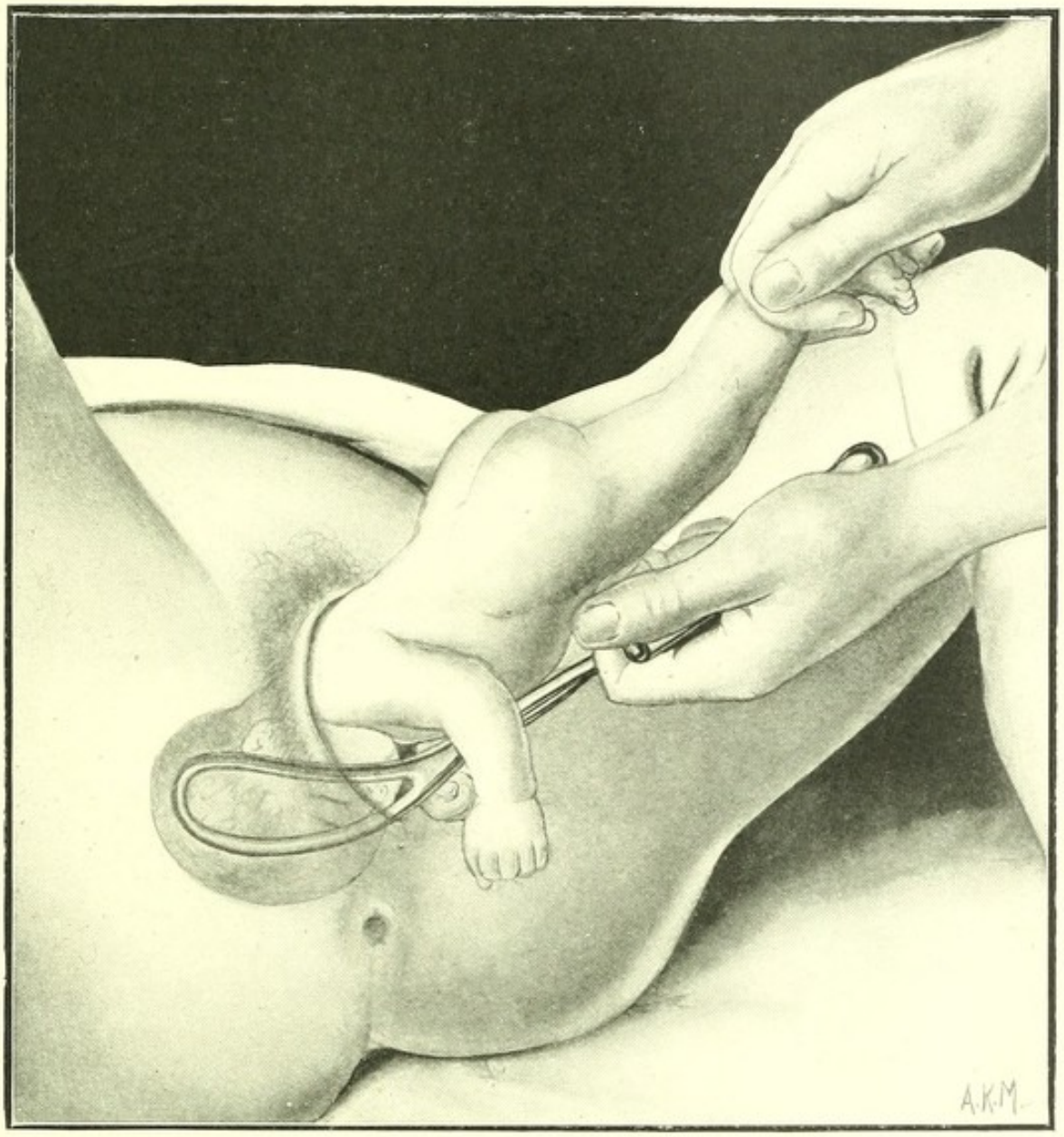


Fig. 167.—The Delivery of the After-coming Head with Forceps.

carried out precisely as in other cases of forceps delivery. The trunk of the child being pulled forwards out of the way, the left or lower blade is passed along the side of the child's head. The right or upper blade is then passed into the hollow of the sacrum, and rotated round into position over the other side of the head. The blades must always lie along the ventral aspect of the child, so as to promote

flexion (Fig. 167). If they are placed along the dorsal aspect, any traction extends the head. Traction should be made first downwards and backwards, then the forceps and child should be carried upwards on to the patient's abdomen.

Impacted Breech.

I have once or twice delivered the impacted breech with forceps when I have been unable to get my fingers into the groin, but I have more often failed owing to the forceps slipping. To get a proper hold of the fœtal pelvis the blades must be applied to the side of the breech, with the tips placed between the thigh and abdomen of the child (Fig. 49). That, however, is not always possible, especially if the thighs are at different levels. I cannot, therefore, give the treatment a very hearty recommendation, although it is a method I would always try before attempting to apply the fillet or blunt hook. The introduction of the blades is quite simple, and is carried out as already described for other presentations.

CHAPTER XXIV

FORCEPS (*continued*)

Forceps in Contracted Pelvis.

In the last chapter I considered the general principles that should guide one in the employment of forceps under ordinary conditions. There now remains the very important question of the employment of the instrument in contracted pelvis, which I have thought advisable to discuss in a separate chapter.

Few subjects in midwifery have given rise to so much discussion, or to such differences of opinion, as the employment of forceps in contracted pelvis. Even at the present time differences of opinion exist. As illustrating this, let me give very briefly the views of a few representative Continental and American obstetricians regarding the matter.

In Winckel's large work on obstetrics Wyder says: 'The application of forceps is contra-indicated so long as the head has not passed the obstruction, and in general contracted pelvis so long as the head has not moulded itself to the pelvic deformity.' Proceeding further, however, the writer admits that where the life of the mother or child is in danger an attempt may be made with forceps even before these conditions are fulfilled.

Olshausen and Veit[1] take a slightly broader view, for they consider the application justifiable if the greatest circumference of the head is already engaged in the brim.

Ribemont-Dessaignes and Lepage[2] write: 'This operation, which during certain times has been the subject of numerous discussions, has lost in great part its interest, by reason of the introduction of symphysiotomy and the almost complete abandonment of forceps in contracted pelvis.' These writers recommend the application of forceps only when symphysiotomy is contra-indicated—for example, when the child is already on the point of dying. Farabœuf, Pinard,

[1] 'Lehrbuch der Geburtshülfe,' 5th edition, 1902, p. 530.

[2] 'Précis d'Obstétrique,' 6th edition, 1904, p. 1122.

and French obstetricians generally, are opposed to pulling the head past the obstruction.

Edgar of New York[1] writes: 'The greatest circumference of the head must have passed the inlet, and the head must be fixed in the pelvis'; but when speaking of forceps in contracted pelvis he says[2] 'Forceps application is applicable to those cases in which the head is engaged, or in which it can be made to engage by suprapubic pressure, or in which it is possible to be sure that there is no disproportion between the head and the pelvis.'

Williams[3] says: 'Generally speaking, contracted pelvis presents an absolute contra-indication to the application of forceps, for if the contraction be marked it will be impossible to drag the head through the pelvis, and if brute force be employed it will result in the death of the child, and severe injuries to the soft parts of the mother, and occasionally cause her death. On the other hand, when the contraction is slight—and especially when the head is already engaged in the upper part of the pelvic cavity—a tentative application with forceps may be justifiable. Under such circumstances a few tractions of moderate intensity should be made; if the head follows them, they should be continued, but if not the forceps should be removed, and delivery effected in some other manner.'

Of these writers, Williams is undoubtedly the most explicit, and his attitude towards this subject is clear and well defined. The others, with the exception of a certain school in France, who condemn entirely the application of forceps before the greatest circumference of the head has passed the brim, evade the real question at issue. While condemning the pulling of the head past the obstruction, they are forced to admit that it must be done under certain circumstances. Personally, I am in entire agreement with Williams, and I think his summing-up of the matter in the few words already quoted is excellent.

In recent years one or two German writers have expressed similar views. Both Skutsch[4] and Nagel[5] recommend the bringing of the head past the obstruction with moderate traction. Nagel[6] writes: 'Only those can term the high forceps barbarous who have had little practice with, and have incompletely mastered, the operation. In truth it is now the most skilful of all the obstetric operations.' The most important recent contributions on the subject of high forceps in contracted pelvis are by Wenczel[7] and Tòth.[8] This attitude that it

[1] 'Practice of Obstetrics,' 1903, p. 1016.
[2] *Ibid.*, p. 698.
[3] 'Obstetrics,' 1903, p. 358.
[4] 'Geburtshülfliche Operationslehre,' Jena, 1901.
[5] 'Operative Geburtshulfe,' Berlin, 1902.
[6] *Ibid.*, p. 221.
[7] *Archiv f. Gyn.*, 1904., lxxiii., p. 673.
[8] *Ibid.*, Bd. lv., p. 11.

is permissible to pull the child's head past the obstruction appears to me the only rational one, for otherwise how can one avoid performing symphysiotomy or Cæsarean section unnecessarily. Every one knows that there are many cases in which only a little traction is required to bring the head through the brim. Is one to perform symphysiotomy or Cæsarean section in such cases? So much for the extreme position that forceps are not to be applied until the child's head has passed the obstruction.

But there is the other extreme position, that of those who employ brute force to bring the child through the contracted brim. Admitting that it is sometimes permissible to pull the head past a bony obstruction of the pelvis with forceps, it must be clearly understood that this obstruction must be slight, and that the amount of force employed must be very moderate. Unfortunately, at present this is not fully appreciated. Practitioners drag at the child's head with forceps, and proudly boast how, with their feet against the bed or couch, or even against the pelvis of the mother, they have pulled children through the most contracted brims. Only the other day a practitioner told me that he had never yet seen the case of contracted pelvis in which he could not deliver the child with forceps. Every week we receive into the Glasgow Maternity Hospital cases of contracted pelvis in which practitioners have failed to deliver with forceps.

What are the reasons for this state of matters? and who are to blame for this unfortunate, but far too common, practice?

In great part obstetric teachers have been to blame. Let me indicate what I mean by a specific example. The last important discussion on the employment of forceps in contracted pelvis took place at the annual meeting of the British Medical Association in Carlisle in August, 1896.[1] The discussion was introduced by the late Milne Murray, who was then recognized as a great British authority on forceps. Milne Murray then said: 'During the last eight years I have delivered living children in several cases where the brim was not more than $3\frac{1}{4}$ inches, and in one case, already on record, I delivered a living child where accurate measurements of the pelvis made post-mortem and under chloroform showed that the conjugate was not more than 2·75 inches. In this case the head was quite free when the forceps were applied—indeed, it had to be steadied by an assistant during their application.'

The harm which has followed such teaching is incalculable. It will be many years before it is generally recognized as being unsound and unscientific. Speaking for myself, it is only from the experience

[1] *Brit. Med. Journ.*, October 31, 1896, vol. ii., p. 1282.

gained in the last few years in the Glasgow Maternity Hospital that I have realized it—indeed, I have only fully done so since I examined our results from the treatment and discovered how very unsatisfactory they are. Let me give these results. Here is a table, which includes all cases of pelvic deformity, where the conjugata vera measured 3½ to 3 inches (8·7 to 7·5 centimetres), delivered by forceps in the Glasgow Maternity Hospital during the years 1899 to 1906 inclusive. The cases number 130 in all.

TABLE OF 130 CASES, WHERE CONJUGATA VERA MEASURED 3½ TO 3 INCHES (8·7 TO 7·5 CENTIMETRES), DELIVERED BY FORCEPS IN GLASGOW MATERNITY HOSPITAL, 1899 TO 1906.

C.V. 3 in. (7·5 cm.), 39 Cases.	C.V. 3¼ in. (8 cm.), 52 Cases.	C.V. 3½ in. (8·7 cm.), 39 Cases.
Alive, 21. Dead, 18. Fœtal mortality, 46 %.	Alive, 40. Dead, 12. Fœtal mortality, 23 %.	Alive, 33. Dead, 6. Fœtal mortality, 15 %.

I need hardly say that these results are far from satisfactory. Many of the cases, without doubt, were interfered with before admission to hospital, but, excluding the fatal cases that we in the hospital were not responsible for, the fœtal mortality is far too high. If such are the results obtained by my colleagues and myself in the hospital, who have had so much experience with forceps in contracted pelvis, and have every convenience for performing the operation, it may safely be concluded that worse results will follow a similar treatment practised by those who only occasionally encounter cases of pelvic deformity.

In employing forceps in contracted pelvis two great mistakes are made: (1) Insufficient time is given the head to mould; (2) forceps is employed in degrees of pelvic deformity in which it is quite profitless to employ the instrument. I have said sufficient about the first mistake elsewhere. I have pointed out that the second stage should be allowed to continue three, four, five, six, or even more hours, and that the condition of the mother and child should be watched, and interference had recourse to only when there are decided indications for doing so.

The second mistake is well illustrated by the table. As shown, the fœtal mortality is as high as 46 per cent. with a conjugata vera of 3 inches (7·5 centimetres). It must be admitted, therefore, that with such a degree of deformity it is unwise, except in very exceptional circumstances, to employ forceps. I am perfectly well aware that there are cases on record where living children have been delivered

through a pelvis of $2\frac{3}{4}$ inches (7 centimetres), or even under that figure. Milne Murray and others have recorded cases, and in the hospital recently we had one; but such cases are of great rarity, and should not come into consideration or influence one in favour of forceps. I have stated that under exceptional circumstances the operation may be justifiable with the degree of deformity we are considering—viz., 3 inches. If, for example, the head is found well engaged and moulded, and seems only very slightly larger than the pelvic brim, and provided the type of pelvis is of the flat variety, one may make an attempt in the Walcher position with the forceps prior to performing symphysiotomy or craniotomy, but, let me again remark, rarely will one succeed in such cases with moderate traction.

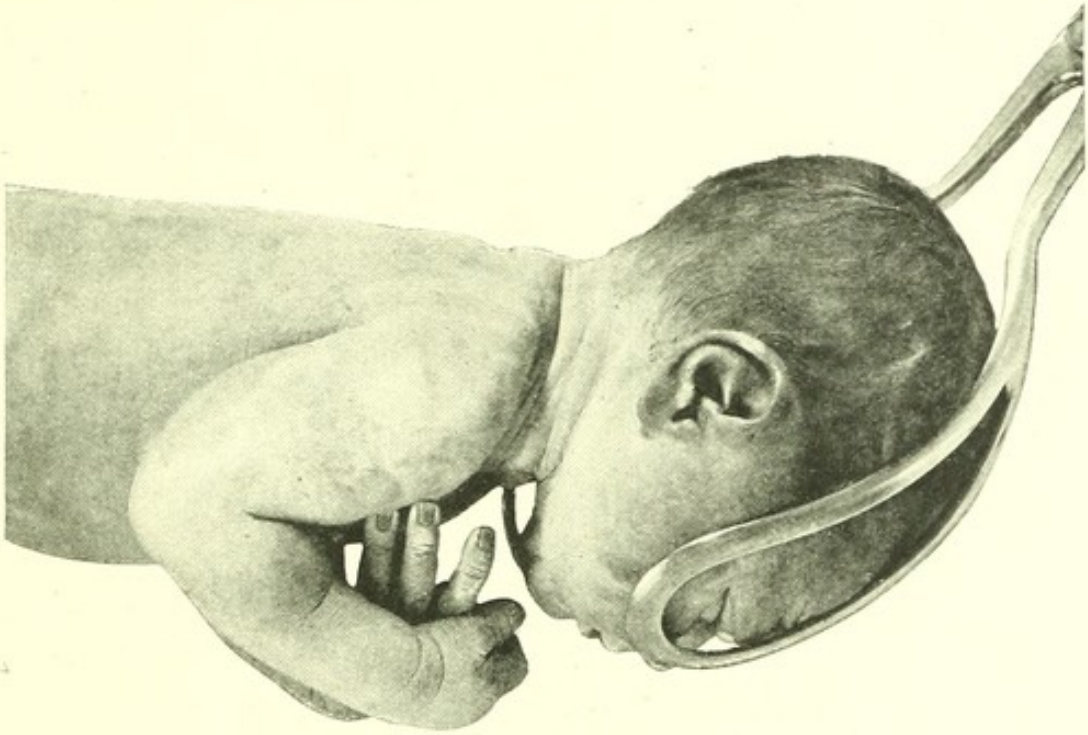


FIG. 168.—Oblique Grasp of the Head, showing the Position of the Blade situated over the Face.

Take now pelves less deformed. As might naturally be expected, with increasing pelvic capacity the fœtal mortality proportionately decreases. Thus from the table it will be seen that at $3\frac{1}{4}$ inches it is 23 per cent., and at $3\frac{1}{2}$ inches it is 15 per cent. No hard-and-fast rules can be laid down regarding the employment of forceps in such degrees of medium deformity; the only guide must be the relative size of the head and the pelvis. In certain cases with a pelvis of $3\frac{1}{4}$ inches it may be absolutely sound treatment to employ forceps, while in other cases with a deformity of $3\frac{1}{2}$ inches it may be equally unsound.

When is one justified in such cases in using forceps? It is easier to answer this by stating under what conditions one is not justified.

1. One is not justified in applying the instrument until the head has been given the utmost limit of time to mould. By the utmost limit of time I mean until symptoms of disturbance in the mother or embarrassment in the fœtal circulation arise.

2. One is not justified in applying forceps if there is distinct overlapping after the head has been allowed this long time to mould.

3. One is not justified, or at least one will find it profitless, to apply forceps in posterior parietal (Litzmann's obliquity) presentations (p. 163).

4. One is not justified in continuing attempts at forceps delivery after two failures with a moderate degree of traction and the patient in the Walcher position.

Fig. 169.—Oblique Grasp of the Head, showing the Position of the Blade situated over the Occiput.

Application of Forceps in Flat Pelvis. — When the head is arrested at the brim in a flat pelvis, it will be found lying with its long axis in the transverse diameter. Consequently, the blades, if they are simply slipped into the sides of the pelvis without considering the child's head, will generally grasp the head obliquely (Fig. 168), although they may accidentally grasp the head antero-posteriorly.

The fact that this antero-posterior grasp of the fœtal head has always been considered so unsatisfactory has led several obstetricians to recommend the application of the blades to the transverse diameter of the child's head, and consequently in the antero-posterior diameter of the pelvis.

There are, therefore, three distinct methods of applying the forceps in flat pelvis:

1. The casual slipping of the blades into the sides of the pelvis, and grasping the head obliquely.
2. The deliberate application of the blades—one over the occiput, the other over the face.
3. The deliberate application of the blades antero-posteriorly as regards the pelvis—one blade in front of the promontory, and the other behind the symphysis.

1. **The Casual Slipping of the Blades into the Sides of the Pelvis and Grasping the Head Obliquely.** — This is the method generally employed, and it is certainly the easiest (Fig. 169). The instrument often slips, however, although in many cases the hold is quite satisfactory. All one has to do is to apply the instrument as described in the previous chapter. When the blades are locked, the handles often gape very considerably, so that in order to obtain a firm hold the butterfly screw must be tightened firmly.

Having applied the blades, tentative traction is made; if the instrument holds, good and well; if it slips, the blades are reapplied. It has always appeared to me a haphazard way of employing the instrument, so that I invariably try to employ the second method, now to be considered:

2. **The Deliberate Application of the Blades—One over the Occiput, the Other over the Face.**—This is a method of applying the blades which is usually condemned, and although personally I approve of it and practise it, I do not feel justified in emphatically recommending it, seeing that so many of the most distinguished obstetricians since the time of Smellie and Baudelocque have condemned it. With the exception of the Edinburgh school, there are few supporters of the method of employing the forceps so that the blades lie directly over the occiput and face. I believe, however, that most of the objections to this mode of application are theoretical, and are advanced by those who have not had experience of the instrument employed in this way.

In employing this method it is well to have the patient in the dorsal decubitus. The left blade, after its introduction into the vagina, is passed, not directly over the part of the fœtal head against which it is ultimately to lie, but is guided by the hand in the vagina up towards the sacro-iliac synchondrosis, and then rotated over the face or occiput as the case may be. The right blade is then passed into the hollow of the sacrum and rotated round to the other side of the pelvis, and it likewise is placed directly over the other extremity

of the long axis of the head (Fig. 170). The placing of the blades exactly in position is by no means easy, and I must candidly admit that I have frequently failed, and got a slightly oblique instead of an exact antero-posterior grip of the head. It has always appeared to me, however, even in the cases in which I have failed to get the blades applied exactly as I wished, that I secured a better grasp of the head than if I had simply casually slipped in the instrument and trusted to the hold obtained. The locking of the blades is sometimes attended with a little difficulty, as the handles gape very widely. It is necessary to tighten the butterfly screw firmly.

The blades being locked, traction should now be made to see if the instrument is holding; this being considered satisfactory, it

Fig. 170.—Application of Blades of Forceps, with One Blade over the Face and the Other over the Occiput.

is advisable to place the patient in the Walcher position. The operator now sits upon the floor (Fig. 171). That I have found absolutely necessary if the full benefit of the axis-traction forceps in the Walcher position is to be obtained. He then pulls directly in the axis of the brim. One or two attempts at pulling the head past the obstruction is all that is permissible, and the amount of force that the operator exerts must not be extreme; it must not be more than can be exerted by his forearms. In the majority of cases, if one has carefully estimated the relative size of the head and the pelvis and conformed to all the conditions already laid down, the head will pass through. In flat pelvis it does so sometimes with a sudden jerk,

which, on the first occasion the sensation is experienced, may alarm the operator; but it is of no consequence, and simply means that the head has passed into the roomy part of the pelvis.

The forceps is now removed. To continue the extraction with it still in the antero-posterior diameter of the head would be a distinct error in technique, for one would then be dragging the longest diameter of the head through the narrowest diameter of the pelvis. The blades must, therefore, be reapplied in the ordinary way. I have

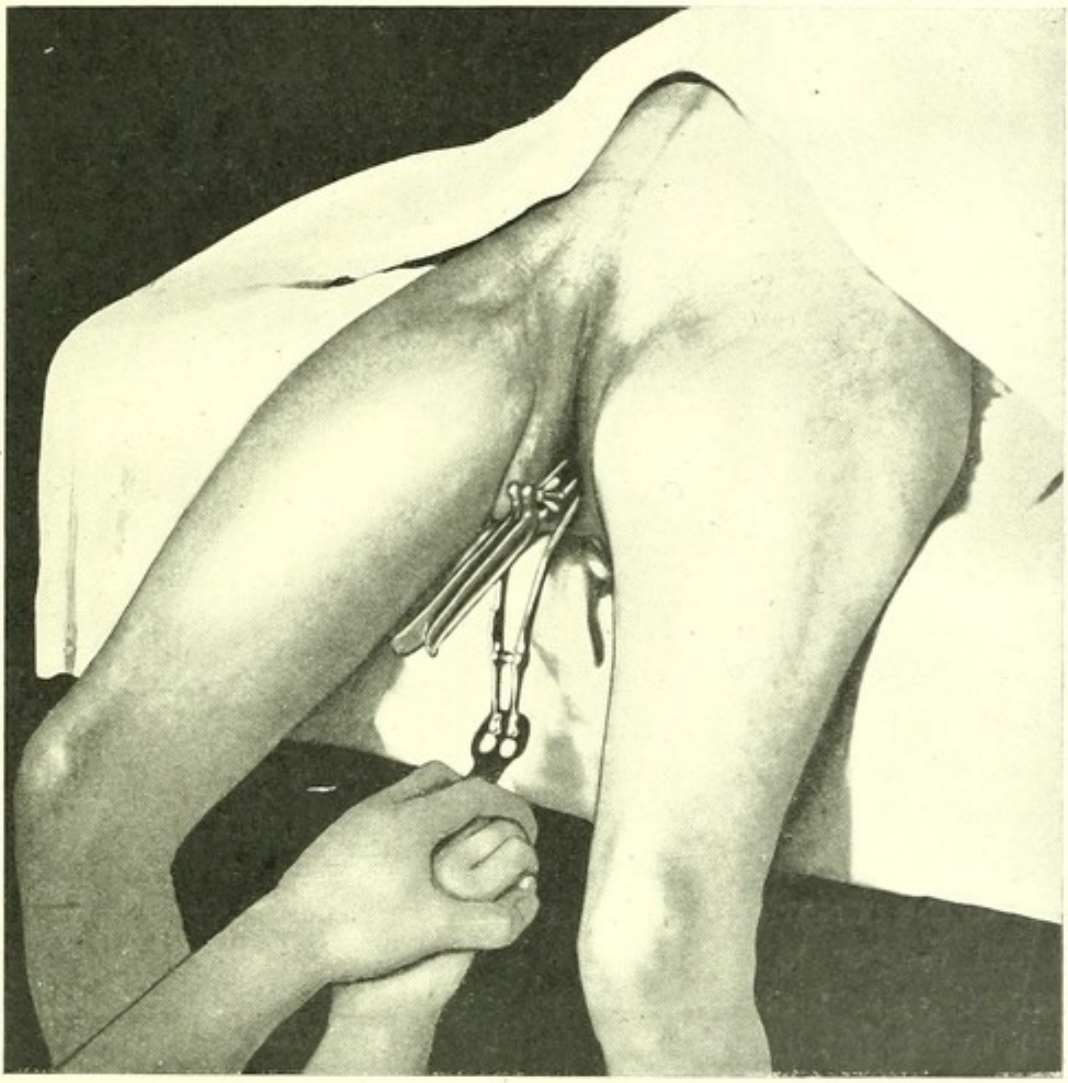


FIG. 171.—Axis-Traction Forceps with Head fixed at the Brim.
The patient is in the Walcher position, and the operator is sitting on the floor.

sometimes found that if I reapplied the blades immediately, I obtained the same grip of the head, for it had not rotated. It is, I think, better, therefore, after removing the blades, to stimulate the uterus to contract, to exert firm pressure upon the uterus when it does so, and to rotate the head into the conjugate diameter with the hand in the vagina before reapplying the instrument. Delivery is then completed in the ordinary way.

3. The Deliberate Application of the Blades Antero-Posteriorly as regards the Pelvis—One Blade in front of the Promontory and the Other behind the Symphysis.—This is the method employed by the old obstetricians, and careful instructions regarding such an application will be found in the writings of Baudelocque, Smellie, etc. At the present time it is still employed by a few obstetricians in France, but in all other countries it has been entirely abandoned, the previous methods described being preferred.

Several obstetricians—for example, Sloan, Reid, and Cameron of Glasgow, and Fry in America—have invented forceps the blades of which lie antero-posteriorly as regards the maternal pelvis. The object of such forms of antero-posterior forceps is, of course, to obtain a transverse grasp of the child's head. Here is an illustration of

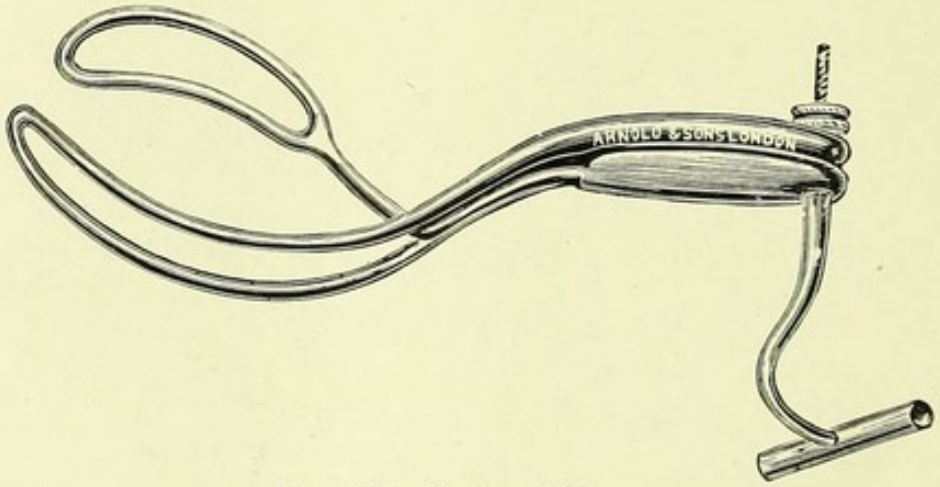


Fig. 172.—Cameron's Forceps.

Cameron's forceps (Fig. 172). It is at once evident, that the position of the blades antero-posteriorly must be a source of considerable danger to the parturient during extraction, and especially must there be great danger to the soft parts situated over the promontory. Antero-posterior forceps, therefore, has not been received with any favour, and is not likely to become more popular in the future.

An instrument somewhat similar in principle to Cameron's forceps, but much more complicated, is the prehenseur-levier-mensurateur of Farabœuf (Fig. 173).

Forceps in Generally Contracted Pelvis.—In suitable cases forceps is most useful. In this variety of pelvic deformity it must never be employed unless the head is well fixed at the brim and there is no overlapping. The presence of an unusually large caput may sometimes render it difficult to say how much of the head has really passed the brim, but by careful palpation along the brim one can always tell the relative size of head and pelvis. It must be

remembered, however, that a relatively less amount of disproportion can be overcome in a generally contracted pelvis than in a flat pelvis. In a generally contracted pelvis we have seen that the head engages in the oblique diameter of the pelvis and is very much flexed. The application of the blades is, as has been already described, for cases where the head is high in the cavity, except that the blades must be brought well forward, otherwise they are very apt to slip off. The Walcher position is of no advantage in the pure varieties of generally contracted pelvis.

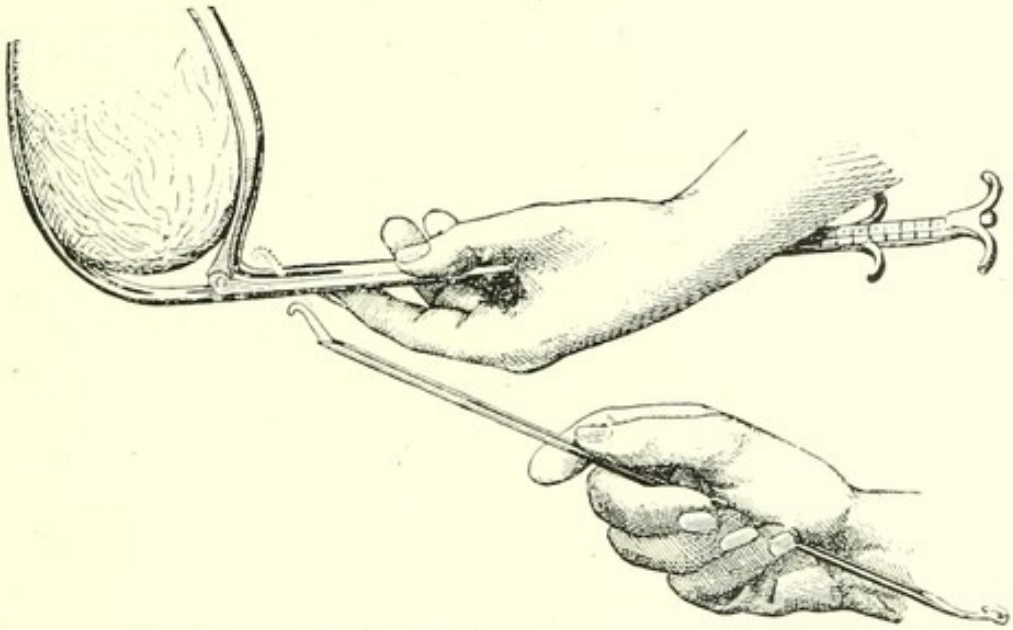


Fig. 173.—Prehenseur-levier-mensurateur. (Farabœuf.)

Maternal and Fœtal Mortality and Morbidity.—The maternal mortality in my cases was 1·4 per cent., which does not appear a very high figure. I would remark, however, that several of the fatal cases of craniotomy, which are mentioned in connexion with that operation, were really the result of injudicious use of forceps. The same remark also applies to the maternal morbidity, which works out at 20 per cent. That figure in no way represents the proportion of cases in which injuries to the parturient canal resulted from the injudicious use of forceps.

I have already said sufficient about the fœtal mortality (Chapter XII.). The morbidity also is very high; bruises and lacerations of the soft parts, indentations and fractures of the bones, and injuries to eyes, ears, nerves, are by no means uncommon. These injuries are considered in Chapter XXXVII.

CHAPTER XXV

THE ENLARGEMENT OF THE PELVIC CAPACITY—SYMPHYSIOTOMY, PUBIOTOMY, AND HEBOTOMY

Symphysiotomy.

History.—The operation of symphysiotomy now to be considered is one which has had a most chequered history. Although performed upon the dead as an alternative to post-mortem Cæsarean section by Claude de la Courvée in 1655, it is invariably associated with the name of Sigault, who suggested it in 1768, and performed it for the first time in 1777. The result of Sigault's operation was in the main satisfactory, for the child was born alive. The woman had previously given birth to four stillborn children. She suffered for the remainder of her life from a urinary fistula.[1]

In the succeeding years symphysiotomy was performed many times, as Baudelocque,[2] a strong opponent of it, wrote: 'It was performed more times in the space of four or five years than the Cæsarean operation had been in the course of twenty or thirty, or perhaps in half an age.' Its popularity was short-lived, however. In France it was soon entirely abandoned, although in Italy it lingered on, and was occasionally performed.

After an interval of about one hundred years interest was again aroused in it, and, as might be expected, Italy furnished the prime movers in the revival. The obstetrician most prominently associated with this revival was Morisani.[3]

Encouraged by Morisani's results, it soon met with the support of many distinguished obstetricians in other countries, chief amongst these being Pinard, Varnier, and Bar in France, and Zweifel in Germany. Little wonder, therefore, that in a few years symphysiotomy once again came to be the most burning question in obstetrics.

[1] Zweifel, 'Die Symphyseotomie,' 1893; and Fasbender, 'Geschichte der Geburtshülfe,' 1906.

[2] Heath's translation, vol. iii., p. 241.

[3] *Ann. de Gyn.*, tom. xxxvii., 1892.

In France and Germany during the last decade of the nineteenth century it was constantly being discussed, and at the International Medical Congress in 1894, and again in 1897, it was the principal subject under consideration in the Obstetrical Section. The operation never has aroused much interest in this country or in America. Valuable communications have been made by Herman,[1] Buist,[2] Jewett,[3] and others, but there have been no enthusiastic partisans, as in France and Germany. In some respects this is fortunate.

A year or two ago it appeared as if history were going to repeat itself, and the operation were again to be forgotten. Quite suddenly, however, interest was aroused by the introduction by Van der Velde and Gigli of pubiotomy.

What will be the ultimate place of symphysiotomy amongst obstetric operations it is impossible to predict. Many of us would consider it a misfortune if, as Sinclair recommends, 'it were banished from our hospitals.'[4] Personally, I believe the operation fills a most useful place in practice, and that is the opinion of many others, and if every one would deliberately struggle against taking up an extreme position with regard to the operation, that place could be more exactly determined.

General Considerations.—The object of the operation of symphysiotomy is to enlarge the pelvic capacity, so that a living child may be delivered without any great difficulty *per vias naturales*. Its indication, therefore, is a certain degree of pelvic deformity; the exact degree we shall consider later. In the Glasgow Maternity Hospital we have not practised the operation in persistent mento-posterior positions of the face nor in brow presentations, and I agree with those who condemn the operation for such conditions, and limit it to cases of dystocia caused by pelvic deformity.

As a result of division of the symphysis all the pelvic diameters are increased. Formerly it was thought that this occurred by a simple rotation of the bones outwards; it is now known, however, that the innominate bones, when separated, rotate, not only outwards, but downwards, for the sacro-iliac joints—the hinges, if we compare the innominate bones to two folding doors—do not lie parallel to the divided ends of the pubic joint. All recent writers have referred to this, and the general opinion is that with 3 centimetres of pubic separation there is a descent of 2 centimetres. The most valuable paper on this subject in the English language is by Sandstein,[5] who

[1] Trans. Lond. Obst. Soc., 1900, vol. xlii., 1900, p. 282.
[2] Trans. Edin. Obst. Soc., vol. xxvii., p. 112.
[3] *Amer. Journ. Obst.*, vol. xliv., 1901. [4] *Lancet*, January 19, 1901.
[5] Trans. Edin. Obst. Soc., 1902 p. 68.

made careful measurements of the pelves of twenty-eight female cadavers upon whom he performed symphysiotomy. Sandstein believes that the increase of the pelvic capacity results more from the movement downwards than from the rotation outwards.

As regards the amount of gain in the conjugata vera, Sandstein says: 'Roughly speaking, 6 centimetres (2·34 inches) of pubic separation gives an increase of 1 centimetre (0·39 inch). Morisani found with 6 centimetres separation a gain of 1·3 to 1·5 centimetres.' Jewett[1] writes: 'With a pubic separation of 7 centimetres the total gain in the antero-posterior diameter is about 1·3 centimetres; in the transverse the gain is 1·5 centimetres; and in the oblique about twice as much as in the conjugate.' Döderlein, from his experiments,[2] states that he found the pelvic ring increase from 105 qcm. to 155 qcm., with 6 centimetres of separation (the conjugata vera was 10·2 centimetres). Wehle[3] considers that with a separation of 6 centimetres there is an increase of 1·2 centimetres, and with a separation of 7 centimetres an increase of 1·5 centimetres.

Generally speaking, these different observers are pretty well agreed as regards the amount of separation necessary to obtain a gain of 1 centimetre in the conjugata vera. Curiously enough, however, Farabœuf and Sandstein arrived at exactly opposite conclusions when the initial size of the pelvis is considered, for Farabœuf found that the larger the pelvis the less was the increase, while Sandstein states 'The larger the true conjugate, the greater the increase for each centimetre of separation.' In this matter I attach more importance to Farabœuf's results, for Sandstein seems to have experimented only upon cases where the pelvis was normal. He says, 'The conjugata vera averaged 11·28 centimetres' (4·5 inches).

But there is another factor besides the increase of the pelvic capacity which favours the passage of the head after symphysiotomy, and, with the exception of Sandstein, all writers are agreed regarding its importance. It is the bulging of the anterior parietal bone into the gap between the separated pubic bones. In certain cases of obliquely deformed pelvis this cannot occur; but such cases are not common.

[1] 'Practice of Obstetrics,' 1902, p. 747.

[2] *Cent. f. Gyn.*, 1893, No. 23, p. 490.

[3] *Arbeit. aus der Königlichen Frauenklinik* in Dresden, 1892, vol. i., p. 374.

Conditions which must be Fulfilled before the Operation is Contemplated.

Before the operation of symphysiotomy is contemplated the following conditions must be fulfilled :

1. The child must be alive.
2. The pelvis must be of sufficient size, and there must not be too great a disproportion between it and the fœtal head.
3. The passage must be well dilated.
4. The parturient canal must not be infected.

1. The Child must be Alive.—Not only must the child be alive, but the fœtal heart sounds should be regular, strong, and of normal frequency. To subject a woman whose child's vitality is already very decidedly impaired to the risks of symphysiotomy serves no purpose, for the child will very probably not be saved, and the mother's life will be much more endangered than if one performed craniotomy. If the pelvic deformity is such as to permit of symphysiotomy, craniotomy can be carried out with the greatest ease, and with little risk to the patient's life or her future comfort and health. Consequently, it is clearly the operation which should be chosen. Some obstetricians refuse to perforate a living child under any circumstances, but I have no sympathy with such an extreme attitude. As I shall explain in connexion with craniotomy, it is occasionally better for the individual, the family, and the State to perforate a living child, especially if its life has been decidedly endangered.

In difficult craniotomies it has been suggested that the delivery of the child might be facilitated by performing symphysiotomy. Although such a procedure is extremely undesirable, it is conceivable that an operator might be justified in having recourse to it. Suppose, for example, the accoucheur performs craniotomy and cannot get the child extracted; such a misfortune might happen if he had not appreciated the real extent of the pelvic deformity. The operator in such a plight, with a perforated child he cannot extract, has nothing left but to perform symphysiotomy or Cæsarean section, and I can quite understand that he might prefer symphysiotomy. Before adopting such a course, however, he must make very sure that the pelvic capacity is such as to allow the perforated head to pass. Some time ago I read of a case in point where the accoucheur, after performing craniotomy and symphysiotomy, had finally to have recourse to Cæsarean section.

Here, also, let me say that it is undesirable to combine symphysi-

otomy with induction of premature labour, as has been once or twice suggested. If the premature infant cannot be extracted with forceps, it is injudicious to subject the mother to the risks of symphysiotomy for the sake of a premature child, which, even under the most favourable conditions, has but a feeble hold of life.

2. **The Pelvis must be of Sufficient Size, and there must not be too great a Disproportion between it and the Fœtal Head.**—In discussing this most important matter, let me first of all indicate the extreme limit of pelvic deformity at which the operation may be performed with safety. Personally, I believe this to be 3 inches (7·5 centimetres), unless the fœtal head is abnormally small. Pinard,[1] Bar,[2] Zweifel, Jewett, Herman, and Buist, are practically of the same opinion. All of them admit that a slightly lower figure than 3 inches (7·5 centimetres) need not necessarily contra-indicate the operation, but in their recorded cases, with few exceptions, that has been the figure. In the cases in the Glasgow Maternity Hospital the operation was performed on two occasions with a vera of $2\frac{3}{4}$ inches (6·8 centimetres), and in both there was considerable laceration of the soft parts. In none of our recent cases has the vera been less than 3 inches (7·5 centimetres). My colleagues and I have come, therefore, to the same conclusions regarding the lowest limit of pelvic deformity at which symphysiotomy is advisable as our British and Continental confrères.

With regard to the upper limit, however, no definite figure can be stated, for it entirely depends upon the size and position of the child's head relative to the pelvis and the favour in which forceps is held by the operator.

I have already stated, when considering forceps delivery, that with a vera of 3 inches (7·5 centimetres) the fœtal mortality in the Glasgow Maternity Hospital with forceps was 46 per cent. This mortality, I said, was so high that I did not consider one was justified in trying to deliver with forceps alone. But, while I make such a statement with all confidence, I cannot, unfortunately, make the other—that symphysiotomy should always be employed with a conjugata vera of 3 inches (7·5 centimetres), for the operation may be a wise or a foolish choice in that degree of pelvic deformity. What must decide the question is the disproportion between the head and the pelvis. If this is pronounced, Cæsarean section is indicated; if, on the other hand, the disproportion is not very marked, then symphysiotomy may be chosen.

Where the pelvis is a little larger than 3 inches (7·5 centimetres),

[1] *Ann. de Gyn.*, 1896, 1897, 1899.

[2] 'Leçons de Pathologie Obstétrical,' 1900.

I do not believe that, in a particular case, one can decide before labour that symphysiotomy is the correct operation. One may go the length of thinking it probable that the operation may ultimately be necessary; but one cannot be certain, for in such cases labour may terminate spontaneously or be easily completed by forceps. If an operator says to me before or early in labour 'This is a case for symphysiotomy,' I invariably think that he does not quite appreciate the refinements in the choice of operation for pelvic deformity; and, secondly, that if, on account of the extent of the pelvic deformity, he has come to the conclusion that symphysiotomy is necessary, it would probably be better to choose Cæsarean section.

As far as I have been able to judge, symphysiotomy is justifiable—I would even say indicated—when, after the second stage has been allowed to go on as long as possible, and after two attempts at moderate traction, with the patient in the Walcher position should the pelvis be flat, it is found that forceps just fails to bring the child down through the pelvis. The pelvis may be 3¼ inches (8·1 centimetres), or even 3½ inches (8·7 centimetres), but that should in no way influence the choice. It is, therefore, apparent that I would limit symphysiotomy to a very few cases. As illustrating this, I may mention that while I have performed Cæsarean section over fifty times, I have only chosen symphysiotomy upon nine occasions.

I am perfectly well aware that, although Olshausen, Schauta, Jewett, and English operators generally, favour a trial with forceps, many, and amongst them the most distinguished symphysiotomists, are opposed to such practice. Personally, I cannot conceive how it is possible to avoid doing symphysiotomy unnecessarily in certain cases if forceps are not tried. On several occasions I have had under my care a patient, the size of whose pelvis and the head of whose fœtus were most carefully estimated, prepared for possible symphysiotomy, and yet I have delivered her with no great difficulty of a healthy living child with forceps. Again, let me repeat, the obstetrician of experience can always say if a head will pass through a pelvis after symphysiotomy, but he cannot always say that it will not pass with a little assistance from forceps. Naturally, those who only employ forceps after the head has passed the contracted brim, employ symphysiotomy much more frequently than I do. While I am quite prepared to admit that up till a few years ago I have delivered with forceps when I should have performed symphysiotomy, I am equally certain that they have had recourse to symphysiotomy upon many occasions when I would have succeeded with forceps alone.

3. **The Parturient Canal must be well Dilated.**—It is perfectly obvious that the os must be fully dilated if one intends extracting the

child immediately after dividing the symphysis—the procedure most favoured. We shall have to return, however, to this subject later, when considering the extraction of the child. But not only must the cervix be fully dilated : the vaginal canal must also be sufficiently relaxed. In multiparæ this invariably exists. But in primiparæ it is quite otherwise, so much so that many operators, including myself, are very loath to perform symphysiotomy upon a primipara. Amongst my cases in the Maternity Hospital, both the examples of severe lacerations to vagina, vestibule, and urethra occurred in primiparæ This was not because the disproportion between head and pelvis was greater in them than in the multiparæ, but simply because the soft parts had not been previously stretched. When the ends of the symphysis are separated, and the support of the anterior pelvic wall is removed, the vagina and parts about the vestibule are very liable to be torn or burst during the extraction of the child. But, although all operators emphasize the special danger to primiparæ, few make it a *sine qua non* that the patient must have already borne children.

To overcome the danger from an undilated vaginal canal in primiparæ, a large colpeurynter may be inserted into the vagina. Bar and others speak very highly of the benefit to be derived from this procedure. Traction may be made upon the colpeurynter either by pulling upon it from time to time or by attaching a weight to the end of it. In the case of primiparæ, deep incisions into the lower part of the vaginal wall and the perineum prevent lacerations of the vestibule and vagina, and may be had recourse to if the vulvar orifice is very narrow.

Some operators have recommended the performance of the operation early in labour. That is a mistake, as one cannot always tell beforehand that a head will not mould sufficiently to pass the brim without division of the symphysis.

4. **The Parturient Canal must not be Infected.**—If the patient has been infected, or has been presumably infected, by those in attendance, it is undesirable to subject her to the risk of symphysiotomy — especially as in most cases when the canal is infected several attempts at delivery with forceps have been made, and the child's vitality has been distinctly reduced. This, of course, as already indicated, does not apply to failure to deliver with forceps, carefully employed. What I am opposed to is subjecting a woman probably infected to the dangers of symphysiotomy when the child has already been much injured and it is very questionable if it will survive. Naturally, the only alternative in such cases is craniotomy.

Anatomy of the Parts concerned in Symphysiotomy and Pubiotomy.

Before proceeding to discuss the surgical procedure in symphysiotomy, a knowledge of the anatomy of the parts is necessary. The articulation between the pubic bones is an amphiarthrodial joint formed by the juncture of the two oval articular surfaces of the ossa pubis. This joint consists of a disc of fibro-cartilage connecting

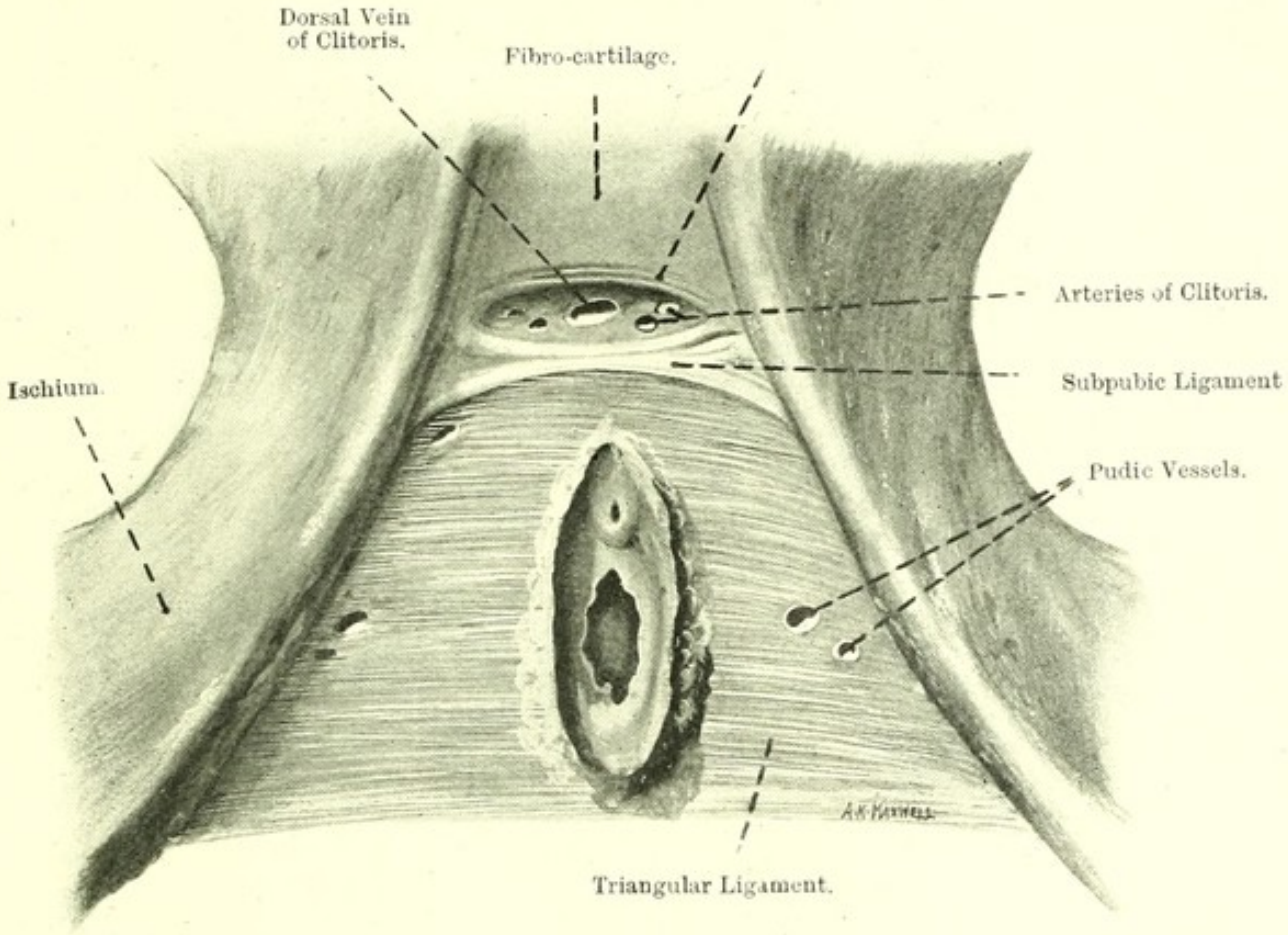


FIG. 174.—Dissection to show Anatomy of the Symphysis Pubis.

the surfaces of the pubic bones in front, and contains a cavity in its centre, caused by the absorption of the fibro-cartilage, and is lined by synovial membrane.

Each pubic symphysis is covered by a thin layer of hyaline cartilage, which is connected to the bone by a series of nipple-like processes. This cartilage may catch the knife of the unskilled operator, although there is, in reality, ample room; hence, presumably, is the reason of incorrect statements concerning bony ankylosis and the difficulties they may cause in the operation of dividing the joint.

The stability of the symphysis depends less on this fibro-cartilage than on the fibrous investment which it receives from the anterior, posterior, superior and inferior pubic ligaments. The ligament of greatest importance, anatomically and surgically, is the inferior

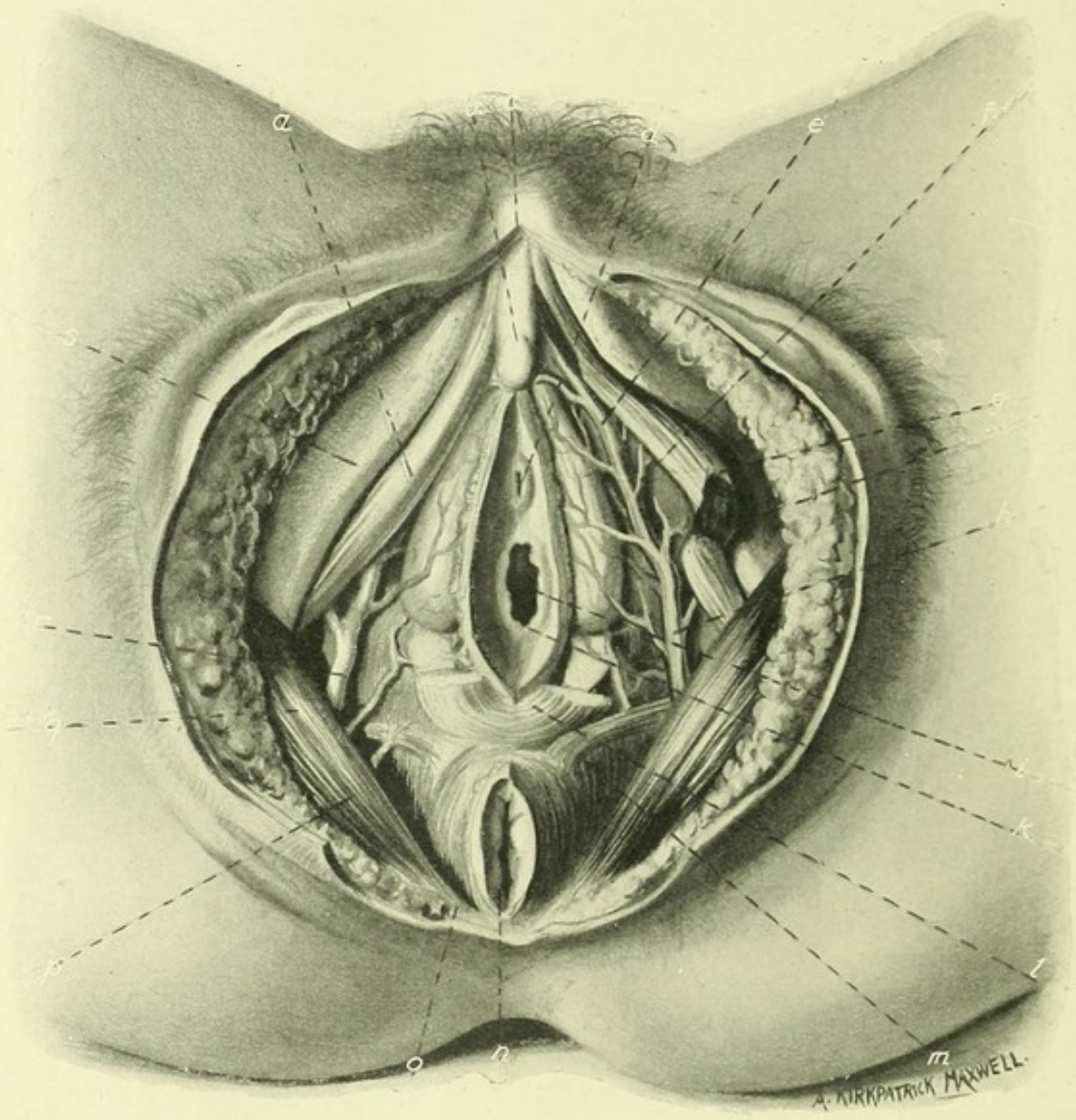


FIG. 175.—Deep Dissection of Female Perineum to show Structures likely to be injured in the Operations of Symphysiotomy and Pubiotomy.

a, Crus clitoridis ; *b*, clitoris ; *c*, suspensory ligament of clitoris ; *d*, meatus urinarius ; *e*, artery to clitoris ; *f*, artery to crus clitoridis ; *g*, left crus divided and retracted to show *f* ; *h*, internal pudic artery ; *i*, vagina ; *l*, sphincter vaginæ ; *m*, levator ani ; *n*, anus ; *o*, sphincter ani ; *p*, border of gluteus maximus ; *q*, artery to bulb ; *r*, internal pudic artery more superficial than *h* ; *s*, ischium.

or subpubic ligament (Fig. 174). This ligament is of considerable thickness and strength. It forms the upper boundary of the pubic arch, and is attached above to the interpubic disc and laterally to

the adjacent sides of the descending rami of the pubes. Its lower border is free, and is separated from the triangular ligament by a transverse oval interval, through which the dorsal vein of the clitoris passes backwards to the interior of the pelvis.

The arterial supply to the structures of importance in the operation of symphysiotomy is derived chiefly from the internal pudic artery. The obturator and deep epigastric arteries send small twigs to the thickened periosteum of the symphysis pubis.

Each crus clitoridis receives a branch from the internal pudic

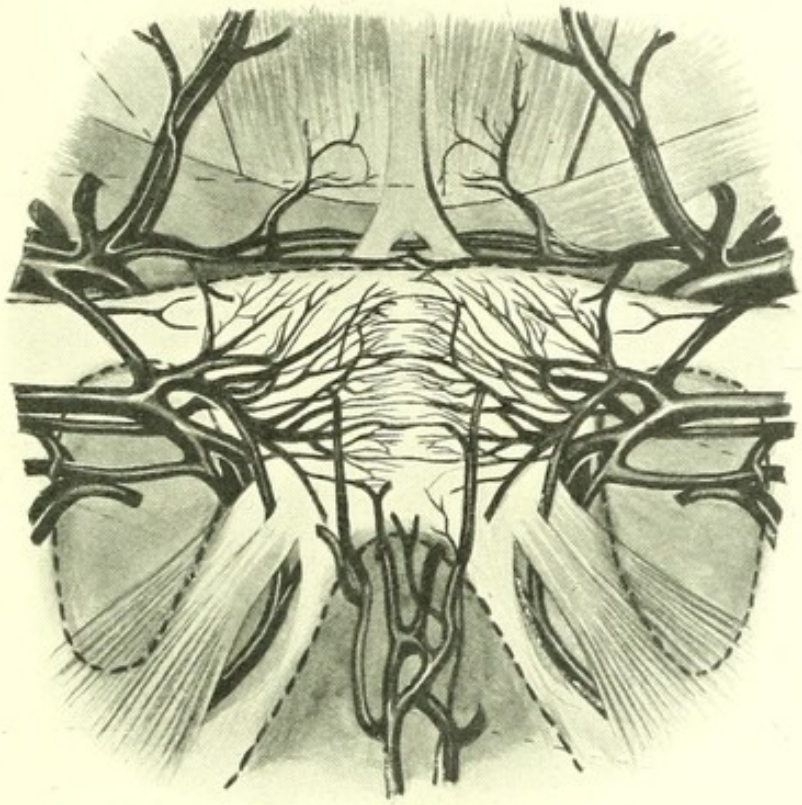


Fig. 176.—Symphysis Pubis from Behind, to show Main Trunks forming Venous Plexus. (Farabœuf.)

artery, while the glans clitoridis is supplied by its terminal branches (dorsal arteries of the clitoris—Fig. 175).

The main source of bleeding, on which much stress is laid by some operators, is venous, chiefly from tearing of the loose unsupported plexus of veins which surrounds the upper part of urethra and neck of bladder—viz., the *inferior vesical plexus* (Figs. 176 and 177). The dorsal vein of the clitoris in its course backwards to the inferior vesical plexus is apt to cause trouble when the clitoris is detached, if the vessel has not been previously clamped.

Another source of hæmorrhage, upon which little stress has been laid, is tearing of the bulbus vestibuli and roof of vagina. The *bulbus vestibuli* is composed of minute convoluted bloodvessels held together

by a very small amount of connective tissue—a particularly difficult tissue in which to check hæmorrhage. Its arterial supply is derived on each side from a branch (arteria bulba vestibuli) of the internal pudic. The bleeding from tearing of the *bulba vaginæ* is mainly venous, arising from rupture of the large veins of the vaginal plexuses, which, in sympathy with the general increased calibre of vessels during pregnancy, have become enormously dilated and tortuous.

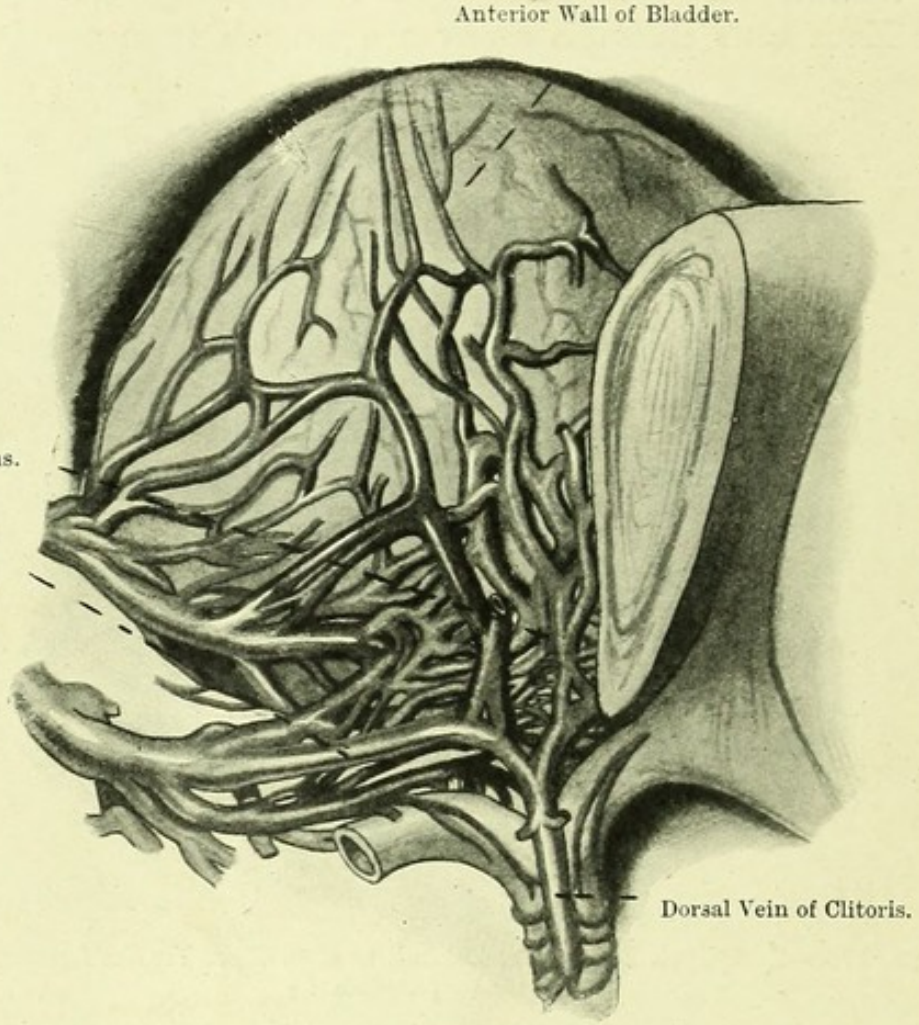


Fig. 177.—One Half of Symphysis Pubis removed to show Bladder and Venous Plexus. (Farabœuf).

Methods of Operating.—Having briefly described the anatomy, we must now turn to the different methods of performing the operation of symphysiotomy. The woman being anæsthetized, the pubes shaved, and the parts about the vulva thoroughly cleansed, the pelvis should be brought to the edge of the operating table or couch, and the legs supported by two assistants. Zweifel allows the legs to hang down, and if the accoucheur is short of assistants it is all right, for in that position the pubic bones will not spring so widely apart as they would do if the legs lay abducted.

As regards the actual method of performing the operation, there are certain differences in detail in different countries. Let me take the French method first—the method perfected by Farabœuf, and without doubt the most exact.

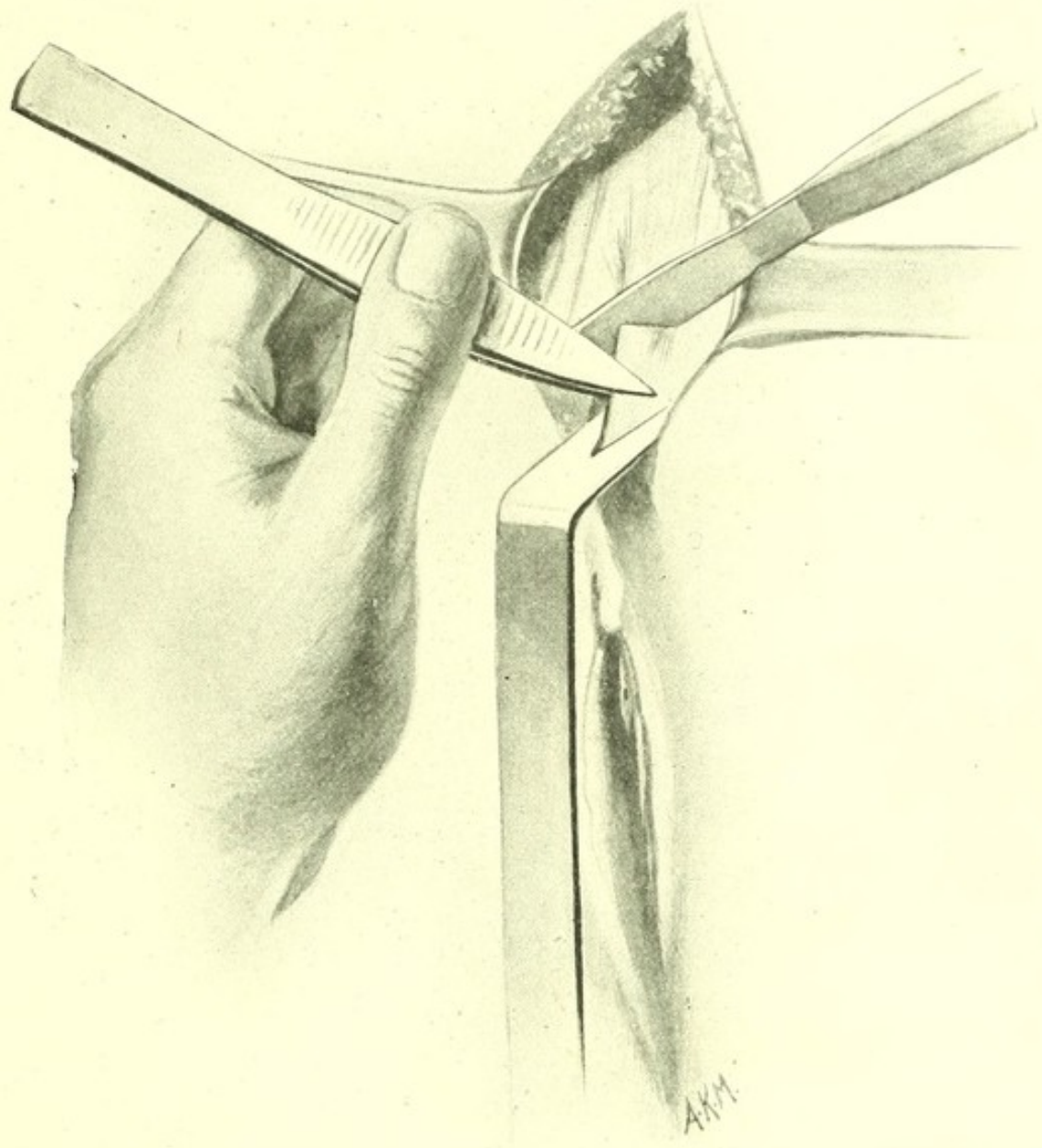


Fig. 178.—Division of Suspensory Ligament of Clitoris. (Farabœuf.)

An incision is made over the symphysis of about 3 inches (7·5 centimetres) in length, and extending from about 1½ inches above the pubis to the line which the operator has made with tincture of iodine to mark off the lower limit of the triangular ligament. Should the clitoris be placed higher than usual, a 'lambda' incision is made

round it. The clitoris must then be pulled downwards, and its suspensory ligament divided (Fig. 178), all bleeding being suitably controlled. This being done, the lower margin of the triangular ligament is defined. The operator now turns to the upper part of the wound, and makes a longitudinal incision through the linea alba (Fig. 179). It is desirable to keep the incision longitudinal, but if it is not possible

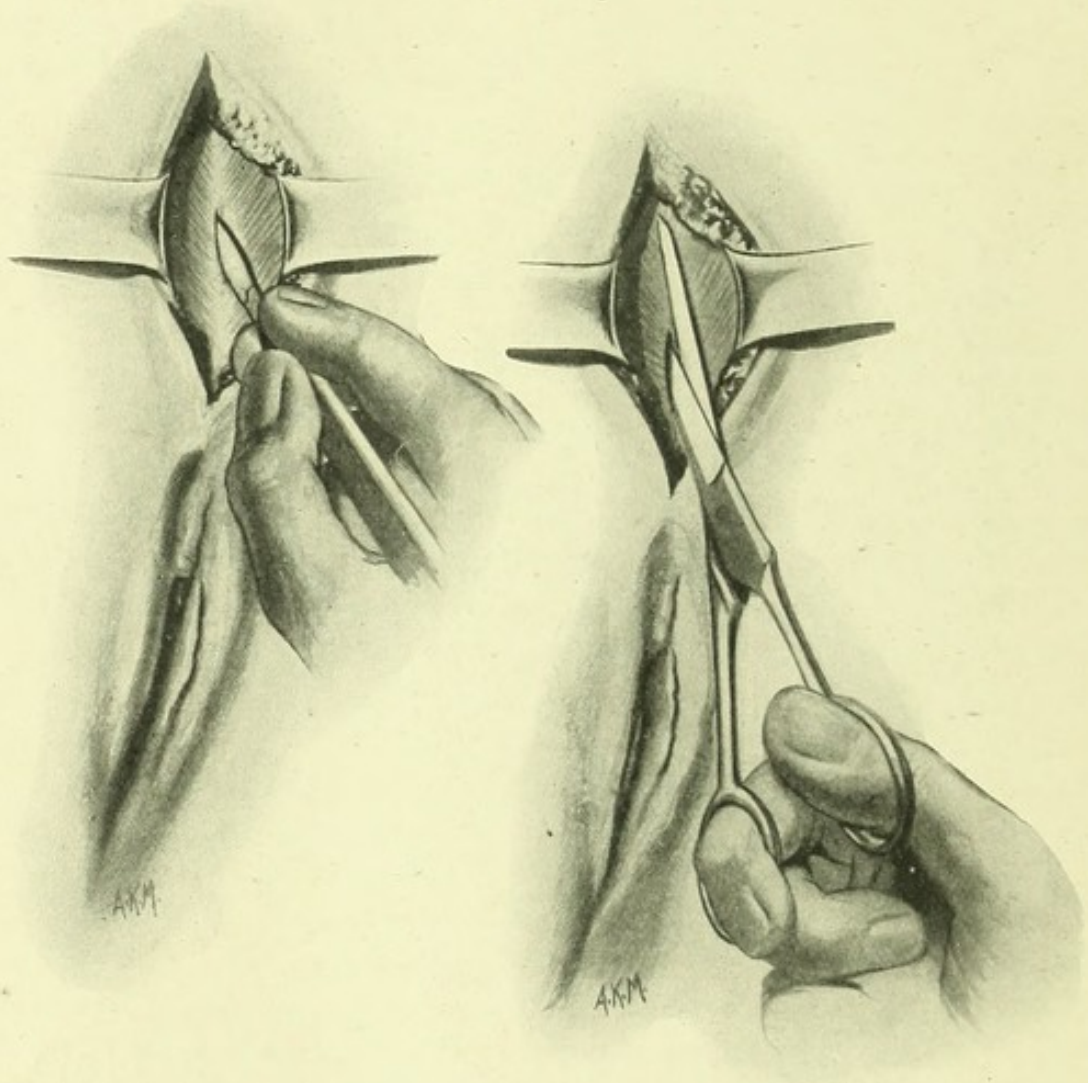


Fig. 179.—Stages in the Division of Recti Abdominis. (Farabœuf.)

The skin has already been divided, and is held apart by retractors.

to get the fingers in through the opening, the assistant should flex the legs, and the operator make slight cuts laterally. A finger and then a grooved director (Fig. 180) is pushed behind the pubes into the so-called space of Reitzius, between the bladder and the posterior surface of the pubic bones. Having done this, the director is withdrawn and introduced under the triangular ligament from below

upwards. The operator then cuts upon the director from behind forwards with the point of a short-bladed knife (Fig. 180).

In recent years the operation has been much simplified, and the

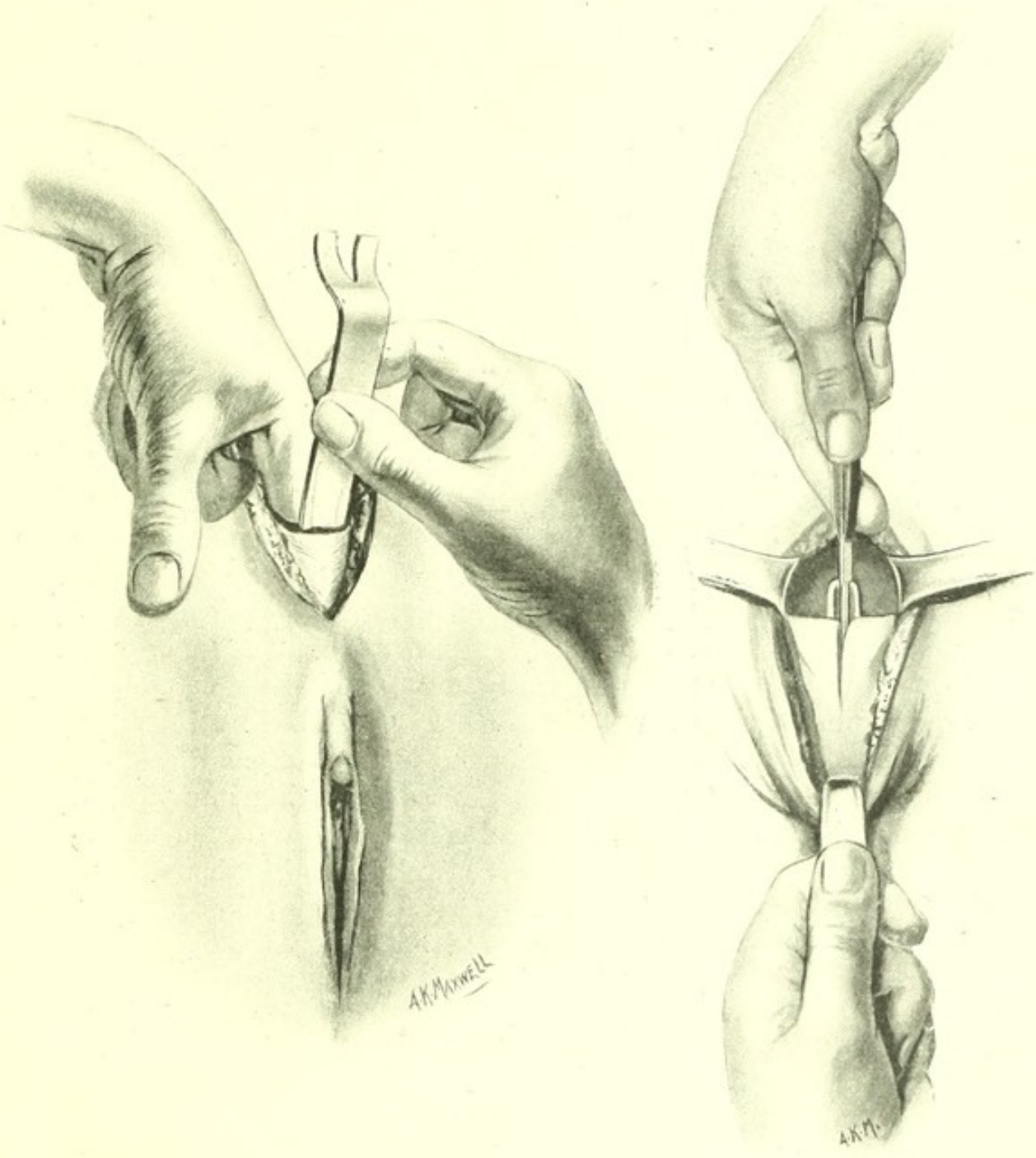


Fig. 180.—Division of Symphysis Pubis. (Farabœuf.)

following is the method I have always employed: Having made an incision over the symphysis pubis, and pushed my finger down behind the joint as already described, I divide the joint from before backwards and above downwards with a strong small-bladed bistoury. I

then divide the triangular ligament, keeping well to the left side. I do not believe there is much danger to the urethra at this stage; the real danger to the urethra is during the extraction of the child. Consequently, I do not introduce a sound into the bladder and drag the urethra over towards the other side.

Morisani, and Italian operators in general, make a small incision, longitudinal or transverse, above the symphysis, then push the forefinger down behind the pubic joint, and divide the latter from behind forwards and from below upwards with a special curved knife. There are various forms devised by Galbiati, Spinelli, Novi, etc.

Zweifel, the great advocate of the operation in Germany, operates in very much the same manner as the Italians. After a transverse or longitudinal incision over the pubes, he passes his forefinger behind the joint. If there is any difficulty in defining the joint, an assistant moves the leg. With a probe-pointed knife the joint is divided from behind forwards. The triangular ligament is then exposed, and carefully divided from above downwards. Any danger of injuring the urethra is avoided by directing the urethra over to the right with a sound in the bladder.

Immediately after the division of the joint and of the triangular ligament, but only then, the pubic bones spring apart. Only once have I had any difficulty in dividing the joint, and that was when it was irregularly formed. Such is the experience of all other operators. Ankylosis of the joint is practically unknown. Zweifel, Morisani, Bar, and Pinard are all of that opinion. Irregularities in direction are not infrequent, and sometimes trouble arises from the operator not noting the exact position of the joint and cutting into the fibrocartilage. A condition which has occasionally prevented a sufficient separation of the pubic bones is an ankylosis of the sacro-iliac joint. It is quite unnecessary, therefore, to employ any instrument to forcibly separate the pubic joint; that can be done by those in charge abducting the legs according to the instructions of the operator.

After complete division of the symphysis pubis, an important point for consideration now arises: Should the child be extracted with forceps immediately after the division of the symphysis, or should time be given the natural forces to bring about the expulsion? Just as might be expected, seeing that a good deal can be said for both courses, each has its supporters. Morisani, Zweifel, and Döderlein are in favour of waiting; Bar, Pinard, and operators in this country are not in favour of delaying too long. Bar, for example, delivered all his cases, except three, artificially. In the Glasgow Maternity Hospital the delivery has always been completed with forceps. Without doubt,

artificial delivery increases the risks of laceration of the soft parts; but if the patient is a multipara, or if a primipara has had the vagina stretched or incised beforehand, careful extraction should not be followed by much injury to vagina or urethra.

If the case is left to Nature, a temporary dressing is put over the wound, and a bandage applied round the pelvis so as to support it. If such a course is followed delay in expulsion of the head is not infrequent. If not caused by simple uterine inertia, it is generally the result of the head continuing to lie with its long axis in the transverse diameter of the pelvis. This arises from widening of the pelvis and lessening of the resistance of the pelvic floor.

If artificial extraction is proceeded with, the blades of the forceps are carefully applied and slow and steady traction made. When previous attempts to deliver with forceps have been made, it is advisable to leave the instrument loosely applied to the head while the symphysis is divided.

The pelvis during extraction must be supported. This is best done by an assistant on either side holding the leg in one hand and pressing on the trochanter with the other. Should the operator have insufficient assistance, a binder should be applied round the pelvis and the legs allowed to hang down. It is very important that the pelvis should be properly supported, and that the amount of separation should be controlled; and, not only that, but the separation should be equal, otherwise there will be a greater strain thrown upon one sacro-iliac joint than upon the other.

In the Glasgow Maternity Hospital we have very generally placed the patient in the Walcher position, and without any harm resulting. Some operators, however, are opposed to such a procedure, for they believe that if there is any difficulty in extracting the child the danger of injuring the sacro-iliac joints will be increased.

It is, I take it, quite unnecessary to discuss another method of delivery—viz., version—for almost no one is in favour of it in this country. Several French operators, however, recommend it. Bar discusses the method, and, although his results are quite as good with it as with forceps, he gives it very little support. Bumm is also opposed to it.

After the delivery of the child there is sometimes fairly free bleeding, which should be controlled by packing some gauze down behind the pubes and pressing down the uterus from above. It is futile to try and catch the bleeding-points.

The third stage should be managed in the same way as in a normal labour. If desired, a temporary binder may be applied round the pelvis. Some prefer to give five or seven minutes for placental

separation, and then express or remove the placenta manually, but that, as I have said, is not so sound treatment.

There now remains only the stitching of the wound to complete the operation. Before describing this, however, there is one question which must be considered, and that is, Should the utero-vesical pouch be drained? Without doubt, in many cases, blood collects there, and, not obtaining a free exit, is a source of danger should it become infected. Zweifel is a strong advocate of draining; Pinard also approves of it, but Bar looks upon it unfavourably. Abdominal drainage is unsatisfactory. I have found Zweifel's suggestion[1] of draining through an opening in the left labium minor very useful. I employ a loose packing of gauze and push it well down behind the joint; the end of the gauze I pull out through an opening in the left labium. If, however, there happens to be any wound into the vagina, I drain through it.

In closing the joint, pegging or wiring the bones is quite unnecessary; stitching of the wound as shown (Fig. 181) is all that is required to obtain satisfactory union. Personally, I employ three chromicized catgut sutures for the periosteum, ordinary catgut for the fascia, and silkworm for the skin. Before introducing the sutures, the edges of the pubic bones must be brought exactly together, and for holding them together the forceps of Farabœuf (Fig. 181) are very useful. Failing that instrument, a strong, single-pronged vulsellum forceps may be employed. I find, however, that no special instrument is necessary if the edges of the bones are brought well together by the assistants. The stitching is very simple. In bringing the edges together, care must be taken that the bladder and gauze packing, which is left in to drain the vesical pouch, are not caught between them. On one occasion the latter accident happened to me, and I had great difficulty in getting the gauze out of the wound.

Should post-partum hæmorrhage occur from the uterus, it is to be treated by the ordinary means; personally, I have never required to pack the uterus, having always found that ergot and hot douching controlled the bleeding.

The after-treatment of cases of symphysiotomy is exceedingly troublesome; indeed, that to my mind is the great objection to the operation. The following is the method employed in the Glasgow Maternity Hospital: A simple dressing is applied over the wound, and kept in position by bands of adhesive plaster which are applied right round the pelvis. A large pad of absorbent cotton is then placed over the part, and a firm binder applied round the pelvis. The patient

[1] *Cent. f. Gyn.*, 1902, No. 13, p. 321.

is then put to bed, and two long sand-bags are placed and maintained in position against the pelvis and thighs.

In order to facilitate the sponging of the vulva and the toilet of bowel and bladder, the charge Sister of the hospital devised a mattress which consists of three portions, the middle part being a narrow strip which can be easily slipped out. This allows the nurse to reach the parts very conveniently without disturbing the patient.

The gauze drain in the vesical pouch is removed in twenty-four hours, and replaced or not as is deemed advisable. The bowels are moved on the third day, and then every second day. The stitches are

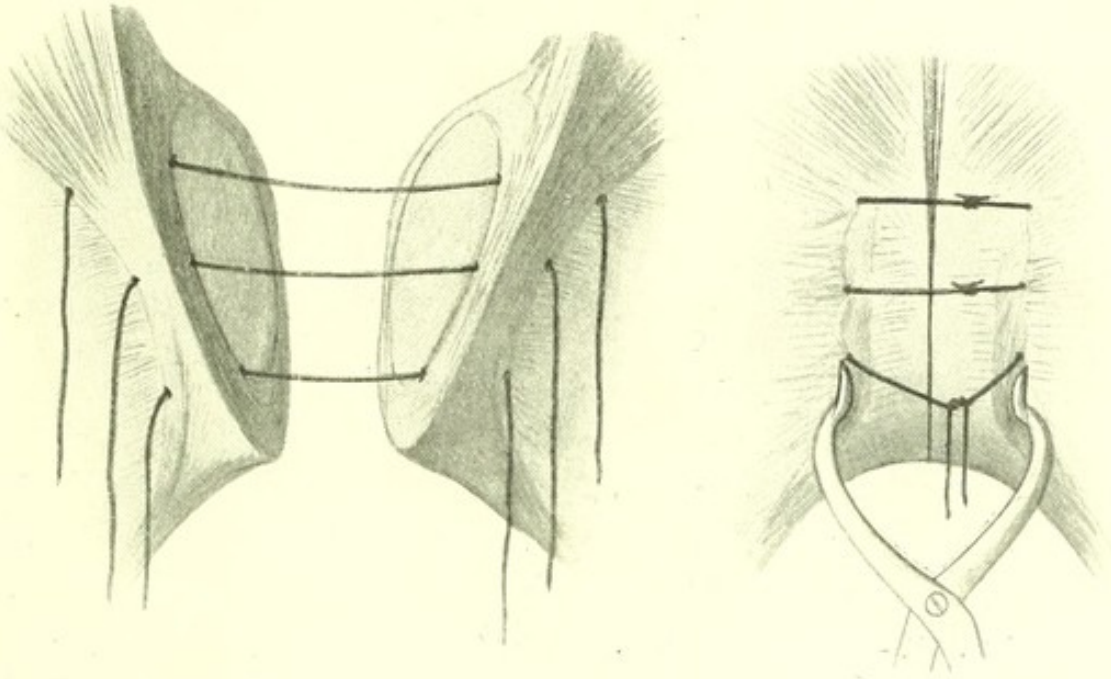


Fig. 181.—Uniting divided Symphysis.

Figure on the right shows Farabœuf's forceps for coapting the severed joint. (Farabœuf.)

removed on the twelfth day, and the patient is allowed up about the twenty-fourth day.

I need hardly say that, should any lacerations occur to the soft parts as the result of the operation, these should be carefully repaired. Any tearing of the vagina should be stitched, and, above all, one should make sure that every care is taken in making good any injury to the urethra.

The Subcutaneous Method of Performing the Operation.—As an alternative to the methods of performing symphysiotomy already described, several operators have recommended subcutaneous division of the symphysis. The Americans, and I think with right, claim this as their method, for undoubtedly Ayres deserves the credit of having

brought it prominently forward. In England Herman and Buist have each detailed series of cases in which the operation was easily and successfully carried out.

Ayres'[1] method is described by Edgar[2] as follows:

'The left index finger is introduced within the vagina, and held against the posterior aspect of the joint (Fig. 182). A narrow tenotomy knife is then passed up to a point within ½ inch of the summit of the joint beneath the overlying soft tissues. A probe-pointed bistoury is then substituted for the tenotomy knife, and carried to the top of the joint, where it meets the index finger; it is then carried downwards through the joint until the latter is felt by the index finger behind to give way. An assistant now presses a small gauze

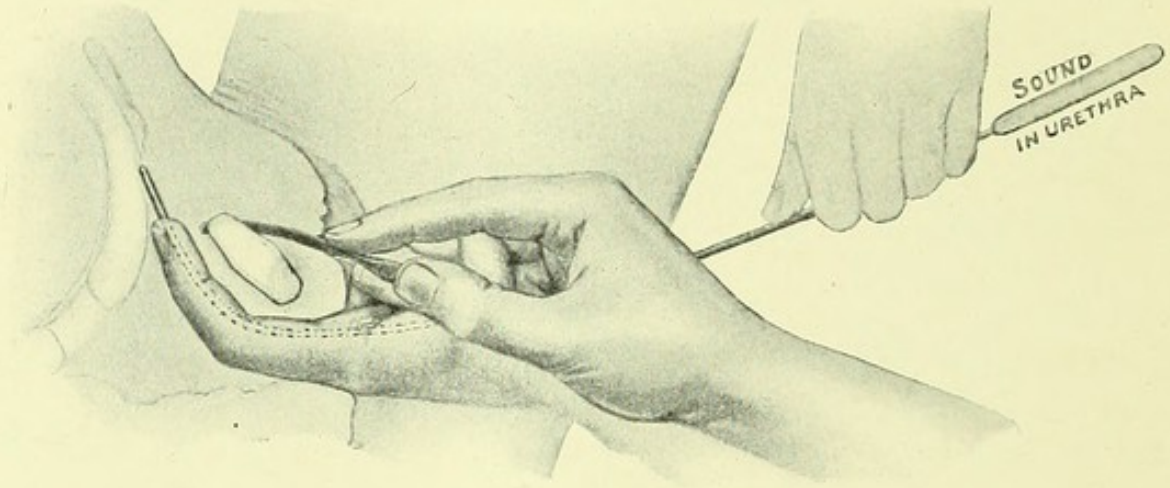


Fig. 182.—Subcutaneous Symphysiotomy—Ayres' Method. (Edgar.)

compress against the incision beneath the clitoris. If possible, the child is then delivered with forceps.'

Herman's method[3] is even simpler: 'Take the tenotomy knife and press its point through the mucous membrane opposite the middle of the symphysis pubis. It will easily penetrate the symphysis. If you have not hit the middle line and the point impinges on bone, the difference of resistance will inform you of the fact; if so, shift the point a little to the right or left, and it will come upon the symphysis. When the knife has penetrated the symphysis, cut downwards until you have reached and divided the ligamentum arcuatum. Then turn the blade so that the cutting edge is upwards, and divide the rest of the symphysis. There may be a little difficulty in dividing the last ligamentous fibres at the top and lower part of the symphysis, because

[1] *Amer. Journ. Obst.*, July, 1897. [2] 'Text-book,' 1903, p. 969.
[3] 'Difficult Labour,' 1902, p. 427.

there is a little tendency for the knife to push these fibres before it, instead of cutting quickly through them. You will overcome this tendency by pressing, with the finger applied externally, these fibres against the knife. When you have divided all the fibres which unite the two pubic bones, they will, at once, spring about ½ inch apart; then seize the fœtal head with forceps and deliver.'

Personally, I can offer no opinion about either of these methods. Buist[1] and Herman,[2] however, speak very highly of the operation, and many successful cases so treated have been recorded in this country and in America.

Zweifel has quite recently[3] written in support of subcutaneous symphysiotomy. His method can hardly be described as subcutaneous, as that term is generally understood. An opening is made above and below the pubis, the bladder is pushed away, and a needle is passed behind the joint. The saw is then pulled through, and the joint divided by means of it. Zweifel makes no reference to the methods just described, although they may be much more correctly termed subcutaneous, and have been known and practised for years in this country and America.

Prognosis.

The results from symphysiotomy in the hands of those who have had experience of the operation are highly satisfactory; indeed, I cannot understand how anyone would wish to do away with the operation.

I am well aware that some teachers of obstetrics are opposed to the operation. In not a few cases, however, their opposition is negligible, for they have had absolutely no experience of it. A little time ago I heard a prominent teacher of obstetrics condemn the operation—to my certain knowledge he had never performed the operation. Without doubt there have been cases of disaster, but many of these could have been avoided if greater care had been taken in selecting the cases. If the obstetric surgeon thoroughly understands what he has to do and chooses his cases carefully, the operation performed upon patients brought to hospital in labour will be followed by much better results than Cæsarean section. I challenge any opponent of symphysiotomy to refute that statement. I do not consider, however, that the operation is suited for domestic practice. The general practitioner, unless he has had very special training in obstetrics, does better to choose Cæsarean section, which, after all, is one of the simplest operations in abdominal surgery.

[1] Trans. Edin. Obst. Soc., vol. xxvii., p. 112.

[2] Trans. Lond. Obst. Soc., 1900, vol. xlii., p. 282.

[3] *Cent. f. Gyn.*, 1906, p. 737.

I give here a table showing the maternal and fœtal mortality of a number of the advocates of symphysiotomy. I am convinced that if Cæsarean section had been performed in these cases the maternal mortality would have been very much greater and the fœtal mortality little better.

TABLE OF SYMPHYSIOTOMY CASES.

	Total Cases.	Maternal Deaths.	Fœtal Deaths.
Bar	23	0	6
Pinard	100	12	12
Morisani	55	2	3
Zweifel	52 (open)	3	4
	12 (subcutaneous)	0	0
Herman	8	0	0
Jewett	8	1	1
Buist	8	0	2
Munro-Kerr	9	0	0

Having given so satisfactory a mortality table for the operation, we must now consider the morbidity, for it is a very favourite argument against the operation that it is followed by many more serious disturbances than Cæsarean section.

The dangers to the patient are: (*a*) Injuries to the sacro-iliac and pubic joints, and resulting interference with locomotion; (*b*) severe hæmorrhage from laceration of the parts in front and behind the symphysis; (*c*) injuries to urethra and bladder; (*d*) septic infection. The injuries to the sacro-iliac joint result from too great separation of the pubic bones, for, although the ossa innominata may be compared to two folding doors whose hinges are the sacro-iliac joints, these hinges permit of only a very limited movement. As might be expected, it is the superior and anterior ligaments of the sacro-iliac joint which are specially put on the stretch; the strong posterior supports escape almost entirely. This is extremely fortunate, and explains why it is that disturbance of locomotion is so very infrequent.

Sandstein states that in the cadavers experimented upon, in 44 per cent. the rupture of the anterior ligaments began below 6 centimetres of pubic separation, while in 56 per cent. it began above that point. In two it only began at 8 centimetres, and in one not even at 8 centimetres. These observations of Sandstein are, on the whole, in agreement with those of others, although 2 or 3 centimetres of separation has occasionally been found to be sufficient to produce injury to the sacro-iliac ligaments. The extreme limit of safe pubic separation is generally stated to be 7 centimetres, but personally I agree with Morisani, Pinard, Bar, Zweifel, and others, that it is

inadvisable to exceed 6 centimetres. The injuries result from exceeding this limit, or from allowing one side to be more separated than the other. In those who survive the operation, one can only judge of injury to the joint by disturbance of locomotion or pains in the joints. Doubtless, if one could examine the sacro-iliac joint in all cases, one would find rupture of part of the ligaments in not a few, for it has been noted at several autopsies of cases which have died shortly after operation. The fact, however, remains that few patients have their locomotion disturbed. Pain they sometimes complain of for a few days after the operation, but our experience is in agreement with Bar's, that such pain is almost always transitory. Suppuration of the joint, observed in one or two cases, has always occurred where there was general septic infection.

There is no permanent injury done to the pubic joint. Faraboeuf, Bar, and others, by means of X rays, have been able to demonstrate that there is, as a rule, a permanent separation between the bones. Even without the aid of X rays, one can in many cases, with the fingers in the vagina, make out a distinct separation between them. In my cases the separation that persisted has been very slight, due, I have no doubt, to careful nursing. But even although a little persists, it is of no great moment, for there is very little disturbance of locomotion, provided the sacro-iliac joints are not seriously injured. Nor is this to be wondered at, for in cases of split pelvis there is no great difficulty in walking.

Disturbances of locomotion following symphysiotomy are always referred to by the general medical public, and believed by them to be frequent. That, however, is an extremely erroneous idea; not one of my patients has had her locomotion impaired in the slightest degree. I am quite convinced that the disturbance has been grossly exaggerated. Without doubt, defect in walking has occasionally followed, but such cases are extremely rare, as the results of Morisani, Pinard, Bar, Zweifel, Jewett, Herman, Buist, etc., show.

More serious, and infinitely more frequent, are injuries to the soft parts, especially to the bladder, urethra, and vestibule. The worst bleeding arises from tearing of the corpora cavernosa and the venous plexuses behind and in front of the symphysis. In cases where there exists a varicose condition of the veins underneath the integument in front, hæmorrhage is naturally liable to occur when dividing the skin; such bleeding, however, is very easily controlled by the ordinary means. The bleeding, however, which occurs after division of the joint, from tearing of the vascular tissue behind and to the side, is often very profuse. It can only be arrested by plugging with gauze, and by applying firm pressure on the uterus from above. Undoubtedly Zweifel is correct, that excessive hæmorrhage is, as a rule, the result

of faulty technique, although, as I have already remarked, not so much in dividing the tissues as in extracting the child.

So far I have escaped injuring the bladder. Morisani rather makes light of the acccident, as he has never seen it occur; Bar, likewise, has not observed it. Pinard, however, mentions it as having happened in two of his hundred cases, and Zweifel also has had experience of it. In one of Pinard's cases the injury was very extensive, and followed a difficult extraction of the child with forceps.

Very much more frequent are injuries to the urethra. In one of my cases the urethra was torn completely from the surrounding tissues, and in the other it was split almost up to the bladder. In the former case the tissues were brought together round it, and perfect union resulted; but in the other the stitched urethra did not heal, and the patient left the hospital with practically no urethra. She had, however, almost complete control of the bladder, except when she strained, coughed, or sneezed. All operators have had experience of injuries to the urethra; still, Pinard, Varnier, Zweifel, and Bar have had singularly few cases. Varnier says, 'One ought to be able to prevent these injuries by perfecting the extraction.'[1] I entirely agree with him. Both my cases were primiparæ, and I believe the lacerations might have been prevented by incising the vulvar orifice.

Symphysiotomy Repeated.—I have on one occasion performed the operation twice upon the same patient, but with a very highly unsatisfactory result. I divided the symphysis pubis, but could not get any separation of the bones, because there was a firm mass of tissue behind uniting the bladder to the posterior surface of the joint. Applying forceps with the patient in the Walcher position, I extracted the child with a little difficulty. During the extraction my assistants kept up pressure upon the sides of the pelvis, and the pubic bones separated only about 2 centimetres ($\frac{3}{4}$ inch). I feared the bladder might be torn. The mother escaped without injury, but the child was not so fortunate. There was a deep indentation over the frontal bone, with evulsion of the eye. The indentation I corrected by compression (Chapter XXXVII.); the eye, unfortunately, had to be removed.

Both Bar and Pinard refer to similar difficulties as I experienced. Bar, in one of his cases, removed the cicatricial tissue after dividing the joint. Nor is it to be wondered at that it should be so when the ordinary method is employed, for there is bound to form a very firm cicatrix. Buist and Herman have not experienced any difficulty in the cases in which they employed the subcutaneous method.

An important question arises at this stage: How far is the pelvis

[1] *Comptes rendus des XII Congrès International de Médecin*, Moscow, 1897.

permanently enlarged by symphysiotomy? It is generally stated that it is permanently enlarged. This conclusion is come to because, in quite a number of cases, subsequent labours have terminated spontaneously or with only a slight assistance with forceps. Such reasoning is apt to be misleading. Without doubt the pelvis is increased; skiagrams of cases where the symphysis has been divided show a separation of the bones and a distinct bridge of fibrous tissue, but the increase is infinitesimal unless there is a great permanent separation of the divided ends. There is practically no 'give' in the fibrous tissue. The real explanation why subsequent labours terminate without much difficulty is, in all probability, because the vagina has been previously dilated, the size, shape and consistency, or position of the fœtal head is more favourable, and the head has been given more time to mould. I do not believe that the pelvis is permanently

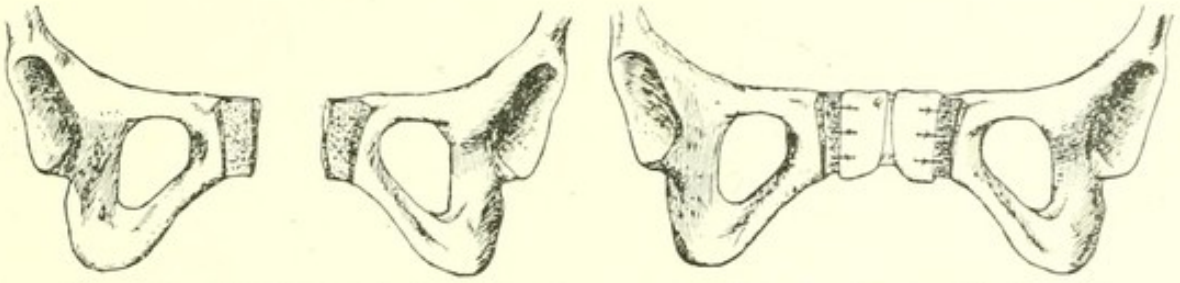


FIG. 183.—Füth's Plastic Operation for permanently enlarging the Pelvic Girdle.

enlarged to any practical extent after symphysiotomy. The bearing of this is that one must be prepared to repeat symphysiotomy, or have recourse to some other operation, at subsequent labours.

Several plastic operations have been suggested for permanently enlarging the bony pelvis, but they have not proved of any practical value. Füth's suggestion[1] is probably the best. He has performed the operation successfully several times, and Varnier referred to a case at the International Congress at Moscow in 1897. The operation consists in removing an anterior layer of the pubic bones and joint, then dividing the joint posteriorly and placing the separated anterior layer between. It will be readily understood from the illustration (Fig. 183). Quite recently this same author has suggested the transplanting of the xiphoid cartilage between the ends of the bones.[2] This subject of plastic operations was fully discussed and severely criticized by Varnier years ago in connexion with a paper by Phénoménoff and Kotchckoff.[3] It has very recently been considered again by Klien[4] in connexion with a very wild method suggested by Credé.[5]

[1] *Monat. f. Geb. u. Gyn.*, 1896, vol. iii., p. 491.
[2] *Cent. f. Gyn.*, 1907, p. 692.
[3] *Ann. de Gyn.*, 1894.
[4] *Cent. f. Gyn.*, 1906, p. 846.
[5] *Ibid.*, 1906, p. 617.

Pubiotomy, Hebotomy (Hebosteotomy).

Within the last year or two much has been written, especially in the Italian and German obstetric journals, regarding the enlargement of the pelvis by dividing the pubic bone instead of the symphysis. Bonardi, Van der Velde, Gigli, and Döderlein have been especially prominent in advocating this method. The credit, however, of first recommending it, as an alternative to symphysiotomy, is undoubtedly due to Stolz,[1] who described in 1844 the operation which is being practised to-day, even to the use of a saw. Nearly twenty years ago Sir William Macewan, of Glasgow, made a communication on the subject at the International Congress in Berlin.

I cannot possibly discuss in detail all that has been written regarding the relative merits of symphysiotomy and pubiotomy, but it appears to me that there has been a great deal of unnecessary discussion over minor details. I am not convinced from the important discussion which took place at the Deutchen Gynäkologen Kongress in Dresden, in May, 1907,[2] that pubiotomy is better than symphysiotomy. Zweifel prefers symphysiotomy, and French obstetricians with few exceptions do so also.

The symphysis is not a joint in the ordinary sense, nor is it, when opened, subject to the same dangers as, say, the knee-joint; consequently, the claim that there is greater danger in opening and dividing the symphysis than in dividing the pubic bone is purely theoretical.

As far as one can judge there is slightly less risk of injuring the urethra, but Zweifel and Döderlein indicated that the bladder is not a little endangered, especially if the so-called subcutaneous methods are employed. It has always been admitted that the chief danger to the urethra, bladder, and vagina arises during the extraction of the child, so that to justify the choice of pubiotomy it must be proved that the danger of injuring these structures is really less during extraction. Bar doubts it,[3] and I entirely agree with him. Baisch[4] thinks otherwise. One cannot discuss this dispassionately until the excitement over pubiotomy has calmed down. On anatomical grounds there should be more bleeding with pubiotomy, unless the corpus cavernosum is carefully stripped off and pushed well out of the way. As a matter of fact, Zweifel[4] has abandoned pubiotomy because of this hæmorrhage. This bleeding may not only occur at the time of

[1] Fasbender, 'Geschichte der Geburtschülfe,' 1906, p. 872.

[2] *Cent. f. Gyn.*, 1907, No. 24.

[3] 'L'Obstétrique,' 1905, p. 245.

[4] 'Reformen in der Therapie des engen Becken,' Leipzig, 1907, p. 131.

operation, but a slow oozing may continue, with the formation of a hæmatoma.

Several important communications have been made regarding the primary and permanent enlargement of the pelvis resulting from the respective operations. One of the most interesting is by Sellheim,[1] who has gone into the subject most carefully.

He states: 'Hebotomy and symphysiotomy bring about the same alterations in the birth canal.' It would appear also with both there is a slight permanent increase in the pelvic capacity. After symphysiotomy the union is naturally fibrous, but after pubiotomy bony. Hocheisen[2] has recently recorded sixteen cases operated on in Bumm's Klinik; skiagraphs accompany the paper. He states that after a few months bony union is always present.

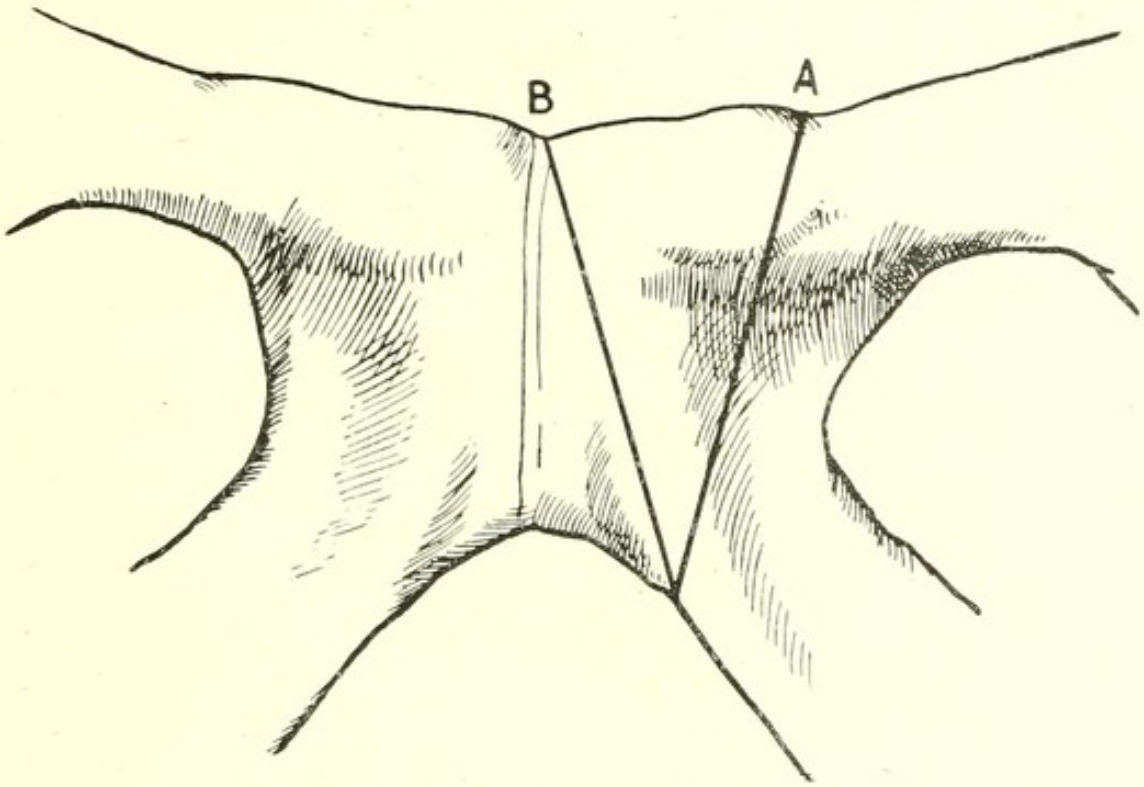


FIG. 184.—The Symphysis Pubis from the Front.

The lines A and B represent the directions in which the pubes may be divided in the operation of pubiotomy. A is the direction recommended by Van der Velde; B, that recommended by Gigli.

In performing pubiotomy, division of the bone is best made with a Gigli saw (Fig. 185), the direction being either as Van der Velde or Gigli has suggested (Fig. 184). Van der Velde's incision certainly is less likely to cause injury to the internal pudic artery and the corpus cavernosum. It is not possible to avoid the latter altogether, however, unless it is first separated and pushed aside. An objection to adopt-

[1] *Monat. f. Geb. u. Gyn.*, 1906, Bd. xxiii., p. 362.

[2] *Archiv f. Gyn.*, 1906, Bd. lxxx., Heft i., p. 99.

ing Gigli's line is, as I found on one occasion, that if the symphysis is oblique one may come right down upon it. Döderlein had a similar experience.[1] There is a great variety of carriers for the saw, and some operators pass them from above downwards and some from below upwards. Such minor details are of no importance, however; they simply confuse the issue. The all-important point is to keep the point of the saw-carrier close against the bone. Undoubtedly the safest plan is to make an incision over the pubic spine, and introduce the forefinger behind the pubis and push the bladder aside. This method of Döderlein (Fig. 185) cannot, of course, be termed sub-

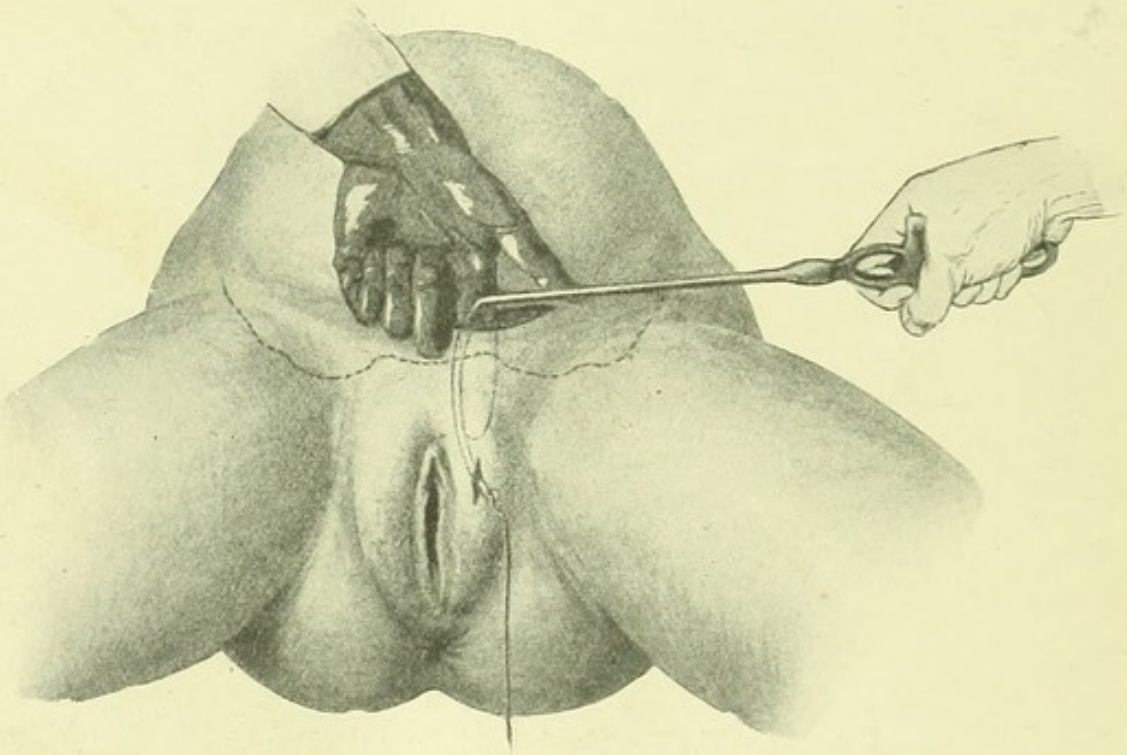


Fig. 185.—Pubiotomy, after the Method recommended by Döderlein.

cutaneous. Bumm and others who favour the subcutaneous method pass a curved saw-carrier close under the pubic arch, entering it between the larger and lesser labia. The clitoris and labium minor are pulled over to the other side. The carrier is then pushed round the bone, the point of the instrument being kept hard against the bone. It is brought out close by the inner margin of the spine of the pubis. The saw is then pulled through, and the bone divided. The child is then delivered artificially, or the parturition is allowed to go on naturally. After the delivery is completed, and all blood has been squeezed out of the wound, the small openings in the skin above and

[1] *Archiv f. Gyn.*, 1904, Bd. lxxii., p. 287.

below are closed with stitches, the vagina plugged, a dressing applied over the parts, and the pelvis firmly supported by a binder.

As regards results, Krönig[1] gives a mortality of two in twenty-three collected cases. Döderlein,[2] for 294 collected cases, found the maternal mortality with the open method 10·4 per cent., and with the subcutaneous 4·1 per cent. It may be said that such results are no better than those obtained from Cæsarean section. But it is incorrect to argue in that way, for in many cases where hebotomy was performed Cæsarean section would have proved fatal, as the cases had been examined and infected before the operation was performed. Stoeckel[3] refers to forty-four cases with no maternal and only two fœtal deaths.

A still more lateral division of the pelvis was carried out by Farabœuf and Pinard[4] in a case of obliquely contracted pelvis. The pubes and ischium were divided about 4 centimetres from the middle line. This operation has been termed 'ischio-pubiotomy.' The result was most satisfactory. The child was saved, and the mother made an excellent recovery. Bony union is reported to have followed. A similar operation was suggested by Aitken[5] of Edinburgh in 1784.

[1] Winckel's 'Handbuch,' 1906, Bd. iii., Teil i., p. 364.
[2] *Cent. f. Gyn.*, 1907, p. 683.
[3] *Ibid.*, p. 690.
[4] *Ann. de Gyn.*, 1892.
[5] Fasbender, 'Geschichte der Geburtshülfe,' 1906, p. 872.

CHAPTER XXVI

CÆSAREAN SECTION

Indications for the Operation.

As the results from Cæsarean section have improved, its limitations have become less restricted, so that the operation is now had recourse to for conditions which ten to fifteen years ago would not have been considered justifiable.

The conditions for which Cæsarean section is most generally performed are deformity of the bony pelvis and myomatous and carcinomatous tumours of the uterus. In recent years, however, there have arisen advocates for the operation in certain cases of eclampsia, concealed accidental hæmorrhage, and even placenta prævia.

In contracted pelvis Cæsarean section is called for when a living child cannot be born *per vias naturales*, and, in the case of a dead child, when the risks of craniotomy are greater than those of Cæsarean section. From the previous chapters upon contracted pelvis and forceps we have seen that it is almost impossible to deliver with forceps a full-time child alive when the conjugata vera is less than 3 inches (7·5 centimetres), and that even at 3 inches about half of the children are either born dead or succumb shortly to the injuries inflicted on them during their extraction. Unless a child is very small, forceps delivery should not be attempted under $3\frac{1}{4}$ inches. Even at $3\frac{1}{4}$ inches Cæsarean section and symphysiotomy should always be considered if there is a distinct disproportion between the head of the child and the maternal pelvis, and especially if the pelvis is generally contracted.

As regards symphysiotomy and pubiotomy, I expressed myself as very much opposed to those who take up an extreme position either for or against these operations. I tried to make it clear that I considered it most desirable that symphysiotomy or pubiotomy should retain a place amongst obstetric operations, and that, to put it briefly, *symphysiotomy was indicated in the case of a living child when one just failed to effect delivery after one or two attempts with forceps.* I do not

consider that symphysiotomy and Cæsarean section come into competition, for if the disproportion between the head and the maternal pelvis is so great as to lead an operator, before labour or at an early stage of labour, to consider symphysiotomy or Cæsarean section necessary, then, without doubt, Cæsarean section is the safer operation, and will be attended with better results for mother and child. In cases of medium pelvic deformity a careful estimate of the relative size of the fœtal head and maternal pelvis will allow one, with few exceptions, to predict a successful delivery with forceps. The few cases in which one is wrong are those just suitable for symphysiotomy, and the operation in these cases has given me absolute satisfaction.

Turning now to the cases of extreme pelvic deformity, Cæsarean section is indicated whenever the conjugata vera is below $2\frac{1}{4}$ inches, for craniotomy in cases of such extreme pelvic deformity is an operation of great difficulty, and attended with a very high maternal mortality. Even at $2\frac{1}{4}$ to $2\frac{1}{2}$ inches (5·6 to 6·2 centimetres), especially if there is a general contraction of the pelvis, the operation is one requiring both experience and patience. Under such circumstances, I have spent as long as two and a half hours in extracting the child. My results from craniotomy performed under favourable conditions, even in these difficult cases, when the vera is $2\frac{1}{4}$ to $2\frac{1}{2}$ inches (5·6 to 6·2 centimetres), have been slightly better than those obtained from Cæsarean section, and so, if the child is dead, I prefer craniotomy to Cæsarean section.

Here, probably, is the most suitable place for considering the question as to whether or not one must always perform Cæsarean section if the child is alive and the deformity such that the only alternative is craniotomy. We are constantly receiving into hospital cases in which labour is far advanced, in which many examinations, and even attempts at delivery, have been made by midwives and practitioners whose hands have not been thoroughly cleansed. In such cases, if the child is alive, must one choose Cæsarean section?

Personally, I am quite convinced that one considers the best interests of the mother and of the State in deciding against Cæsarean section and having recourse to craniotomy, if it is at all possible to deliver the child by such means. The general results in the Glasgow Maternity Hospital from Cæsarean section performed upon women admitted advanced in labour, and previously interfered with, have been disastrous. Even supravaginal hysterectomy, the operation generally had recourse to in these cases, is attended with a very high maternal mortality. I agree with Galabin[1] when he says: 'In such

[1] *Brit. Med. Journ.*, October 11, 1902, p. 1124.

cases the argument still holds good which was used while the mortality of Cæsarean section was very high—that to perforate a living child may conduce to the interest even of fœtal life if it saves the mother to bear more children.' Still more does this argument hold good when one thinks that in many of these cases the life of the fœtus has already been endangered, and that in a considerable number the child is extracted dead or dies soon after.

In recent years I have made it a rule never to perform Cæsarean section in cases which have been interfered with prior to their coming under the care of myself or my assistants, unless the deformity of the pelvis is so extreme as to render craniotomy impossible, or more dangerous to the mother than Cæsarean section. I am compelled, therefore, not infrequently to perforate a living child. I am well aware that such an attitude is condemned by some operators; but each operator must satisfy himself as to the attitude he should assume towards such cases. It is always with extreme regret that I perforate a living child; but I am perfectly convinced I save more mothers and probably, indirectly, more children. I do not take upon myself the blame of destroying the children; that rests with those who send the cases too late to hospital. In this class of cases it is very striking that Pinard, who is absolutely opposed to perforating a living child, has a very high maternal death-rate—20 per cent.[1] Indeed, in the four cases where he performed total hysterectomy he had three maternal and two fœtal deaths. Theoretically it is sound to take up the attitude that no living child should be perforated, but practically it is not.

The indications for Cæsarean section when labour is obstructed by tumours of the uterus and neighbouring structures, deformities and displacements of the uterus, and cicatricial contractions of the vagina, are considered in the chapters devoted to these special subjects.

As regards eclampsia, there is now a general consensus of opinion that in certain cases—they are, of course, few in number—Cæsarean section is not only permissible, but is actually the treatment indicated. Van den Akker is credited as being the first to perform the operation, which he did in 1875. The patient was not only an eclamptic, but suffered from slight pelvic deformity. A hundred years previously Lauverjat recommended the operation.[2] Halbertsma performed his first operation in 1878, but did not report it till 1889. In recent years all obstetric writers have referred to the subject, and several monographs with collections of cases have appeared in obstetric

[1] *Ann. de Gyn. et d'Obst.*, September, 1907, p. 529.

[2] Fasbender, 'Geschichte der Geburtshülfe,' 1906, p. 804.

journals, more especially in Germany. Among the more important are those by Hillman,[1] Streckeisen,[2] and Croom.[3]

The cases in which the operation is indicated are when the eclamptic seizures are of great severity and frequency in the later weeks of pregnancy, and, above all, when the cervix is not taken up and is very rigid and undilatable. This is not the place to discuss the treatment of eclampsia. I would only say that, with my present experience, I am strongly opposed to radical operative interference until saline transfusion and the administration of chloral or morphia have been given a full trial. On many occasions I have seen the very worst cases of eclampsia arrested by such treatment. If, however, after two hours the progress of the disease is not arrested by these measures, I consider emptying of the uterus not only justifiable, but absolutely indicated.

Cæsarean section in eclampsia comes into competition with so-called vaginal Cæsarean section and forcible dilatation of the cervix by means of metal dilators. Metal dilators in most cases at term are quite unsuitable if the cervix is not taken up. As regards vaginal Cæsarean section, I cannot but feel—and I say this from personal experience—that in the case of a primipara at term it is an operation attended with considerable difficulty; I would therefore confine it to cases in the earlier months of pregnancy. In the later months the abdominal operation is more easily carried out. This whole subject is fully considered in Chapter XXVIII.

As regards the results from abdominal Cæsarean section, all are agreed that the maternal mortality is extremely high. It must, however, be remembered that only the very worst cases are treated by this method, and that, consequently, one cannot expect other than a high death-rate. Hillman, who collected forty, found the maternal mortality 52·5 per cent. In Streckeisen's twenty-six new cases collected in 1903, the maternal mortality worked out at 32 per cent. Allowance, however, must be made for the fact that the tendency, when only single cases are recorded, is for operators to report their successes, so that the latter figures, I fear, hardly give a correct idea of how high the maternal mortality actually is. The cases recorded by Croom, Schauta, Olshausen, etc., show a very high maternal mortality. Berkeley[4] puts the mortality at 47 per cent.

Cæsarean section in accidental hæmorrhage and placenta prævia is considered in connexion with the treatment of these conditions. I would only remark here that, while many are in favour of Cæsarean

[1] *Monat. f. Geb. u. Gyn.*, Bd. x., Heft ii. [2] *Cent. f. Gyn.*, 1903, p. 1072.
[3] Trans. Edin. Obst. Soc., vol. xxix., p. 194.
[4] *Journ. of Obst. Brit. Empire*, March, 1904, p. 271.

section followed by hysterectomy in severe cases of concealed accidental hæmorrhage, very few indeed approve of such radical treatment for placenta prævia.

In addition to the conditions mentioned, Gemmell[1] and Kohn[2] refer to the performance of the operation in myasthenia gravis.

Preparation of the Patient.—In all abdominal operations the great danger is septic infection, and in few is this more likely to occur than in Cæsarean section. In addition to the ordinary risks through the abdominal wound, there are all the dangers through the parturient canal. The uterus left behind, and containing as it does debris of decidua and blood-clot, with large dilated veins and lymphatics running from it, furnishes a most suitable soil for the growth and dissemination of any micro-organisms which may be introduced into it either through the abdominal wound or the vagina. Then, the operation has frequently to be performed upon women hurriedly prepared. But, even worse than that, not infrequently the patients sent into hospital are advanced in labour, and in very many cases have been previously examined by midwives and practitioners whose hands have not been thoroughly cleansed. So serious is this latter factor, and so unsatisfactory are the results from Cæsarean section, that many of us now are disinclined to perform the operation in such cases unless there is absolutely no alternative. As I have already said, some of us even go the length of perforating and destroying a living child, for in such cases one cannot reckon upon a maternal mortality of less than 20 per cent. One is confronted, therefore, by this unfortunate state of matters—that Cæsarean section, the simplest of all abdominal operations, is attended with a much higher mortality than ovariotomy or hysterectomy for myomata, for example. This can only be remedied by the medical practitioners appreciating the limitations of forceps, doing everything to prevent infection, and, if they are not prepared to perform Cæsarean section, sending their patients into hospital in the last days of pregnancy or very early in labour.

It is a distinct advantage to have the patient in hospital for some days before the operation. To arrange this is not always easy, for the onset of labour is not a date one can fix with exactness. My own practice is to bring the patient into hospital or nursing home a week before labour is expected. If she delays going into the institution until the last moment, she will be frequently taken in labour before she can get there. There is another advantage of having a patient in hospital for some time before Cæsarean section. Very many of the

[1] *Journ. of Obst. and Gyn.*, December, 1904, p. 476.
[2] *Prag. Med. Woch.*, May 14, 1903, p. 242.

cases of severe rickets when they are admitted to hospital show signs of considerable bronchitis, and if a severe operation with a prolonged anæsthesia is performed immediately after their admission, the bronchitis often becomes extreme. On one or two occasions I have been very anxious indeed regarding patients in this respect. To some degree the frequency of bronchitis after Cæsarean section in my patients in the Glasgow Maternity Hospital may be accounted for by the fact that the operating-theatre is lit by gas,[1] which, as has been frequently pointed out, decomposes the chloroform, setting free chlorine gas, which has a most irritating effect upon the bronchial mucous membrane.

The manner in which my patients are prepared for Cæsarean section depends largely upon the urgency of the operation. When a patient is admitted some days before the operation is expected, she is carefully scrubbed and her bowels are thoroughly evacuated. All hair about the abdomen and pubes is shaved, and the abdomen thoroughly washed and scrubbed with soap and water, followed by turpentine and alcohol. A wet dressing of weak carbolic (1 in 40) is applied for six hours: this latter is then removed and replaced by sterilized gauze. Every third or fourth day the same process is gone over, and again immediately before the operation. In the cases, on the other hand, which come in and have to be operated upon immediately, the wet compress that is applied to the skin is wrung out of carbolic (1 in 20), which is kept on for half an hour. The abdominal wall is always carefully scrubbed again by my assistant before the operation begins. Some may say that in the method described the abdominal wall is too frequently scrubbed, for the tendency amongst many abdominal operators at present is to scrub the abdomen as little as possible, it being claimed that repeated scrubbing sets free more organisms than it removes. I doubt this very much. I am quite opposed to the extreme position of those abdominal operators who only cleanse the abdomen when the patient is placed upon the operating-table. I prefer the old and tried method described.

Besides the cleansing of the skin of the abdomen, I attach great importance to the thorough washing out of the vaginal canal. This is done by myself or my assistant or charge-sister. I know that many obstetricians do not attach much importance to this step in the preparation of the patient, and, indeed, quite a number are actually opposed to it. They say that the vagina but rarely contains organisms of a pyogenic character. There is much to be said for this, and the strongest argument of all is the fact that those who have made exhaustive bacteriological examinations of the vagina in large

[1] The New Glasgow Maternity and Women's Hospital is, of course, lit with electric light.

numbers of pregnant women have found comparatively few virulent forms of bacteria. But if one examines carefully their records, one finds that in 1 or perhaps 2 per cent. of cases streptococci, staphylococci, *Bacillus coli*, or gonococci have been found, and that, to my mind, is a sufficient argument in favour of a thorough cleansing of the vagina. In this connexion I can never forget that a few cases of natural parturition in which no examination has ever been made, in which the placenta and membranes have come away easily and completely, and nothing either in the way of fingers or douche nozzle has been introduced into the vagina after the delivery, show signs of sepsis, more or less severe. I can call to mind some three or four such cases. I therefore believe that it is of importance that the vagina should be carefully washed out prior to the performance of the operation. My practice is to do this immediately before the operation. It is not, I consider, sufficient to simply push in the nozzle and let the fluid run over the surface; the fingers of a gloved hand are introduced, *after every possible care has been taken to cleanse the vulva*, and the vaults of the vagina are thoroughly washed. The solution used is a very weak antiseptic, most commonly a ½ per cent. solution of lysol. I would not advise the practitioner in private practice, who is hurriedly called upon to perform the operation of Cæsarean section, to wash out the vagina if no vaginal examination has been made. *I only advocate careful douching when the conditions are favourable, and the patient is resident in a hospital or nursing home.*

Time for Operating.—At this point it is advisable that I refer to the time for operating. It was the custom until a few years ago, and is still the recommendation of not a few, to operate only after labour has been in progress some little time. Those who advocate this claim that, if the cervix is dilated, any blood-clot forming in the uterus is more readily expelled; in other words, that drainage is better, and that post-partum hæmorrhage is less likely to occur. Others maintain that it is better, when one has the choice, to operate prior to the onset of labour, because one can choose the most suitable time in the day, and quietly make every preparation. These latter claim that the uterus finds no difficulty in expelling any clots that may form in its cavity, and that the danger of post-partum hæmorrhage is theoretical. Personally, I think there is much to be said in favour of operating before labour has commenced. In multiparæ I always do so if possible, and I never saw any trouble result. On two occasions, however, in primiparæ considerable disturbance from after-pains followed.

Operating before labour has commenced is naturally only suitable for those cases in which there is absolutely no doubt that Cæsarean

section is necessary. If there is any doubt about this, and any probability of the labour being terminated spontaneously, by forceps, or by symphysiotomy, the patient must be allowed to go into labour, and possibly, indeed, the latter must be allowed to continue for some time before Cæsarean section is performed.

There is a danger in operating before the onset of labour, but I cannot remember having seen it mentioned, that one may occasionally perform the operation before term has been reached, and so deliver a child distinctly premature. Hospital patients are often so uncertain regarding the onset of pregnancy, and the abdomen in the rachitic becomes early so prominent, that it is impossible by palpation to estimate the size of the child. It was once my experience to deliver a child which, as far as could be judged after delivery, was not more than thirty-six weeks old. When, however, the patient's statements regarding the duration of her pregnancy are reliable, the likelihood of performing the operation much before term is reduced almost to a vanishing point.

The actual operation is just as easy in the pregnant as in the parturient, and the uterus, I find, contracts equally well in both. If one has to remove the uterus, it is a distinct advantage to operate before labour, for there is a much smaller stump to stitch, as the calibre of the cervical canal is much narrower. When, therefore, hysterectomy is called for, the operation should always be performed, if possible, before labour has started.

Immediately before commencing the operation a full dose of ergotin should be given hypodermically. It is a mistake to give it too soon, especially if the labour has been going on for long, as there may be some little trouble in extracting the child or secundines.

The Operation.

The Abdominal Incision.—The abdominal incision should possess two qualities—it should be high and it should be sufficiently long. It should be high, because one can open into the uterus high up on the fundus. My rule is to make an incision 8 to 10 inches (20 to 25 centimetres) in length, the length depending upon whether or not I intend to turn the uterus out of the abdomen before opening into it. Two-thirds of this incision is made above and one-third below the level of the umbilicus (Fig. 186). If it is the operator's intention to remove the uterus the incision should be made lower.

Having opened into the abdominal cavity, one has to decide whether or not the uterus should be turned out of the abdomen. There is no doubt that if the uterus is not turned out before it is

emptied, the abdominal incision may be kept about 2 inches (5 centimetres) shorter, and that, of course, is a distinct advantage. On the other hand, the abdominal cavity can be kept cleaner by turning the uterus out. On theoretical grounds the advantages are in favour of turning out the uterus, and personally I prefer it. Others—as, for example, Schauta[1]—prefer not to turn out the uterus. It is really a matter of no very great importance, except in those cases where the membranes have ruptured some time before, for then there is a

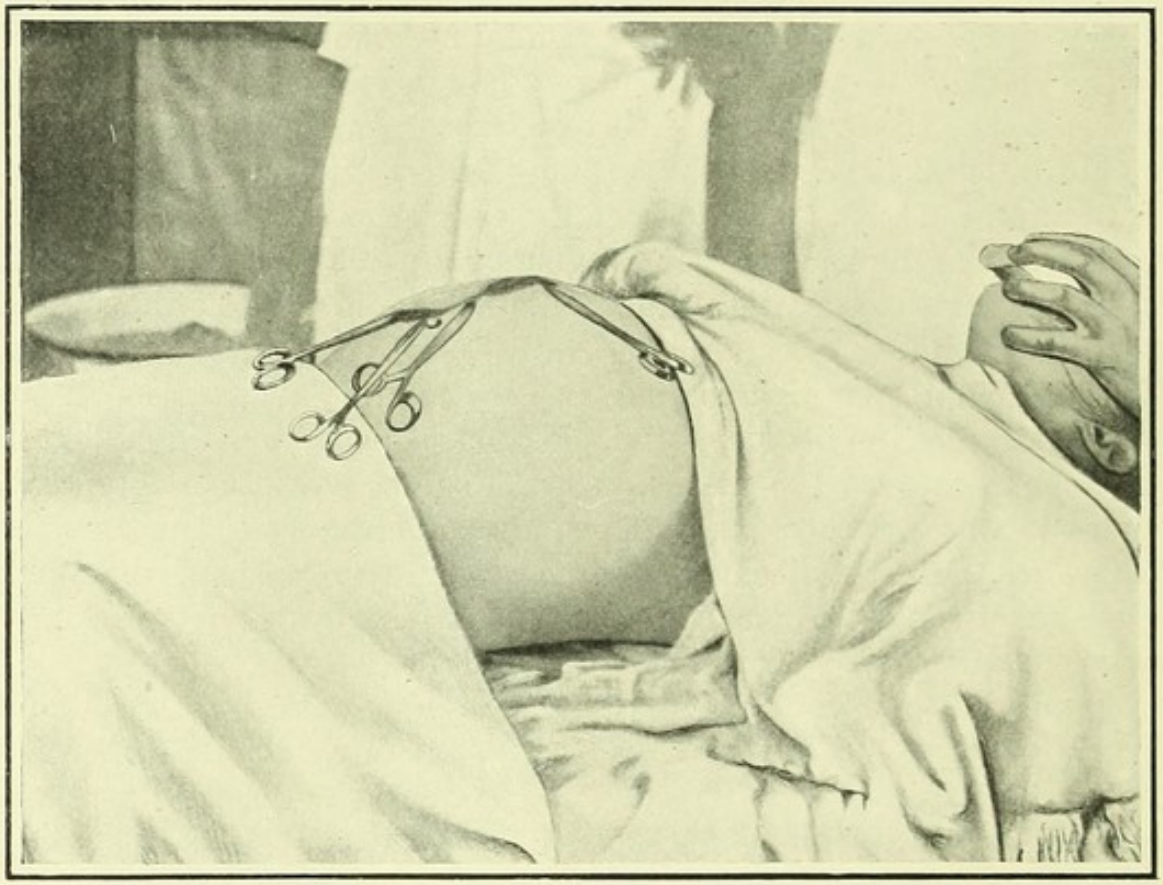


Fig. 186.—The Abdominal Incision—Two-thirds above and One-third below the Umbilicus.

danger that the uterus may have become infected through the vagina. Consequently, in such cases the uterus should always be turned out before being opened into.

If it is decided to open the uterus while it still remains in the abdomen, the hand should be inserted, and any torsion of the uterus corrected, as it is an advantage to open the organ in the middle line. The torsion will invariably be found towards the right, so that the hand has to be pushed round to the right side of the abdomen and the uterus dragged and rotated to the left. The uterus should then be surrounded by large sterilized swabs, to prevent as far as possible blood and liquor amnii getting into the abdominal cavity.

[1] *Archiv f. Gyn.*, 1906, Bd. lxxix., Heft i.

If, on the other hand, it is decided to turn the uterus out before opening into it, the hand should be passed up over the fundus, when, if the abdominal incision has been long enough and high enough, there is no difficulty in bringing the uterus out. After having turned it out, the abdominal wound above should be temporarily closed by means of pressure forceps, and the uterus surrounded by sterilized swabs or towels.

The Uterine Incision.—The recognized uterine incision is the longitudinal one running down the middle of the anterior wall of the uterus. It should be confined to the active contractile portion of the organ, and should not extend into the lower uterine segment. There are several objections to cutting into the lower uterine segment, and of these the most important are: that the wall is very thin; that the wound is brought nearer to the vagina, and so there is greater risk of infection; and that in extracting the child the lower end of the wound is very apt to tear. Another disadvantage is that, in stitching the lower segment, if thick silk ligatures are employed, they may find their way into the bladder. Several cases of this kind have been reported in Glasgow. Especially interesting was one described by Cameron, in which three large stones were removed from the bladder of a patient upon whom he had performed Cæsarean section some few years before. The nucleus of each stone was a silk ligature.

The longitudinal incision is not the only one which has been advocated. Kehrer recommended a low transverse incision; Johannowsky a posterior longitudinal; Cohnheim a posterior longitudinal one with drainage through Douglas' pouch into the vagina; Caruso and Müller a sagittal fundal incision, which latter has found a strong advocate in Morisani.

But the incision which in recent years has been most discussed, and most frequently employed as an alternative to the longitudinal, is the transverse fundal incision, recommended by Fritsch in 1897.[1] It was suggested to him by seeing with what ease a child was extracted from the gravid uterus on the post-mortem table. For some few years, especially in Germany, the incision of Fritsch was very extensively employed, because this author claimed that it possessed the following advantages: (*a*) The abdomen being opened into high, there is less risk of subsequent hernia; (*b*) by pulling forward the fundus the escape of blood and liquor amnii into the abdominal cavity is better prevented; (*c*) the child is more easily extracted; (*d*) the placenta is less frequently cut down upon; (*e*) there is less bleeding; (*f*) there is greater diminution of the wound and less stitching required.

[1] *Zentralblatt f. Gyn.*, 1897, p. 561.

After employing the incision in some nine cases, I discussed the matter in detail in two papers.[1] My conclusions were that the first two advantages mentioned would be obtained with the ordinary incision if the abdomen were opened into high enough, and the uterus turned out before opening into it. The third advantage, that the child is more easily extracted, I was inclined to admit, for when the waters have drained away there is occasionally slight difficulty in extracting the child through a longitudinal incision. The difficulty, however, is only slight, although on two occasions I have seen difficulty in extracting the head, which was firmly grasped below the retraction ring. Curiously enough, Steinthal[2] reported a case of the same difficulty where a fundal incision was employed, and so firm was the grasp of the head that he was forced to make a longitudinal incision through the retraction ring before he could get the head removed. The fourth advantage claimed, that the placenta is less frequently cut down upon, I did not find was the case, for I encountered it in 40 per cent. of my cases. Others have had a similar experience. Schroeder[3] encountered the placenta in 35 per cent., Hübl[4] in 41 per cent., V. Braun-Fernwald[5] in 54 per cent. It certainly is preferable not to cut down upon the placenta, for there is always more bleeding when one encounters it, and the stitching of the uterus is not so satisfactory; besides, risks of infection are slightly increased. The other advantages, that there is less bleeding and greater diminution of the wound, did not impress me, although I was disposed to think that the transverse incision contracted more than the longitudinal.

The objections urged against the incision, that the fundus uteri contracts adhesions to the bowels, that a high attachment of the fundus to the abdominal wall results, and that involution of the uterus is in consequence interfered with, are not of much importance. I admit, however, that rupture of the uterus at a subsequent pregnancy is more liable to occur with a fundal than with a longitudinal incision, for if the uterus contracts firm adhesions to the anterior abdominal wall, as it does in so many cases where the incision is anterior, and as it should be encouraged to do according to those who favour the conservative operation, there must be less chance of rupture, and especially of rupture into the free abdominal cavity. As a matter of fact, rupture of the fundal cicatrix did occur in one of my cases at a subsequent

[1] *Journ. of Obs. and Gyn. Brit. Empire*, vol. ii., 1902, p. 21; and *Brit. Med. Journ.*, vol. ii., 1902, p. 1129.

[2] *Cent. f. Gyn.*, 1898, p. 345.

[3] *Monat. f. Geb. u. Gyn.*, Bd. xiii., 1901, p. 22.

[4] *Ibid.*, Bd. xii., 1900, p. 480.

[5] *Archiv f. Gyn.*, Bd. lix., 1899, p. 320.

pregnancy. The case is described and the uterus figured in Chapter XXXV.

One could not but feel that the excitement in Germany regarding Fritsch's incision was out of all proportion to the importance of the subject. I quite agree with Bar when he wrote regarding it: 'Je regarde la modification de Fritsch pour peu importante et je m'en tiens encore à l'incision longitudinale pratiquée aussi haut que possible.'[1]

The longitudinal incision, therefore, is practically the only one now employed. It should be of from 6 to 7 inches (15 to 18 centimetres)

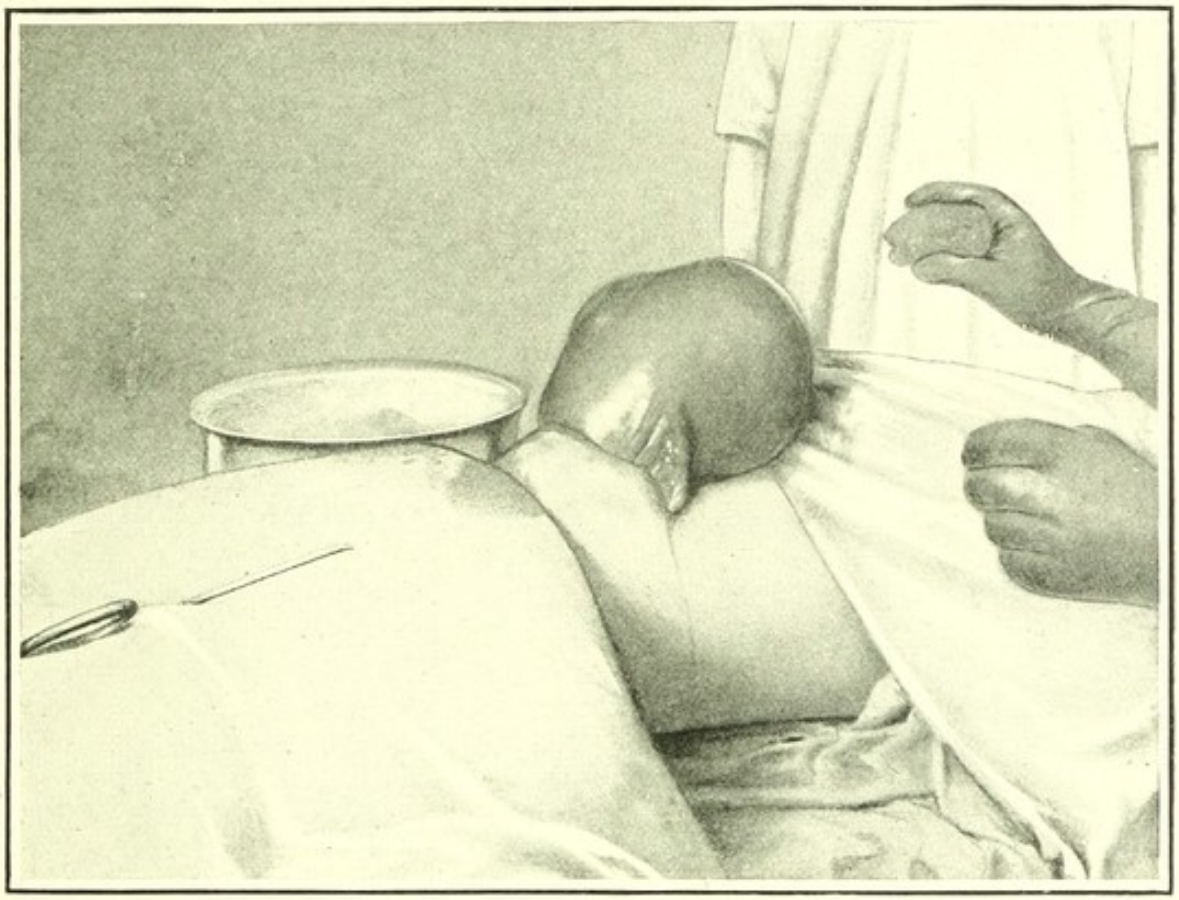


Fig. 187.—Showing bulging of Membranes through Uterine Incision.

in length, and, as I have already stated, should be placed high on the anterior wall in the middle line. In cutting through the wall, very free bleeding occurs, and this especially if the placenta is situated anteriorly. The slight inconvenience of this may sometimes be lessened by the device suggested by Cameron. A large vulcanite ring placed over the part to be incised is firmly pressed on one side by the operator and on the other by his assistant. This has the effect of controlling the hæmorrhage, except when the placenta is situated underneath the incision.

The operator, when opening the uterus, cuts down carefully upon the membranes, which when reached bulge out through the incision

[1] 'Leçons de Pathologie Obstétricale,' 1900, p. 20.

(Fig. 187). Two fingers are then inserted between the membranes and the uterine wall, and the incision is quickly enlarged upwards to the extent required (Fig. 188). The membranes are then ruptured, and the child seized and extracted. In cutting down upon the membranes one often punctures them, but this is of no consequence.

When the placenta is encountered, as it is in some 40 per cent. of cases, the operation is carried out in exactly the same way. The operator on reaching the placenta slips his fingers up between it and

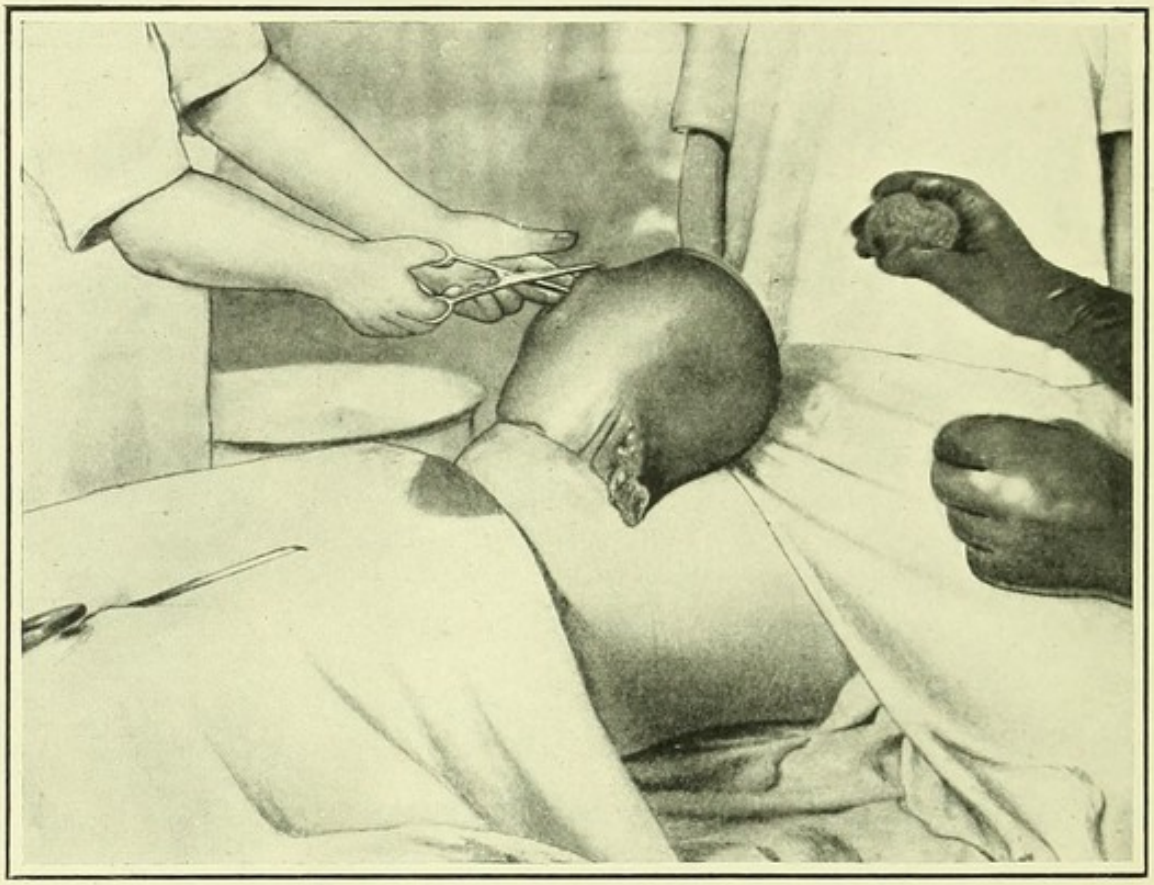


Fig. 188.—Enlarging the Uterine Incision.

the uterine wall, enlarges the incision, and extracts the placenta quickly; or, better still, pushes his hand through the placenta and seizes hold of the child, just as he would do in performing version in a case of 'central placenta prævia.' To open the uterus, as Olshausen[1] has suggested, in the part where the placenta is not situated has not been found practical, for it is not always possible to make sure of its position, and valuable time is lost in trying to do so. Olshausen claims that the area where the placenta is situated has visibly dilated vessels.

The observation of Bayer, Leopold, and Palm, that when the placenta is situated anteriorly the distance between the tubes anteriorly is

[1] *Cent. f. Gyn.*, No. 1, 1906, p. 1.

increased, and when situated posteriorly the distance between them posteriorly is increased, I have often not been able to verify, for it must be remembered that the placenta is very usually situated in great part upon the lateral wall of the uterus. Holzapfel, Koblanck,[1] and Olshausen refer also to its uncertainty.

The extraction of the child is best accomplished by seizing one or both feet (Fig. 189), for with a high uterine incision, except in cases of breech presentation, the head is more difficult to reach. There is

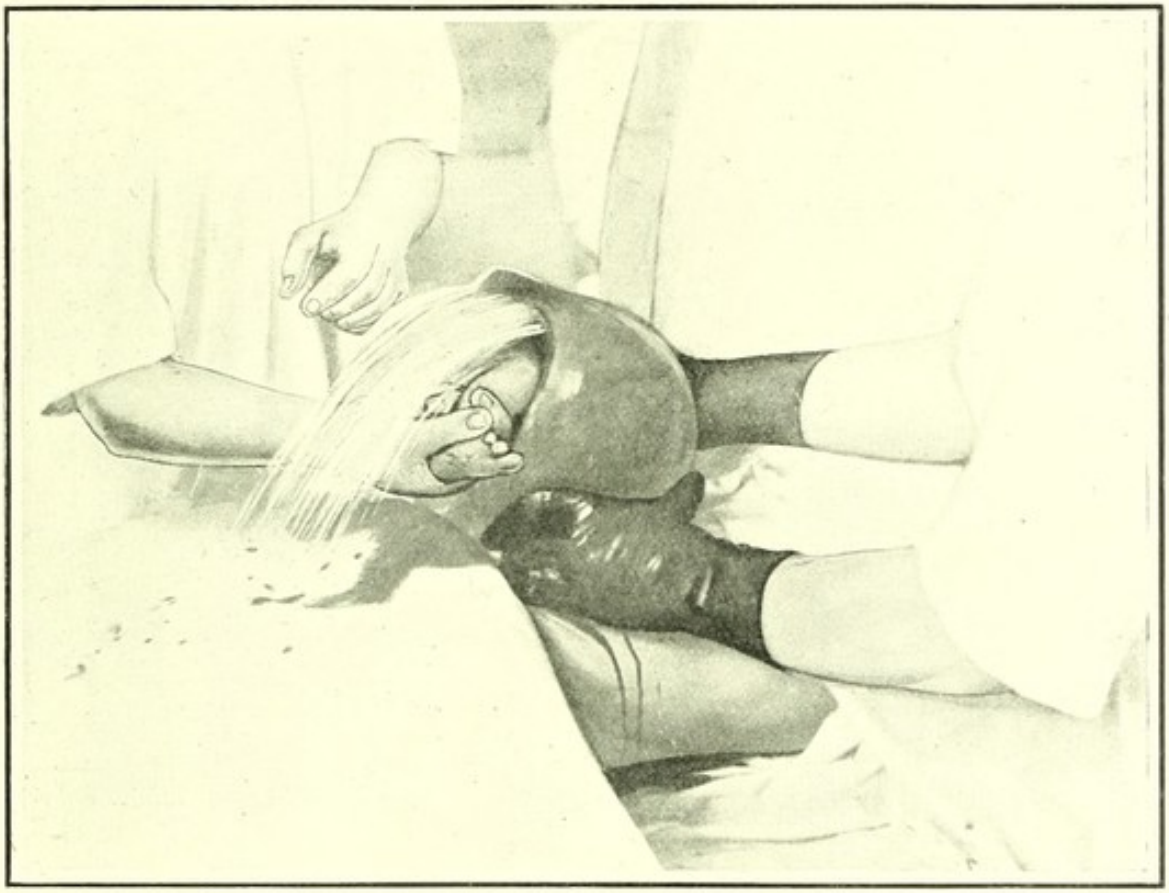


FIG. 189.—The Hand has been pushed through the Membranes and a Foot seized.

almost never any difficulty in extracting the head. The cases in which I have found difficulty are where the waters have drained away, and the uterus is firmly applied to the surface of the child. I have twice seen the neck grasped by the retraction ring; but in both cases the difficulty was overcome without cutting through the retraction ring, as Steinthal[2] required to do.

If too small an incision has been made, the uterus may contract firmly round the head, and delay in delivering the child may in consequence result; but a slight extension of the incision upwards overcomes this difficulty. It is a mistake to try and drag the child through

[1] *Zeitschrift f. Geb. u. Gyn.*, Bd. xlvi., Heft 1, 1901, p. 99.

[2] *Cent. f. Gyn.*, 1898, p. 345.

too small an incision, for the uterus is very apt to be torn, and if this occurs downwards, as it generally does, an irregular and ragged tear is made in the lower segment.

Whenever delivery is completed, the umbilical cord should be clamped with forceps and cut, and the child handed over to the assistant who is ready to look after it. In most cases the child will cry very soon (Chapter XXXVII.).

As the child is extracted, the assistant seizes the uterus, and if it is not already outside the abdomen, brings it out and surrounds it with

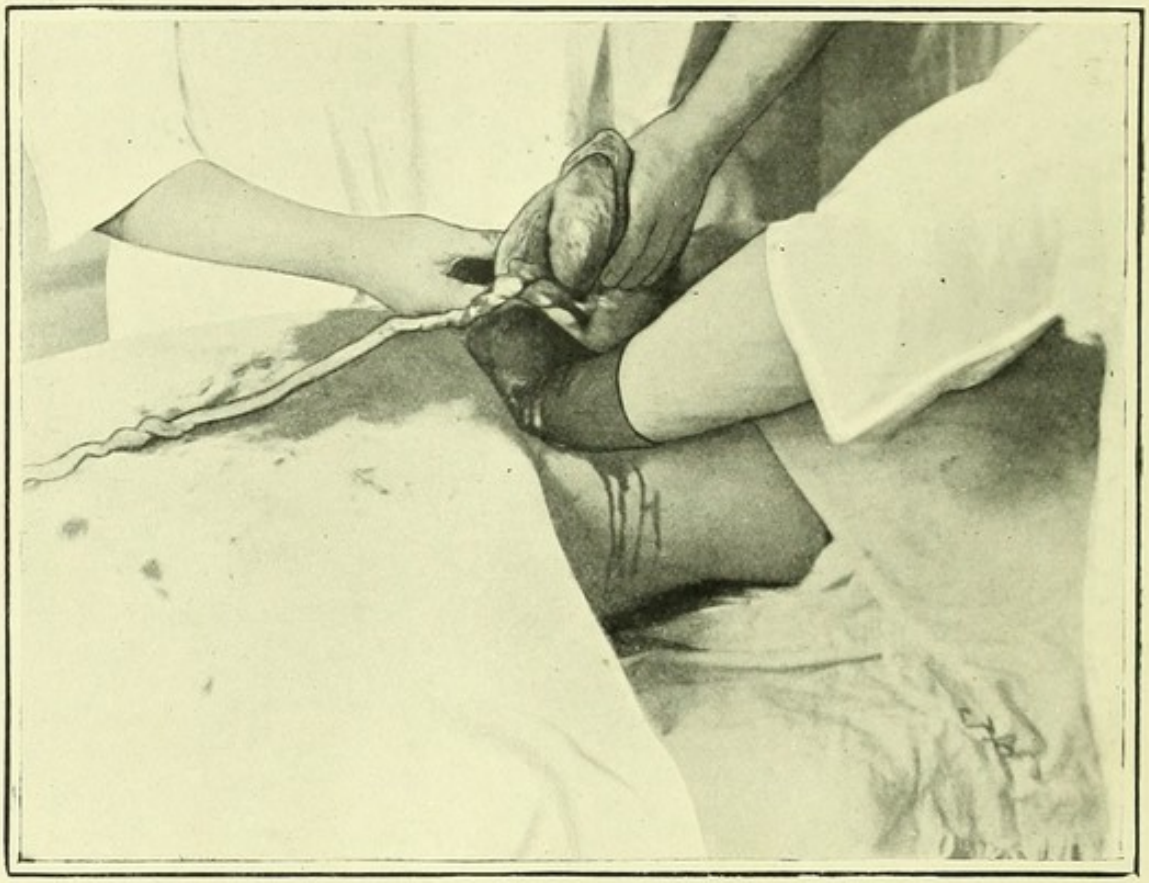


Fig. 190.—The Removal of the Secundines.

large swabs. He then kneads it firmly, which causes it to contract and arrests all hæmorrhage.

There remains now only the removal of the placenta and membranes, and it is of the greatest importance, if the uterus is left behind, that these should be completely removed (Fig. 190). When the membranes have bulged down into the vagina, there is a risk of infection in pulling them back up through the uterus. If the os is sufficiently dilated, this difficulty may be overcome by separating the placenta and membranes, and then pushing them down through the cervix by means of a large swab.

The Treatment of the Uterus.—There are three different courses

open to one after extracting the child: (*a*) Removal of the uterus by supravaginal hysterectomy, formerly known as Porro's operation, when the stump was treated extraperitoneally; (*b*) panhysterectomy; (*c*) retention of the uterus without sterilization, the true conservative Cæsarean section; (*d*) retention of the uterus and the sterilization of the patient by removal of a portion of the tubes.

Each of these methods has its advantages, and must be considered in some detail.

(*a*) *Removal of the Uterus by Supravaginal Hysterectomy, formerly known as Porro's Operation, when the Stump was treated Extraperitoneally.*—The removal of the uterus after the extraction of the child is indicated in cases where there is a probability that the parturient has become infected; when myomatous tumours are too extensive or too numerous to permit of simple myomectomy; when post-partum hæmorrhage cannot be controlled; when the uterus has been too much injured, as from rupture or from previous Cæsarean sections, to justify one leaving it behind; and in women the subjects of osteomalacia. All the indications are self-evident and need no elaboration, with the exception of post-partum hæmorrhage. This condition I have only once observed. The patient had been long in labour, and was driven some twenty miles before operation. All other operators of experience have remarked upon the infrequency of post-partum hæmorrhage.

Every one admits that Porro's operation for some years after its introduction gave the best results. It was introduced by him in 1876, but was suggested many years before by Cavallini and Blundell,[1] the latter Professor of Obstetric Medicine in Guy's Hospital. Each suggested the operation after making experiments upon the lower animals. Blundell did the operation upon four rabbits, three of which recovered.[1]

The true Porro operation consisted in a supravaginal amputation of the uterus, the pulling of the stump up through the lower part of the abdominal wound, the fixing of the stump there with long pins, and the passing round it of a *serre-nœud*, which was slowly tightened until it cut through the stump. The abdominal wound was closed in the ordinary way. The method was a very crude one, and suppuration often occurred about the stump and lower part of the wound, so that the healing was very protracted and the mortality was high. Improvements soon began to be made, such as opening of the uterus only after it had been turned out of the abdomen, and controlling hæmorrhage by the application of the tourniquet. The greatest improvement, however, arose as a result of Hegar's method

[1] 'Obstetric Medicine,' p. 367.

of treating the stump in hysterectomy for myoma. Hegar separated the peritoneum, stitched it to the wound, and then dealt with the stump entirely extraperitoneally. This method was perfected by Fehling and others on the Continent, and by Lawson Tait in this country.

While the extra-abdominal treatment of the stump was being perfected, others were engaged in trying to devise a suitable method of treating it intra-abdominally. The earliest device suggested, and carried out in a few cases—it now seems a very primitive one—was to invert the stump or the whole uterus into the vagina. Again, the great advance, although it was somewhat slow in being appreciated, came as a result of improvements in the technique of hysterectomy for myoma. With greater experience and attention to aseptic precautions, Schröder's method of stitching the stump and dropping it back into the abdomen gave such satisfactory results that obstetricians came to adopt it also. At the present time, with the peritoneum carefully stitched over the stump, it is the method generally employed when the uterus is removed by supravaginal amputation.

The extra-abdominal treatment of the stump is still favoured by a few operators[1] in septic cases, for they claim that by that method infection is better prevented. Should it be had recourse to, the uterus is turned out of the abdomen and amputated, the peritoneum turned back and stitched to the abdominal wound, and two pins introduced at right angles to prevent the stump being retracted.

The modern method, which is still erroneously referred to as Porro's operation, consists in securing the uterine and ovarian vessels on both sides by ligatures, amputating the uterus supravaginally, stitching the stump, and finally bringing the peritoneum by a continuous suture over the stump—a method which is correctly described as retroperitoneal or subperitoneal treatment of the stump. The details of the operation are briefly as follows: The patient is placed in the Trendelenburg position, and the intestines are carefully walled off with swabs. The uterus, being pulled out of the abdomen, is dragged over towards one side by the assistant, so as to allow the operator to reach the broad ligament of the opposite side, the hæmorrhage from the wound in the uterus being controlled by firm pressure with swabs, by a long clamp, or by rapidly stitching up the uterine wound. Ligatures are now applied, first to the round ligaments and then to the ovarian vessels, either beyond or on the uterine side of the ovary, according as one decides to remove or leave the latter behind. In passing these ligatures through the broad ligament, one should try

[1] Schauta, *Archiv f. Gyn.*, 1906, Bd. lxxix., Heft i.

to avoid puncturing the large veins which are frequently present. A clamp is then applied close down the side of the uterus, to control any bleeding from the ovarian vessels on the uterine side. The tubes and ovarian vessels are then cut. Any vessels which have not been included in the ligatures are carefully tied, and for the sake of safety I always apply a second ligature round the ovarian vessels.

The securing of the uterine vessels—the next step—is the only troublesome one in the operation. Prior to attempting to secure them, however, the peritoneum on the anterior uterine wall should be divided transversely, just above where it is reflected on to the bladder. In doing this the peritoneum alone should be seized with dissecting or pressure forceps and cut across. If one catches it carelessly, the subjacent cellular tissue, which contains numerous dilated vessels, will be injured, and profuse bleeding will result. The bladder is then pushed down out of the way with a gauze swab. The peritoneum behind the uterus is also divided. One has now opened up the lower part of the broad ligament, and the uterine vessels of each side can be readily seen and felt. The vessels are secured by ligatures passed well round them close by the cervix in case of injuring the ureters, although there is really not much chance of doing this if the bladder has been pushed well out of the way and the ligature is not passed too deeply and too far away from the cervix.

Having secured both uterine vessels, they are cut close by the uterus. Here, again, any vessels that have not been embraced in the ligatures are carefully tied, and a second ligature applied. This second stitch I always introduce with a needle, and, in order to make sure that it does not slip, I take a slight hold of the surrounding tissues. The cervix is now cut across. Not infrequently at this stage several vessels require to be understitched, just at the margin of the cervix. Any other bleeding-points should be searched for, and it is advisable in doing this to relieve the stump from any traction that may be exerted upon it by the vulsellum forceps which is steadying the stump, for traction is sufficient to arrest slight bleeding. In cutting across the cervix it is not necessary to make a V-shaped incision, but one may, if one likes, scoop out a portion from the middle part.

There now remains only the stitching of the stump; prior to doing this, however, I am in the habit of swabbing out the cervical canal with pure carbolic; others use the Pacquelin cautery, or dissect off the mucous membrane. I do not attach great importance to these steps, and many operators dispense with them altogether. The actual stitching of the cervix must be done with care. I usually do it in two layers. The sutures, which are of catgut, are passed through the

anterior and posterior walls of the cervix, but do not include the mucous membrane. The amount of stitching that is necessary depends upon the width of the cervix. In the case of a cervix that has been fully dilated the stump to be stitched is very broad, five deep and two or three superficial sutures being required, while, on the other hand, if the cervix has not been dilated and the stump is quite small, two deep and one or two superficial sutures only are necessary. Some operators do not attach much importance to the stitching of the stump; indeed, a few do not worry about it at all, and simply bring the peritoneum over the cut stump.

Having again satisfied myself that there is no bleeding-point unsecured, the peritoneum is carefully stitched over the stump, and the

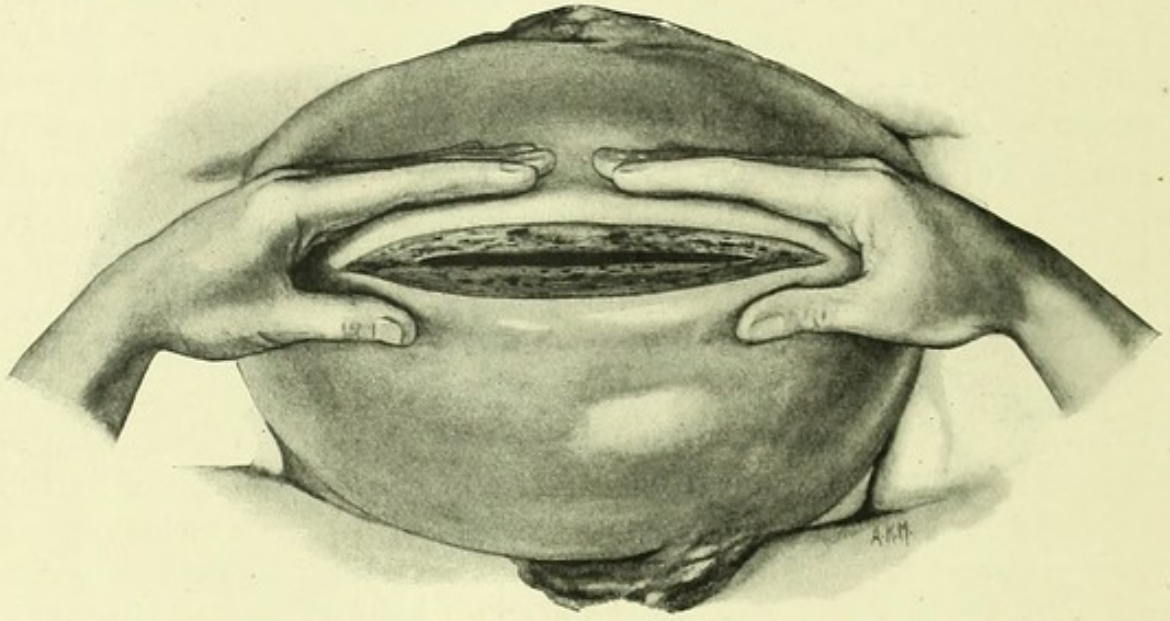


FIG. 191.—The Assistant controlling the Bleeding and bringing the Edges of the Wound together, prior to the Operator introducing the Sutures.

raw surface of the broad ligament brought together with a continuous catgut suture. All blood-clot is now removed, and if the patient is at all collapsed, 1 or 2 pints of normal saline solution are poured into the abdomen. The closing of the abdomen is considered later.

(*b*) *Panhysterectomy.*—When the uterus has to be removed, a few operators prefer total hysterectomy, especially in septic cases; it is also indicated in carcinoma of the cervix, and in certain cases of uterine myoma.

The steps in the operation are, up to the point of tying the uterine vessels, the same as those followed in supravaginal amputation. The bladder must now be pushed further down, and the tissues around separated from the cervix and the upper part of the vagina. The latter is then clamped with forceps curved at the ends, one clamp being placed lower than the other. The vagina is then divided

between them. In the non-pregnant this is a simple matter, but in the parturient the canal is so wide that it is a little more difficult. This double clamping is to prevent any of the uterine and vaginal discharges contaminating the peritoneum. The anterior and posterior vaginal walls are then stitched together, or, if it is thought better, a small opening is left, through which a gauze drain is inserted and pushed into the vagina. In septic or suspected septic cases the latter method is the best.

(*c*) *Retention of the Uterus without Sterilization — Conservative Cæsarean Section.*—This is the ideal operation, and it is the one which,

Fig. 192.—Another Method of controlling Hæmorrhage.
The assistant grasps the uterus and ovarian vessels between his thumb and fore and middle fingers.

as far as one can judge, will come more and more into vogue as technique improves and patients are placed before labour under conditions favourable for operation.

The operation is carried out as follows: After the placenta and membranes have been carefully removed from the uterus—this must be done very completely—the organ is grasped by the assistant as represented in the illustration (Fig. 191). I have tried other methods of holding the uterus while the sutures are being inserted, and these other methods are shown (Figs. 192 and 193); but they are not so satisfactory, for they prevent the escape of blood from the

uterus. The application of a tourniquet round the cervix to control hæmorrhage is, I think, undesirable, as it has a paralysing effect upon the uterine muscle. It is true the method I have indicated as being the best is rather irksome for the assistant, but with a little practice, and by not grasping the uterus too firmly at first, this will be lessened. As may be seen in the illustration, the assistant applies the thumb and forefinger of each hand to the sides of the incision, and brings the two inner edges of the wound exactly into apposition ; this is of the very

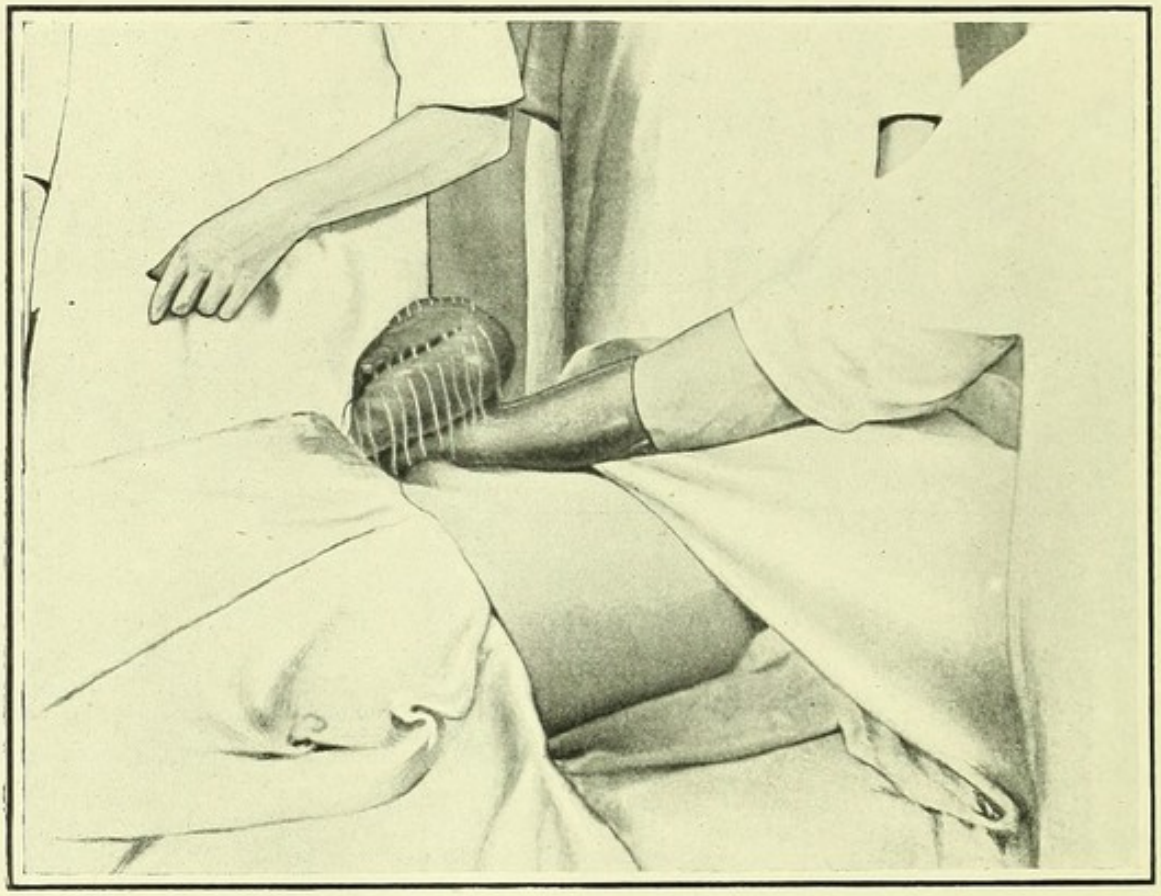


FIG. 193.—The Uterine Sutures inserted.

It also shows another method for controlling hæmorrhage. The assistant compresses the vessels against the uterus by grasping the uterus with one hand. This method of controlling hæmorrhage is practically the same as the application of a tourniquet round the cervix.

greatest importance, because, in order to get a firm cicatrix in the uterus, the stitches must be inserted through the entire uterine wall up to the mucous membrane (Fig. 193).

I agree with Cullingworth, Zweifel, and Fritsch that no harm results from stitching through the whole thickness of the uterine wall. Indeed, if the placenta has been situated on the anterior wall under the incision, I think it a distinct advantage, for in such cases the deeper portions of the uterine wound, being occupied by large sinuses, are very friable ; consequently, in tightening the sutures they are apt to tear through the deeper parts of the wall, and only the superficial

parts are brought into apposition. The mistake is often made of only stitching the superficial layers of the uterine wound, and unless one is very careful this mistake is easily made, for the internal part is often retracted, and, the whole internal surface of the uterus being raw, it is difficult exactly to define the internal edges of the wound. The only possible objection to stitching through the whole thickness of the uterus is that a portion of the suture, being situated in the uterine cavity, is liable to become infected, and this infection may spread along the sutures. If infection of the uterus does occur, however, it is very questionable if the patient's chances would be any better had the stitches not included the mucous membrane.

For the last few years I have always used catgut for suturing the uterus. I prefer catgut to silk, not because it is a better material for suturing, but because a silk suture, if it becomes infected either from within or without, results in a most troublesome sinus. On two occasions this has happened to me, and in one case a couple of sinuses persisted so long and annoyed the patient so much that I had to open them up and remove the silk stitches. Many operators, however, still prefer silk. If it is employed, it should be very fine.

From eight to twelve sutures are usually required, and these are placed at a distance of about $\frac{1}{3}$ inch apart (Fig. 194). In addition, a few fine superficial stitches are also inserted between the others, wherever the edges of the wound are not in perfect apposition.

In tying catgut sutures a double knot is always desirable, and the superfluous portion of the suture must not be cut off too near the knot, for the uterus being an organ that does not remain passive, but is frequently contracting and retracting, the knots are apt to come undone. This is no theoretical danger, for it actually occurred in one of my cases. This patient some eight hours after the operation showed signs of collapse. Unfortunately, I could not get to see her, and those who were in charge, not appreciating fully the probability of internal hæmorrhage, did not care to open up the abdominal wound. At the post-mortem examination about 40 ounces of blood were found in the abdominal cavity, and two or three of the catgut sutures were untied. From that it might be argued that silk only should be used, but the disadvantages of that material have been already stated, and are, to my mind, greater than the advantages. If double knots are applied with catgut, and the suture is not cut too near the knot, I think the latter material is the best, and in my last forty cases I have used nothing else.

The uterus is now ready to be replaced in the abdominal cavity, but prior to doing this it is firmly compressed with warm swabs, and all blood-clot, etc., is removed from the abdominal cavity. Such debris

is usually found in front of the broad ligaments and in the utero-vesical pouch, although some may also find its way down into Douglas' pouch. Having replaced the organ, the abdominal wound is closed.

The stitching of the abdominal wall in layers is, I am convinced, the best method of closing the wound. In Cæsarean section, however, the abdominal parietes are sometimes so thin that this is occasionally unnecessary. My usual practice is to stitch in three

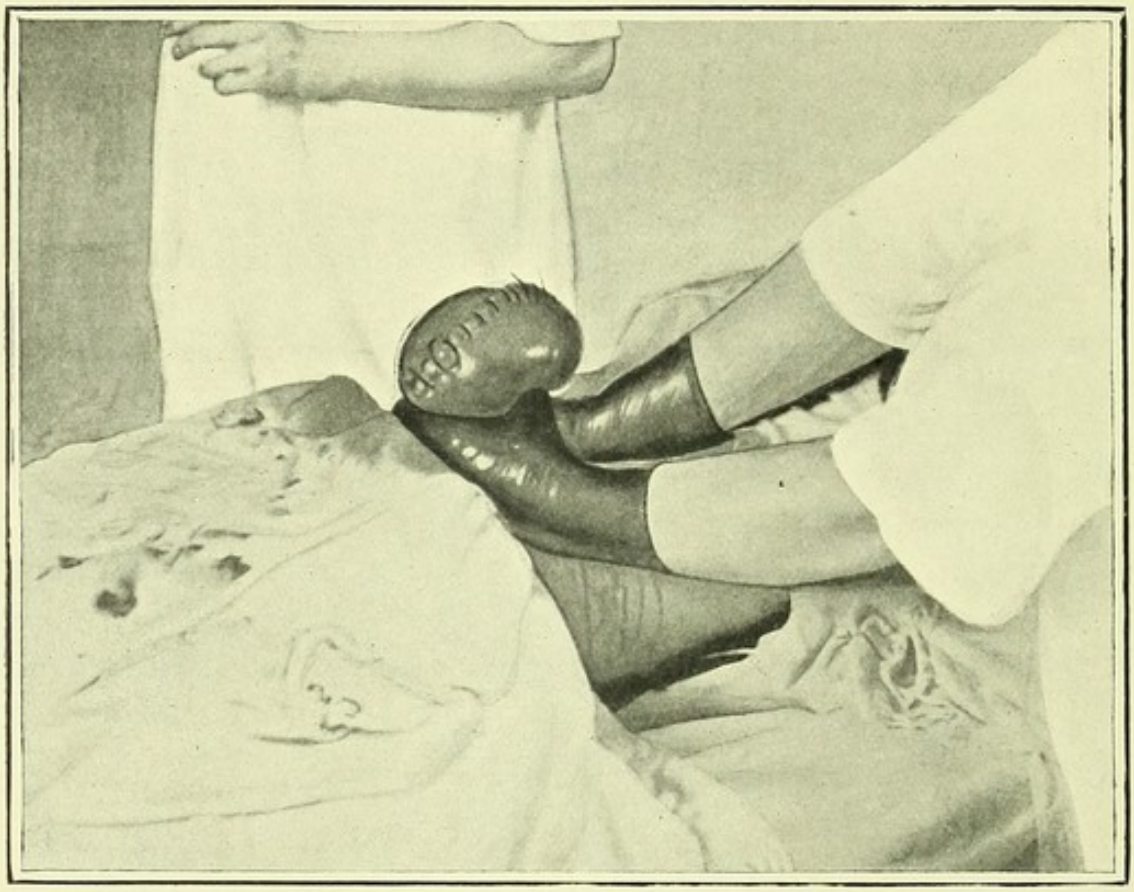


Fig. 194.—The Uterine Sutures tied.

layers. I first stitch the peritoneum with a continuous catgut suture, then I place silkworm gut interrupted sutures through the whole thickness of the abdominal wall except the peritoneum. Before tying these latter, I carefully bring together the rectus sheath with interrupted catgut sutures. This careful closing of the abdominal wound takes ten minutes longer than simple through and through stitching. It is, however, I am convinced, quite worth the time expended upon it. Before the wound is closed it should be washed with normal saline solution and well dried.

After the sutures have been tied, the wound is washed with 70 per cent. alcohol, and a simple dressing of sterilized gauze and gamgee applied. The dressing is not, as a rule, changed until the twelfth day, when the stitches are removed.

(*d*) *Retention of the Uterus and the Sterilization of the Patient by Removal of a Portion of the Tubes.*—This method is the one most frequently employed when it is deemed necessary to sterilize the patient. It has this advantage, that it is an easier operation than hysterectomy, and consequently is specially suited for practitioners who have not had experience of abdominal surgery, and who are suddenly called upon to perform the operation of Cæsarean section in out-of-the-way country districts and without efficient assistants. In hospital practice, however, if the patient is to be sterilized, better results are obtained by removal of the uterus—not that I think removal of a portion of the tubes is an uncertain method of sterilizing the patient, but because the removal of the uterus does away with the dangers of an infected uterus.

The method adopted in the Glasgow Maternity Hospital is to tie the tubes in two places, and remove the small portion between the ligatures. If one is not satisfied with this procedure—and there are a few recorded cases where pregnancy has followed—it is a simple matter to tie the tubes close to the uterus, and bring a fold of peritoneum over the uterine stump of the tube.

There is one reason which I think might justify sterilization, as here described, and it is that if at a future date the woman wishes to have a chance of another pregnancy one might perform abdominal section, and unite the two ends of the tubes together again. Here are two cases to illustrate what I mean: A patient who had been sterilized as described came to me in great distress because her child had died. I told her that I could do nothing for her, but it occurred to me afterwards that the procedure mentioned might have been suggested to her. Some months later I did suggest it to another patient who had been sterilized and who had also lost her child, but she would not consent to the operation. Such a procedure as I have suggested is quite feasible, provided one simply cuts and ties the tubes, for in two cases in which I saw the abdomen opened on a subsequent occasion because of the presence of an ovarian tumour, the ends of the tubes were patent, and could have been easily reunited.

This is perhaps the most suitable place for considering the question of sterilization after Cæsarean section—a subject of great interest, and regarding which very different views are held at present. With regard to this subject there appears to me to be three matters for consideration: (1) The ethical question; (2) the danger to the patient of the repetition of the operation; (3) the danger of rupture of the uterus during a subsequent pregnancy.

From the ethical standpoint the question of sterilization is a very

subtle and difficult one, but it is one which, without doubt, will be much discussed as the mortality from Cæsarean section falls. A most interesting discussion on the subject took place at a meeting of the American Gynæcological Society.[1] It followed the reading of a paper by Green on 'Repetition of Cæsarean Section on the same Patient: the Experience at Boston Lying-in Hospital.' Green took up a very strong position, as can be judged from the following quotation: 'I venture to assert that the only safe and moral ground for the medical profession is that based upon modern medical science uninfluenced by sociological considerations. If a woman comes to Cæsarean section and recovers, she and her husband, if she has one, should be informed of her condition, and of the prognosis and treatment in the event of future pregnancy; if subsequent pregnancy ensues, the responsibility of treatment rests with the obstetric surgeon, but the responsibility for the condition rests elsewhere.'

In the same discussion, Whitridge Williams distinguished between 'pauper patients' and 'women in the upper walks of life.' As regards the former, he is reported to have said: 'I do not believe we are justified in allowing pauper patients to be subjected to repeated Cæsarean section unless they particularly desire it.' As regards the others, he continued: 'They should be made to share the responsibility with the physician. In such cases the husband and wife have the right to demand sterilization, though I should earnestly dissuade them from it after the first operation, and point out to them the possibility of the subsequent death of the child and the absolute impossibility of having another after such an operation. If, however, the patient requires a second operation, the matter should be left almost entirely in her hands; but my advice would tend in the direction of rendering her sterile at that time, as, no matter how favourable our results may be, an occasional death is bound to occur.'

A similar discussion followed a paper read by me before the London Obstetrical Society.[2] Spencer, who has for many years consistently recommended the conservative operation, said: 'The matter was an ethical one, to be decided entirely by the doctor, and that his duty was to deliver the woman and restore her as nearly as possible to a natural condition, a result obtained by the conservative operation without sterilization, and not by the mutilating operation of hysterectomy, nor by the unreliable and dangerous one of tying the tubes. If the patient became pregnant again, the responsibility was not the doctor's, whose duty was to repeat the Cæsarean section, which experience had shown to be very safe.'

[1] Trans. Amer. Gyn. Soc., 1903, vol. xxviii., p. 128.

[2] Trans. Lond. Obst. Soc., 1905, vol. xlvi., p. 309.

Herman, on the other hand, is reported to have said: 'It was for the patient to decide whether she would be sterilized or not.' Cullingworth sided with Spencer, and Routh with Herman.

The danger of repeated Cæsarean section has been gone into very fully by Wallace,[1] who writes: 'Taking into consideration 60 modern cases, Cæsarean section was performed in each of 43 cases, 3 times in each of 15 cases, 4 times in 1 case, and 5 times in 1 case.' The mortality in the 60 cases works out at 9·5 per cent. Since then many cases have been reported, and the mortality has fallen much lower; indeed, speaking generally, it has fallen below the mortality of Cæsarean section performed for the first time. This is to be accounted for in several ways. The chief reason is that if the operation is to be repeated the woman is watched carefully during the later weeks of her pregnancy and is taken into hospital or private home before labour is expected, and so is well prepared for the repeated operation.

Another reason given for the lower mortality is the presence of extensive adhesions, which, it is claimed, shut off the general peritoneal cavity so that the uterus may be evacuated without opening into the general peritoneal cavity. Now, while I admit that adhesions are usually found at a subsequent operation, they are not always so extensive as to permit of the second operation being performed outside the general peritoneal cavity. I have performed the operation twice on the same patient upon six occasions, and in another case I have had to open the abdomen because of the rupture through the cicatrix of a previous Cæsarean section wound in a woman who had nearly reached her term. In the latter case there were absolutely no adhesions. In one of the six cases where the operation was repeated there was only a slight adhesion to the anterior abdominal wall, but in the other five cases the adhesions were more or less extensive. In only two, however, would it have been possible to open the uterus without also opening the peritoneal cavity. Naturally, with each operation the adhesions between uterus and abdominal parietes become more intimate.

A danger in the repeated operation is that occasionally a portion of bowel gets between the uterus and the abdominal wall, and may be injured at a subsequent section. Schauta[2] mentions two cases in which that happened. A simple way of preventing this danger is to encourage adhesions between uterus and abdominal parietes, as Sinclair and Wallace have suggested. The former advocates stitching the uterus to the abdominal wall. Most operators try to prevent adhesions, and bring the omentum down over the uterus.

[1] *Journ. Obst. and Gyn. Brit. Empire*, December, 1902.

[2] Neumann, for Schauta's Klinik, *op. cit.*, p. 79.

Sinclair's and Wallace's suggestion of encouraging adhesions is surely much more rational.

It has been my practice, up to the present, to sterilize all patients after a second Cæsarean section, either by tying the tubes or, more generally, by removing the uterus. I find myself in agreement, therefore, with Whitridge Williams, for I feel that a woman who has twice subjected herself to Cæsarean section has done sufficient for her family and the State. Others, however, have acted differently, and have repeated the operation three, four, five, and even seven times. I do not say that I will not ultimately follow their example, but at present I am not convinced it is the right treatment.

The danger of the uterine cicatrix giving way at a subsequent pregnancy or parturition is the chief argument advanced by those who are opposed to the conservative operation. The number of cases in which the uterine cicatrix has given way are not numerous, but in this connexion it must not be forgotten that until recently only a few were left unsterilized. Even at the present time the number left unsterilized is not great. Relatively speaking, I would say there is a fair proportion in which rupture has occurred. In recent years, for example, ruptures have been recorded by myself,[1] Guillaume,[2] Koblanck,[3] Woyer,[4] Target,[5] Galabin,[6] Everke,[7] Meyer,[8] Eckstein,[9] Prusmann,[10] Convelaire,[11] Werth,[12] and a few others.

In connexion with these cases, it is an interesting fact that in a large proportion the placenta was situated over the cicatrix of the previous Cæsarean section wound.

Without doubt, in most cases the rupture has resulted from imperfect suturing of the uterine wound. As I have already pointed out, this mistake is very easily made, for the inner part of the wound tends to retract, and so the two surfaces are not completely and exactly brought together.

Results to Mother and Child.

As regards the results to mother and child from Cæsarean section, I shall only consider cases of contracted pelvis, for one can hardly estimate the mortality from the operation in cases of eclampsia, accidental hæmorrhage, etc.

[1] *Journ. Obst. and Gyn. Brit. Empire*, November, 1904.
[2] *Cent. f. Gyn.*, 1896, p. 1286.
[3] 'Uterus Rupture,' 1896.
[4] *Monat. f. Geb. u. Gyn.*, 1897, Bd. vi., p. 192.
[5] Trans. Lond. Obst. Soc., vol. xlii., 1900, p. 262.
[6] *Ibid.*, p. 243.
[7] *Monat. f. Geb. u. Gyn.*, 1901, Bd. xiv., p. 637.
[8] *Cent. f. Gyn.*, 1903, p. 1416.
[9] *Ibid.*, 1904, p. 1302.
[10] *Cent. f. Geb. u. Gyn.*, 1905, Bd. lv., p. 415.
[11] *Cent. de Gyn.*, 1906, p. 148.
[12] *Cent. f. Gyn.*, 1906, p. 565.

Taking my own results, I and my assistants have performed the operation sixty-two times. Five of the mothers died—a maternal mortality of 8 per cent. One of the deaths I have already referred to: it resulted from hæmorrhage. The sutures of the uterine wound came undone. The other four resulted from sepsis. Two I could hardly blame myself for, as the women were probably infected before admission. Of the other two, one died although resident in hospital for a short time beforehand and carefully prepared for operation, while the other was in hospital for nearly twenty-four hours, and had not been examined outside. These two latter deaths should not have happened. I was so disturbed by their occurrence, which took place about a year and a half ago, that I instituted a more thorough preparation of my own and my assistants' hands, and in addition had recourse to rubber gloves, and insisted that the two nurses assisting should do the same. I again directed my assistant to wash out the vagina before operation, which had been in abeyance when the two deaths occurred. From a very extensive experience of Cæsarean section—in former years as an assistant, and in recent years as an operator—I am convinced that there is no abdominal operation in which it is more difficult to prevent infection. It is the easiest of all abdominal operations, and yet it still has a high maternal mortality—in my experience twice as high as ovariotomy and three times as high as hysterectomy for myoma. I have considered the reasons for this earlier in the chapter.

At one time it was thought by several operators that hysterectomy gave a lower mortality than the conservative operation, and the results from the two methods were often compared. At the present time, however, the two cannot be compared, for, with few exceptions, hysterectomy is now reserved for the septic cases or suspected cases, in which the mortality will always be high.

The following are the results of some British operators:

	Number of Cases.	Number of Deaths.	Percentage Mortality.
Cameron	50	10	20
Donald	16	1	6
Herman	25	3	12
Munro-Kerr	62	5	8
Spencer	14	0	0
Tweedy	5	0	0

Amongst the best results are those of Queen Charlotte's Hospital. During the last two years there have been twenty-five cases of Cæsarean section for contracted pelvis without a maternal death.

The results in this country compare very favourably with those of Continental operators, as may be seen from the most recent results of Olshausen[1] and Schauta.[2] The former, for 91 cases, had a mortality of 9·8 per cent., and the latter, for 158 cases, had a mortality of 5 per cent. The latest results, those of Leopold,[3] show 7·5 per cent. mortality for 188 cases.

As regards the children, I am glad to say that I have only once delivered a dead child. In this case the fœtal heart was heard two hours before the operation was performed, but through some mistake it was not auscultated immediately before operation. It is almost inexcusable to deliver a dead-born child by Cæsarean section unless the pelvic deformity is so extreme that the child can only be delivered by that means. Several operators do not seem to appreciate this sufficiently, for, although their maternal mortality is quite satisfactory, their fœtal is distinctly too high.

Post-mortem Cæsarean Section.

The performance of Cæsarean section upon women who die during parturition or late in pregnancy is an operation of great antiquity; indeed, its beginning is lost in mythology. According to the Lex Regia instituted by Numa Pompilius, it was decreed that the operation was to be performed should the mother die during the later weeks of pregnancy or parturition. From the very earliest times, therefore, it has been appreciated that an attempt should be made to save the child, provided the child is viable, in all cases where the mother dies.

Owing to the fact that, comparatively speaking, so few children are saved by post-mortem Cæsarean section, it has been recommended at different times that the operation should be performed before the death of the mother actually occurs. According to Fasbender, this was first mentioned by Rodericus a Castro in 1603. The operation upon the dying has always been so repugnant, however, to both the friends and medical attendants that it has been performed comparatively seldom. Apart from sentiment, there is everything to be said in its favour, so that it is not surprising that from time to time it should have been advocated. Kleinhans,[4] who discusses the subject very fairly, gives the following as the conditions which must be fulfilled before an operation is proceeded with:

[1] *Cent. f. Gyn.*, 1906, No. 1, p. 1.
[2] Neumann, *Archiv f. Gyn.*, 1906, Bd. lxxix., Heft i., p. 1.
[3] *Archiv f. Gyn.*, 1907, Bd. lxxxi., Heft i.
[4] Winckel's 'Handbuch,' 1906, Bd. iii., Teil i., p. 844.

1. 'The death of the pregnant woman must be imminent. It is essential that several doctors give a unanimous verdict to that effect.

2. 'There must be proof that the child is alive. Here also it is essential to have the examination and opinion of several doctors.

3. 'The Cæsarean section, which is quickest and least dangerous for the child, is the operation indicated.'

Two comparatively recent papers on the subject are those by Dohrn[1] and Füth.[2]

In recent years a number of children have been saved by post-mortem Cæsarean section, and that, too, after a considerable interval from the death of the mother. For instance, Weisswange[3] described a case where the child was delivered alive nineteen minutes after the death of the mother.

Very valuable experiments on rabbits were made by Runge[4] many years ago.

My own experience of post-mortem Cæsarean section is limited to two cases—one done by an assistant in hospital, and the other by the practitioner who called me to the case in consultation. Neither of the children were saved, although in the latter case, where the mother died of heart disease, the child's heart was still beating feebly when it was extracted.

As one would expect, the cases in which there is the greatest chance of saving the child are where the mother dies suddenly, and the operation is performed immediately.

[1] *Samml. Klin. Vorträge*, 1900, No. 274.
[2] *Cent. f. Gyn.*, 1905, p. 714.
[3] *Ibid.*, 1903, p. 298.
[4] *Zeit. f. Geb. u. Gyn.*, Bd. ix., Heft ii.

CHAPTER XXVII

INDUCTION OF PREMATURE LABOUR

To whom belongs the honour of first suggesting the operation of induction of premature labour is uncertain, and the difficulty of discovering is rendered all the greater by the fact that induction of abortion for grave conditions threatening the mother was performed in very early times. From the beginning of the Christian era, discouraged by the Church, it ceased to be practised almost entirely amongst Christian peoples.

With the revival in midwifery, and the placing of the latter once again upon a scientific basis by Paré and his pupils, artificial interruption of pregnancy for conditions threatening the mother came to be recommended. For example, in certain severe cases of hæmorrhage Guillemeau recommended and practised emptying the uterus. Earlier than that, even, we have in Germany the distinguished midwife Siegemundin recommending rupturing the membranes through the placenta in placenta prævia. For other complications, such as valvular disease of the heart, nephritis, etc., the operation is of recent date.

But there is a condition which must interest us above all others, as furnishing an indication for the induction of premature labour, and it is a medium degree of pelvic deformity. The history of the operation in this connexion is well known. In the year 1756 there was a meeting in London of the most distinguished obstetricians of the day to discuss the morality of induction of premature labour in contracted pelvis. The finding of the meeting was in favour of the operation, and shortly afterwards Macaulay performed it for the first time. Doubtless it had been talked about prior to that gathering, not only in Great Britain, but also in France, Germany, and Italy. Be that as it may, it was first performed in Great Britain, and, what is more, for many years it was only in our country that it was practised. In France, owing to the opposition chiefly of Baudelocque, the treatment was condemned; and so strong was his and his pupils' antagonism

that it was not until 1831 that it was performed there. In Germany, however, it was accepted earlier, for Wenzel performed it in 1809.

Indications for Induction of Premature Labour.

What strikes one in reading the literature on this subject is the great differences of opinion held by obstetricians, especially the extreme position so many of them take up with regard to each of the several indications, and how often apparent inconsistency is evidenced, extreme licence being allowed in one condition, and equally extreme restrictions being laid down in another.

The indications for induction of premature labour or abortion may, for convenience' sake, be divided into obstetrical and medical. Under obstetrical I would place all pathological conditions in the mother or child which render delivery at term dangerous, or necessitate the adoption of an operation of greater seriousness than the one we are considering. Thus, in this group I place contracted pelvis and undue size of the fœtus. It will be observed that I have not included contractions and malformations of the soft parts, nor tumours of the uterus, ovary, etc., for all accoucheurs are agreed that induction of labour in such conditions is rarely, if ever, advisable.

But let us consider the medical indications first. These I would say are conditions in which, owing to disease, it is felt that the pregnant condition is endangering the life of the mother or child. On the maternal side there are in this division an enormous number of diseases, but they may be arranged in three groups: (1) Acute diseases occurring during pregnancy; (2) chronic diseases associated with pregnancy; (3) diseases peculiar to pregnancy.

On the fœtal side, its habitual death in the later weeks of pregnancy and the protraction of pregnancy beyond the normal ten lunar months are the conditions which call for consideration.

1. **Acute Diseases occurring during Pregnancy.**—The induction of premature labour or abortion in acute febrile conditions is almost never indicated. Doubtless, in many of these acute diseases, especially if the type is severe and the temperature runs high, an early induction of labour would result in some children being saved, but it would also with equal certainty be followed by a higher maternal mortality. It is, therefore, the universal opinion of both physicians and obstetricians that the interfering with pregnancy, except in most exceptional circumstances, is decidedly contra-indicated. But it is just regarding these exceptional circumstances that an opinion is desirable. Speaking in a very general way, I would say that induction of labour is indicated under the following circumstances—if with a dead child *in*

utero there is evidence of septic absorption occurring from it. This, of course, is very rare if the membranes are intact; indeed, as far as I can remember, I have seen only one case. Again, if the size of the distended uterus is interfering with the cardiac and respiratory functions, the operation must be considered. In this connexion, however, it must not be forgotten that a labour puts a very severe strain upon a heart embarrassed by an acute febrile condition, especially if one forcibly dilates the cervix. In such cases, therefore—and they must be very few in which labour has to be induced—I feel inclined to favour the more rapid method of emptying the uterus by incising the cervix. Should the woman not be able to stand such an operation, simple rupture of the membranes might give partial relief.

There is one other matter which comes for consideration here. In the case of a viable child, should labour be induced in the interests of the child if the mother is evidently dying? It is hardly necessary to say that it is extremely trying to an operator's feelings and sentiments to operate upon a dying woman when he is not performing the operation in her interests. In spite of that, however, I think it is his duty to do the best for the child, and consequently to empty the uterus before the mother's death rather than wait and do it post-mortem, when there will be very little chance of saving the child. This same question was also considered in connexion with Cæsarean section on the dying (Chapter XXVI.).

It is hardly necessary to say that acute conditions such as appendicitis and intestinal obstruction must be dealt with in exactly the same way in the pregnant as in the non-pregnant. One would never think of inducing labour in such conditions.

2. **Chronic Diseases complicated by Pregnancy.**—As might be expected, induction of labour or abortion is more often called for in cases belonging to this group. But while that is so, we find great differences of opinion amongst writers regarding the indications for such radical treatment. In the next group to be considered, 'diseases peculiar to the pregnant condition,' we shall find much greater uniformity of opinion, for there labour is induced when all other means fail to arrest the downward progress of the patient. With chronic diseases, however, the same downward progress is not as easily appreciated, and so the difficulty of deciding is greater, and taxes more the operator's judgment.

The chronic diseases most commonly found associated with pregnancy are renal cirrhosis and valvular disease of the heart. Although it is universally agreed that neither of these conditions *per se* is a sufficient indication for the induction of either premature labour or

abortion, with each of them the operation may be necessary, when, in spite of the ordinary treatment, rest in bed, dieting, and the administration of suitable drugs, the patient's condition does not sufficiently improve. With chronic nephritis one is inclined to interfere earlier, and not to give the child so much consideration, seeing that its life is so very precarious and its death and premature expulsion so frequent. Therefore, when pronounced symptoms, such as severe headache, disturbance of vision, etc., develop in spite of treatment, labour should be induced without delay. Even prior to these symptoms developing a progressive diminution in the quantity of urine and in the output of urea calls for the operation.

In this connexion must be mentioned 'retinitis albuminurica,' which in the chronic variety is a serious complication. I understand, however, that the prognosis from the ophthalmological point of view is very good in such cases, and that induction of labour is seldom necessary on account of any permanent damage to vision resulting.

As regards chronic valvular disease of the heart it is different, for in that condition there is a great danger during and after parturition of pronounced cardiac failure. I have several times induced labour for cardiac disease, but always with considerable anxiety, for although the patients, with one exception, have stood the labour well, one or two have died a few days later. Often for the first twenty-four or thirty-six hours in such cases there is marked improvement, to be followed in a few days by an aggravation of all the symptoms of cardiac failure, which steadily increases in spite of all one's efforts to arrest it. I am, therefore, very loath to induce labour in valvular disease, unless I am compelled to do so owing to the patient becoming steadily worse in spite of treatment. Most recent obstetric writers of experience are also of this opinion. Many of them refer to the greater safety of emptying the uterus in the early months, and I am at one with them in that.

It is an advantage in this condition to empty the uterus rapidly, with as little shock as possible to the patient. Consequently, this is distinctly one of the conditions in which I believe vaginal Cæsarean section has a place.

In recent years several monographs have appeared on the various anæmias and other blood diseases in pregnancy, and the indications for the induction of premature labour in such conditions have been fully discussed. Herman,[1] for example, considered recently leukæmia and pregnancy, and came to the conclusion 'that in leukæmia with pregnancy the induction of premature labour or abortion is indicated

[1] Trans. Lond. Obst. Soc., 1901.

as a therapeutic measure.' Many years ago Gusserow and Graefe referred to the great danger of pregnancy in women the subjects of pernicious anæmia. Recently, however, Schauta has indicated that little benefit results from emptying the uterus in these cases.

Another disease which, along with others, I have found very seriously aggravated by pregnancy is Graves' disease, and I certainly agree with those who would induce labour if this complication is pronounced, particularly as the disease is very intractable after pregnancy. Williamson[1] has recorded a case where labour or abortion was induced four times. Many obstetricians have been disappointed, however, with the benefit derived from emptying the uterus.

Chorea gravidarum is another condition which occasionally necessitates the operation. In recent years there have been several interesting papers on the subject. Amongst the most valuable in the English language are those of Buist,[2] Dyce Duckworth,[3] Wall and Andrews,[4] and Shand.[5] With the exception of Wall and Andrews, Shand, and a few others, most authorities are agreed that induction of labour should be resorted to when the movements are extremely violent, and are uninfluenced by treatment, and when extreme sleeplessness, and especially mania, supervene. In this disease, as in others presently to be considered, the operation must not be too long delayed, a mistake which is so often made.

3. **Diseases Peculiar to Pregnancy.**—Regarding such diseases, the large proportion of which are toxæmias, one can generalize to this extent, and say that the induction of labour or abortion becomes necessary if, in spite of treatment, the patient steadily loses ground and her life is seriously endangered. The usual mistake in practice is for the medical attendant to postpone the operation too long. This is especially the case with hyperemesis, the most common of all the conditions calling for this radical treatment. It is quite impossible to lay down hard-and-fast rules as to when abortion should be induced in hyperemesis. If, however, after general and local treatment, and complete rest to the stomach by rectal feeding, the retching continues, or returns whenever any aliment is taken by the mouth, and if the pulse becomes progressively more rapid, the time for emptying the uterus has arrived. Pinard is more definite, and relies chiefly upon the pulse, and recommends induction if it rises above 100. But such a simple and exact rule cannot be followed. How far the increase in the 'ammonia coefficient' (percentage of nitrogen put out as ammonia

[1] Trans. Lond. Obst. Soc., 1904, p. 95. [2] Trans. Edin. Obst. Soc., vol. xx.
[3] St. Bartholomew's Hospital Reports, 1903.
[4] *Journ. Obst. and Gyn. Brit. Empire*, June, 1903.
[5] *Ibid.*, April, 1907.

compared with the total nitrogen of the urine) is of value as indicating the seriousness of the condition one cannot at present say, but Williams[1] believes ten per cent. indicates danger.

With hydramnios, another condition which often causes the pregnant woman great discomfort, one has less hesitation in bringing on labour, for the child or children (plural pregnancy is common) are often very weakly. It must not be forgotten, however, that when hydramnios develops in the later weeks of pregnancy, the children may be born quite healthy and strong. Early and acute hydramnios usually calls for interference, and at all times the pregnancy must be interrupted if the condition is causing severe general disturbance and impairment of the respiratory, circulatory, and digestive functions of the mother.

As regards affections of the kidneys in pregnancy, one meets with them in several different forms. Chronic cirrhosis has been already referred to. What, to all intents and purposes, is an acute nephritis may attack the pregnant woman. The features of it are its sudden onset and the presence of large quantities of albumen and blood in the urine. Then there are the cases of 'pregnancy kidney,' with often only a slight amount of albumin, but an amount which is very variable, and often suddenly increases. In many of these cases the albumin disappears soon after delivery; sometimes in two or three days it is entirely gone. In a certain number, however, it continues for long after parturition, sometimes for weeks and months. Indeed, I know of two cases in which it has never disappeared, and the women are now the subjects of chronic nephritis.

With each of the varieties mentioned eclampsia may develop, and with the two first it may develop very suddenly. If, however, the patients are under observation, and are suitably treated, it can generally be warded off. Once or twice in my experience, not only have the seizures been averted, but the pregnancy has continued. Frequently the fœtus dies, and labour supervenes. When eclampsia does threaten, as is evidenced by severe headache, epigastric pain, and amaurosis, and the ordinary means to avert it do not avail, induction of labour must be had recourse to.

In connexion with the subject of induction of labour and albuminuria, to my mind the most difficult cases to come to a decision upon are those in which, in spite of treatment, albumin continues in considerable amount. These are the cases when it often continues for long after labour, and sometimes even becomes chronic. In such cases one has to consider induction, not so much because of the fear of eclampsia, which, although sometimes occurring, can generally be

[1] *Amer. Journ. Med. Sciences*, September, 1906, p. 343.

averted by suitable treatment, as the danger of a chronic cirrhosis of the kidney being established.

I cannot express a decided opinion upon these cases, because they are not the variety one encounters very often, and so one must be cautious in generalizing; but I have once or twice seen such slow recovery—months of albuminuria after delivery, and in two cases chronic cirrhosis established—that a few more similar experiences would decide me in favour of induction of labour whenever the child was viable. The difficulty, of course, in such cases is that one does not know beforehand whether or not the albumin will be slow in disappearing. Personally, I have always found it slow in going if it continues in distinct amount for some time before labour.

Another condition which calls for induction of labour or abortion is icterus, when it becomes pronounced and is attended with progressive general disturbance.

Habitual Death of the Fœtus in Later Weeks of Pregnancy—Protraction of Pregnancy and Unusual Size of Fœtus.

In these conditions one often obtains satisfactory results from the operation of induction of labour.

With habitual death of the fœtus in the later weeks of pregnancy, induction shortly before the date at which the fœtus usually dies (be syphilis the cause or not), often proves very satisfactory. With our present knowledge there is no exact means of diagnosing when the life of the fœtus is in danger. We trust to arriving at the date from previous experience, and we make sure of not inducing after the death of the child by auscultating the fœtal heart. In this connexion I would mention one case in which the slow death of the child *in utero* was observed, although I was unaware at the time I was doing so. The mother had been most unfortunate in her pregnancies, for two ended in the children being born dead in the later weeks of pregnancy and two in abortion. Syphilis could be entirely excluded. During the pregnancy under consideration I insisted upon almost complete rest in bed, and administered chlorate of potash. One day, about four weeks from term, on listening to the fœtal heart, I found that its character had quite altered. One sound had become very much accentuated, and, indeed, it very closely resembled the accentuation of the second sound which occurs in chronic Bright's disease. I made this out on a Monday, and on the Wednesday and Friday it was even more marked. On the following Monday, when I listened, no sounds could be heard; the child was dead. Labour came on about a week later, when a macerated child was expelled. This is the

only case of the kind I have had an opportunity of observing, nor do I recollect of having read any similar observation, so that I can offer no opinion as to the frequency or value of accentuation of one of the fœtal heart sounds as indicating embarrassment of the fœtal circulation in pregnancy.

In protracted gestation, without doubt, the child frequently suffers, and even dies. It is desirable to induce labour, therefore, if protraction of pregnancy has occurred in a previous gestation, or if in any protracted pregnancy the child shows signs of having its circulation embarrassed.

Undue size of the child is sometimes an indication for induction of labour. As a rule, if there has been a previous experience of difficulty, one is perfectly justified in having recourse to such treatment at a subsequent pregnancy, for each individual bears a fairly constant type of child, and it is a peculiarity of some women to have very large children. Prochownik has claimed that he is able to keep down the size of the child by carefully dieting the mother in the later weeks of pregnancy. This is questioned by later observers. As every one is aware this is a very ancient idea.

In the cases where I have had to consider the advisability of inducing labour because of the large size of the child, I have always tested the relative size of the fœtal head and maternal pelvis in the thirty-sixth or thirty-seventh week. If at that time I found the head too large for the pelvic brim, I have induced labour; if not, I have allowed the pregnancy to continue until term.

Induction of Labour in Contracted Pelvis.

As I have already said, the greatest differences of opinion exist regarding the value of induction of labour in contracted pelvis. It may seem strange that this should be so, for the results of many thousands of cases upon which to base a judgment of the operation are now available. But, as in so many other conditions, the difficulty in allocating the treatment its exact value is rendered impossible by the attitude of extremists and partisans.

The advantages of induction of labour are that it is an operation very easily performed, and, if carried out carefully, is associated with a very small maternal mortality. Indeed, theoretically, the maternal mortality should be nil; but, in spite of all care, occasionally infection occurs, and now and then a death from septicæmia follows. This, however, I would place at not higher than 0·6 per cent. Among my twenty-two cases in private and hospital practice in the years 1901 to 1906, inclusive, there has been no death. The great objec-

tion to the operation is the high fœtal mortality. In my twenty-two cases I had a fœtal mortality, immediate and late, of 36 per cent., and that in spite of the fact that I took every possible care in selecting my cases. In judging of the value of induction of labour, one must take the late as well as the immediate mortality. The terms explain themselves. Immediate implies that the children are born dead; late, that they die within two or three weeks of their birth.

If one only thinks of it, many circumstances favour a high fœtal mortality. First and foremost is the fact that the child is premature, and so is more delicate and difficult to rear. Especially is this the case amongst the poorer classes, who are unable to give the premature child the necessary amount of care and attention it requires.

Then there is the great difficulty in determining the age of the child *in utero*. This, also, is especially seen in hospital patients, who have only a vague recollection of such dates as the last menstruation, the onset of morning sickness, quickening, etc., from which one estimates the age of a pregnancy. It is no uncommon occurrence for women to come to hospital with the statement that they have reached 'full time,' and yet to find that they are only in the seventh or eighth month; or to give the story that they are only seven months pregnant, and a day or two after be delivered of full-time children. In private practice, however, this difficulty does not arise so often.

If conditions are favourable, and the different parts of the fœtus can be palpated, one can form a rough estimate of the size of the child. One may even measure the length of the fœtal ovoid, which works out about half the length of the child, and from that determine the age of the fœtus. But it is a very approximate estimate that can be made by such a rough-and-ready calculation, and it is really of no practical value.

It is generally stated that twenty-eight weeks is the viable age, and it would appear from recorded cases that children have been reared born at that age. It has been found by all, however, that below the age of thirty-four weeks the chances of the child surviving are very small indeed; and, after all, it is upon that that we must base our estimate of the value of the operation. I feel convinced, from my own experience and from the records of others, that induction should be performed not earlier than the thirty-fifth or thirty-sixth week. The statistics of the Glasgow Maternity Hospital bear this out. Until a few years ago it was the custom in the hospital to induce labour even earlier than the thirty-fourth week, the date which by almost general consent is now recognized as the earliest at which the operation should be performed. We have given that practice up, however, and personally I have never intentionally induced labour before the thirty-fifth week.

Here arises a point of practical importance. In looking over the older reports in the ward journals of the hospital, it is often not a little difficult to tell what the exact age of the fœtus was when labour was induced, for the operation is generally stated as having been performed at such and such a month. It is most undesirable to speak of months in pregnancy; one must reckon by weeks—for when months are mentioned, who knows whether lunar or calendar months are meant, or whether the beginning or the end of the month is referred to?

It will be seen at once from Black's paper on 'Induction of Labour' in the Glasgow Maternity Hospital, 1896 to 1898,[1] how fatal as regards the interests of the child induction earlier than the thirty-fourth week is. Taking Black's cases, where the pelvis was $3\frac{1}{4}$ to 3 inches, the fœtal mortality when induction was performed before the thirty-fourth week was 80 per cent., and after 40 per cent. It is unnecessary, however, to pursue this aspect of the subject further or to give other statistics; every one is agreed that it is profitless to induce labour earlier than the thirty-fourth week, and that if at all possible it should be performed not earlier than the thirty-sixth week.

As influencing the results of induction of premature labour for pelvic deformity, we must now consider another all-important factor —the pelvic capacity. It is perfectly evident that as one passes from the slighter to the more pronounced degrees of pelvic deformity the fœtal mortality must gradually increase, until it becomes so high that the operation is futile, and should not be considered.

It is seldom necessary to induce labour when the pelvic deformity is very slight, say a conjugata vera of $3\frac{3}{4}$ inches (8·3 centimetres), unless the fœtal head is of usual size. That is determined by estimating the relative size of fœtal head and maternal pelvis.

As regards the lowermost limit let us see how matters stand. Bar[2] states that in fourteen cases where the conjugate was from 7 centimetres or under, and labour was induced, the fœtal mortality was 85·7 per cent. Black, in his record of fifty-two cases, mentions fourteen in which the conjugate was from $2\frac{1}{2}$ to $2\frac{7}{8}$ inches (6·2 to 7·2 centimetres). In these cases the early and late mortality amounted to 78·5 per cent., a mortality very comparable to that given by Bar. These figures are sufficient to prove how hopeless the operation is when the pelvis is below 3 inches (7·5 centimetres). So convinced of this have obstetricians become that, without exception, all are agreed that induction should not be performed in pelves of such small

[1] Trans. Glas. Obst. and Gyn. Soc., vol. ii., p. 121.

[2] 'Leçons de Pathologie Obstétricale,' 1900, p. 147.

dimensions. Induction of labour should not be considered, therefore, if a patient has a pelvis with a conjugata vera of less than 3 inches (7·5 centimetres), except in the extremely rare cases where, after carefully estimating the size of the head and the pelvis, the head is found so unusually small that it will pass through the pelvis without much difficulty at the thirty-sixth week.

Let us now turn to cases in which the pelvis is a little larger, and where there is some prospect of the operation being successful. Here is a table of my twenty-two cases, showing the immediate and late fœtal mortality in the different degrees of pelvic deformity: the terms early and late have been already explained (p. 440).

Table of Author's Cases of Induction of Labour in Contracted Pelvis, 1901-1906.

Conjugata Vera, 3″ (7·5 cm.).	Conjugata Vera, 3¼″ (8·1 cm.).	Conjugata Vera, 3½″ (8·7 cm.).
Total cases, 9. Fœtal mortality (early and late), 44 per cent.	Total cases, 9. Fœtal mortality (early and late), 33 per cent.	Total cases, 4. Fœtal mortality (early and late), 25 per cent.

My experience with a pelvis of 3 to 3⅛ inches (7·5 to 7·8 centimetres) is a fœtal mortality of 44 per cent. Bar[1] found in fourteen cases with a conjugate of 7·1 to 8 centimetres that the mortality, (early and late), was 53·3 per cent. Pinard,[2] for the same deformity, gives for sixteen cases an immediate and late mortality of only 33·3 per cent. Krönig,[3] for Zweifel's Klinik, puts it at 57·4 per cent. Taking Leopold's[4] two groups, which together nearly correspond to those of Bar and Pinard, we find in his twenty-one cases an immediate and late mortality of 57 per cent. Black's figures for practically the same measurements give 61 per cent.; but, then, in two cases which died the labour was induced decidedly before the thirty-fourth week. If these two cases are excluded, so as to bring the conditions as nearly as possible comparable with the others, Black's results work out in eleven cases at 54·5 per cent. mortality, a figure almost identical with those of Bar, Leopold, and Krönig.

Every one, I think, must admit that these results are very disappointing. Even Pinard's of 33·3 per cent., so much better than the others, is a huge fœtal mortality. So much has this impressed

[1] *Op. cit.* [2] *Ann. de Gyn. et d'Obst.*, 1902, Bd. xxxv.
[3] 'Die Therapie beim engen Becken,' Leipzig, 1901.
[4] 'Arbeit aus der Königlichen Frauenklinik,' Dresden, Bd. i., p. 95.

Bar that he states he has now given up inducing labour if the pelvis is less than 8 centimetres (3¼ inches). Krönig points out a most interesting fact, that with pelves of the deformity mentioned the fœtal mortality was only 63 per cent. where the labour was allowed to go on to term. Recently Baisch[1] has come to a similar conclusion.

Taking, now, cases where the pelvis is slightly larger, one finds, where the conjugata vera is 3¼ to 3½ inches (8·1 to 8·7 centimetres), a distinct improvement as regards the fœtal mortality. My results for 3¼ inches (8·1 centimetres) are 33 per cent., and for 3½ inches (8·7 centimetres) 25 per cent. Bar found that, with a conjugata vera of 8·1 to 8·5 centimetres, the fœtal mortality was 31·5 per cent. Leopold for this same figure gives his as 25 per cent. But even these results are not very encouraging; indeed, if I compare them with my results from forceps (23 per cent. and 15 per cent. respectively), it is at once evident that the child has a much better chance of surviving in this particular degree of pelvic deformity if the pregnancy is left alone and labour allowed to terminate spontaneously, or even, indeed, if forceps are employed. I do not for a moment doubt that if cases were chosen from one's private practice and where one could be certain that pregnancy had advanced to the thirty-sixth week, better results would be obtained; but that in hospital practice they can ever be made as good or better than the results from forceps, with, if need be, symphysiotomy, I very much doubt.

To consider the results of induction when the conjugata vera is more than 3½ inches (8·7 centimetres) is hardly necessary, for although with such treatment the fœtal mortality will be very low, so also will it be with forceps; and not only that, but in a very large proportion of cases forceps will not be necessary. The labour will actually terminate spontaneously.

The conclusion I have come to, therefore, from my own experience and from the records of others, is that induction of labour is of little value, if the conjugata vera is below 3¼ inches and above 3½ inches (8·7 centimetres).

I have found the following course the best to pursue in deciding as to whether or not induction of labour is suited for a particular case of pelvic deformity: During the pregnancy, the general capacity of the pelvis is estimated, and the conjugata vera is very carefully measured. If it is below 3 inches (7·5 centimetres), all idea of induction is abandoned. Should, however, the pelvis be 3 inches (7·5 centimetres) or more, the patient is told to return at the beginning of the thirty-fifth week, when she is prepared for operation (the pubes

[1] 'Reformen der Therapie des engen Becken,' Leipzig, 1907, p. 120.

shaved, the parts about the vulva thoroughly cleansed, and the vagina carefully washed), again examined under chloroform, and the relative size of the fœtal head and maternal pelvis estimated. With few exceptions, at this time, cases in which the conjugata vera is less than $3\frac{1}{4}$ inches (8·1 centimetres) can be put aside as unsuitable. *When the conjugata vera is* $3\frac{1}{4}$ *to* $3\frac{1}{2}$ *inches* (8·1 *to* 8·7 *centimetres*), *however, the greatest possible care is taken in estimating the relative size of fœtal head and maternal pelvis. Some cases are dismissed as unsuitable because the head is too large for the pelvis; others are allowed to go on to term because the head can be easily pushed into the pelvis; and others are deemed suitable for induction because the head, although a little larger than the brim, is considered not too large to pass through.* If these rules are followed, the best results will be obtained from induction of labour, and, if the results are not as satisfactory as one would desire, there will at least be the satisfaction that the methods of arriving at a decision regarding the operation have been thoroughly sound and scientific.

Another circumstance influences very decidedly the fœtal mortality in induction of premature labour—viz., whether or not any operative interference is had recourse to in the delivery. The premature fœtus bears operative interference badly. Every writer emphasizes this, and all are agreed regarding the huge fœtal mortality when there is any difficulty with the after-coming head. Take the results in Leopold's Clinic: with primary breech presentation the mortality was 60 per cent., with head presentations it was 15 per cent. From Black's fifty cases the mortality was 25, 41, and 48 per cent., according as the labour terminated—spontaneously, by forceps, or by version.

There is yet another factor which must be mentioned as influencing the fœtal mortality, and it is the last which I shall refer to—the method employed for bringing on the labour.

Most operators recommend that great care should be taken to prevent rupture of the membranes, and that the oldest method, that of puncturing the membranes, is bad; yet quite recently Herff[1] wrote a monograph on the advantage of this method, and gave his primary and late mortality in fifty cases as 12 and 18 per cent. respectively. Kroemer,[2] on the other hand, for the Giessen Clinic, where they employ the metreurynter, gives for ninety-two cases an early and late mortality of 18 and 29 per cent. Lastly, Heller,[3] for the Leopold Clinic, in thirty cases where accouchement forcé with Bossi's

[1] Volkmann's *Samml. Klin. Vorträge*, No. 386.
[2] *Monat. f. Geb. u. Gyn.*, 1904, vol. xx., p. 901.
[3] *Archiv f. Gyn.*, 1904, Bd. lxxiii., p. 554.

dilator was employed, gives the early and late mortality as 16 and 30 per cent. respectively. As far as statistics go, therefore, it would appear as if one method is as good as another. In my cases there has been a higher fœtal mortality with the metreurynter than with the bougie, and I am inclined to think that in a long series of cases the bougie would give the best results.

In conclusion, I must say that the induction of labour in contracted pelvis has disappointed me, and that in spite of the fact that I have chosen my cases with the greatest care. Nor do I stand alone in holding such pessimistic views of the operation. Pinard, Zweifel, and Whitridge Williams condemn it, and many other operators, including Bar, Schauta, Leopold, and Olshausen, although believing it suitable for certain cases very carefully chosen, do not speak of it very enthusiastically. Williamson,[1] in a most excellent review of the subject, speaks of it more hopefully, and he quotes Norris's[2] results. Norris claims that he had an immediate and late fœtal mortality of 10 per cent., but to get that low figure this author explains away some of the fœtal deaths in a manner that hardly satisfies one. I would not care to go to the length of Pinard and Whitridge Williams, who condemn the operation outright; but, as I have already said, it is a most disappointing operation. I regret exceedingly that it is so, for the operation has much to be said in its favour. It is safe for the mother, is easy of performance, and is suitable for private as well as hospital practice. Nor do I think there is much prospect of better results in the future.

Methods for Induction of Premature Labour.

It may be of interest if I enumerate, as nearly as possible in their chronological order, the various methods which have been employed for bringing on premature labour. The dates are, for the most part, those given by Fasbender.[3]

1. Ecbolics, used from earliest times to procure abortion.
2. Rupture of the membranes (referred to sometimes as the English method, 1756; sometimes as Scheel's method, 1799).
3. Separation of membranes (Hamilton, 1810).
4. Massage of breasts (Friedrich, 1839). The sympathy between breasts and uterus was known from earliest times. For inducing abortion, therefore, the method is of great antiquity.
5. Massage of uterus (Ulsamer and d'Outrepont, 1820).

[1] *Journ. Obst. and Gyn. Brit. Empire*, March, 1906.
[2] *Amer. Journ. Obst.*, September, 1904.
[3] 'Geschichte der Geburtshülfe,' 1906.

6. Sponge tents in cervix (Brünninghausen, 1820). Ætius in the sixth century employed this method for removing the dead fœtus.

7. Injection of fluid under membranes (Cohen's method, 1846).

8. Instrumental dilatation of cervix from earliest times.

9. Vaginal tampon (Scholler, 1842).

10. Electricity (Herden, 1802; Schreiber, 1843; Radford, of Manchester, 1793).

11. Introduction of catheter. Generally known as Krause's method (1855), but described by Hamilton some years earlier, and by Mampe in 1836.

12. Hot vaginal douche (Kiwisch, 1846); Scanzoni, hot carbolic douche, 1856.

13. Rubber bag in cervix (Barnes, 1861).

14. Metreurynter (Tarnier, 1862, Braun, Müller, Champetier de Ribes, etc.).

15. Laminaria tents (Wilson, 1865).

16. Tampon in cervix (Kehrer, 1888).

17. Injection of glycerine under membranes (Pelzer, 1891).

Although there are all the above-mentioned devices for bringing on premature labour, only a very few are actually employed. Those which require mention are: The introduction of bougies; the injection of fluids underneath the membranes; metreurynters; and dilatation of the cervix.

It will be observed that I have not included the oldest method—rupture of the membranes—although Herff[1] and Reynier,[2] in recent monographs on the subject, have strongly advocated it. Almost every one else is agreed that it is most undesirable to rupture the membranes before they have effected dilatation of the cervix. Herff claims that by this method there is less chance of sepsis, a greater certainty of a favourable presentation, and less liability of prolapse of the cord. His total fœtal mortality in fifty cases, immediate and late, is 18 per cent.—an extremely good result, one must admit. I am inclined to think, however, that his results are as much due to the care with which the cases were selected and managed as to the method employed.

Insertion of a Bougie between the Membranes and Uterine Wall—Krause's Method.—Although this method is generally known as Krause's method, it was really suggested by Hamilton years before for cases in which simple separation of the membranes was not sufficient. It is the method which is most generally favoured, and to

[1] *Op. cit.*

[2] *Beiträge Geb. u. Gyn.*, 1905, Bd. ix.

the one which, with few exceptions, has been employed in the Glasgow Maternity Hospital. Before considering the advantages and disadvantages of the method, let me describe how it is carried out. The patient, after being carefully prepared for operation, is anæsthetized. The bougie can, of course, be passed into the uterus without anæsthetizing the patient, but it is much less convenient, and there is greater danger of rupturing the membranes. Besides, the risks of sepsis are increased, for, with the patient under an anæsthetic, the vulva and vagina can be much more carefully cleansed and the bougie more easily inserted. The bougie should be a gum-elastic one, and of large size, and should be sterilized either by soaking in perchloride of mercury—1 in 1,000—for twenty-four hours, or by boiling. The bougie should be placed ready for use in a tepid solution of weak lysol, by which means it will be pliant without being too soft. If it is too rigid the membranes are apt to be ruptured, and if too soft it curls up and cannot be easily inserted.

The cervix should be seized by a pair of vulsellum forceps, but no great traction must be made upon it, as otherwise tearing will result. If a finger cannot be passed through the cervix, then Hegar's dilators should be employed to stretch the canal a little. As they are fairly blunt-pointed, they do not rupture the membranes. Before passing in the bougie, the membranes should be separated from the lower segment by sweeping a finger round. This favours the onset of labour, but, more important, it lessens the risk of rupture of the membranes, for the bougie passed in worms its way round the membranes, whereas if the membranes are still adherent when it is inserted, it is very apt to be pushed through them. I usually pass the bougie up the posterior wall of the uterus, as it is easier than passing it up along the anterior wall. Occasionally I have found the progress of the bougie arrested by what was evidently the placenta, but the partial withdrawing and the pushing of it in another direction got over the difficulty. Only once have I seen severe hæmorrhage follow, and in that case it was due, apparently, to separation of the placenta or, possibly, rupture of the circular sinus. The bleeding was so profuse that I was compelled to plug the cervix and vagina.

The bougie should be pushed right home, and some sterilized gauze packed into the vagina over a vaginal retractor or speculum.

I leave the bougie in the uterus until labour is decidedly in progress. If labour has not commenced after forty-eight hours, I again put the patient under an anæsthetic, remove the bougie, forcibly dilate the cervix—which is then usually much softer and more easily stretched—and insert a hydrostatic dilator. It is quite safe to leave the bougie for an indefinite period, provided every care has been taken to

prevent infection; consequently, many operators leave the bougie undisturbed and give hot vaginal douches twice daily until labour starts.

The advantages of Krause's method of inducing premature labour just described are obvious. In theory it is the best of all methods, for it is the simplest reliable way of bringing about uterine contractions and a truly normal labour. But, unfortunately, it has one great drawback, and that is the uncertainty as to when labour will actually follow the introduction of the bougie. On several occasions I have seen two or three days elapse. Indeed, recently I had a case in which labour did not come on for five days. For many reasons that is inadvisable; it keeps the patient and her relatives, not to mention the accoucheur, on tenter-hooks, and the frequent examinations and manipulations increase appreciably the danger of sepsis, and add also to the risks to the child. Besides, valuable time is lost, and, except in cases of contracted pelvis, the condition of the mother which necessitates the induction of labour may in the meantime become much more grave. For these reasons, therefore, in all cases before introducing the bougie, I dilate the cervix and separate the membranes; and if labour does not start in forty-eight hours, I remove the bougie and introduce a metreurynter.

Induction of Labour by Means of the Metreurynter of Tarnier, Müller, and Champetier de Ribes.—The metreurynter in most general use is that of Champetier de Ribes. Before it can be inserted the cervix must be dilated to the extent of allowing at least two fingers to pass, and that is not always easy of accomplishment, especially in the case of a primipara. To get over this difficulty the introduction into the cervix of expanding tents, and keeping them in place by firm vaginal packing for twelve hours, is often had recourse to, but it complicates the operation, and necessitates two anæsthesias within a very short time. When at all possible, therefore, it is better to dilate the cervix and introduce the metreurynter at one sitting. Details regarding the operation are given in Chapter XXVIII.

An important question arises at this point: Should the membranes be ruptured before the metreurynter is introduced? I certainly think the membranes should be ruptured if large bags are employed, as with undilated membranes, the intra-uterine pressure being greatly increased, there is a decided danger of rupture of the uterus occurring. This danger is especially great in placenta prævia. If, however, only a small bag is employed—one, in fact, which is used more for the mechanical irritation it produces than for the amount of dilatation of the cervix that results—then it is unnecessary to rupture the membranes. An excellent procedure, when it is

thought inadvisable to rupture the membranes, is to partially fill the metreurynter, and then as the cervix expands to gradually add some more fluid. The collapsed bag, having been introduced through the cervix, is filled with sterilized water, the projecting portion of tubing is wrapped up in gauze, and the patient put back into bed.

Unless there is some great necessity for hastening the delivery, the uterine contractions are allowed to expel the bag; no traction is made upon the tube. The time which elapses before the bag is expelled varies greatly, twelve hours being the average in my cases, although in one it was thirty hours before it occurred. The experience of other writers is very similar. Kroemer[1] states that the average time before the onset of labour in his ninety-two cases with the bougie was twenty-four to forty-eight hours, and with the metreurynter fifteen hours. The early and late fœtal mortality was 31·2 per cent. Zimmermann[2] records twenty-three cases of induction with the bougie in which the time averaged eighty hours, and ninety cases of induction with the metreurynter in which it averaged seventeen hours. This author does not approve of rupturing the membranes before inserting the metreurynter even in cases of placenta prævia.

After the expulsion of the metreurynter, the delivery of the child should be left to Nature. If delivery has to be hastened, many prefer version, but in the Glasgow Maternity Hospital we have had a higher fœtal mortality after version than after forceps.

As far as can be judged, in France and Germany very many obstetricians at present favour the metreurynter, although they are agreed that it is a treatment hardly suitable for private practice, in which induction by means of the bougie or even by rupturing the membranes, according to Herff,[3] gives quite satisfactory results. The objection urged against it—that it displaces the presenting part—is largely theoretical. The chief objection to my mind is that the metreurynter favours prolapse of the cord. I have found that occur in a considerable number of cases; consequently, my results as regards the fœtus have been worse with the metreurynter than with the bougie. Ahlfeld is of the same opinion. Naturally, this danger can be avoided by preserving the membranes intact. As regards the mother, the morbidity and mortality is slightly higher, and that even in the simplest of all conditions, contracted pelvis. Zimmermann for 211 cases gives the mortality as 2 per cent. and the morbidity as 16 per cent. The most serious accident is for the metreurynter to burst. In the Glasgow Maternity Hospital this occurred in the hands

[1] *Monat. f. Geb. u. Gyn.*, 1904, Bd. xx., p. 901. [2] *Ibid.*, 1902, Bd. xvi., p. 37.
[3] *Op. cit.*

of my colleagues upon two occasions. The bag should therefore be tested by filling it and pressing it firmly between the hands.

My own feeling as regards the metreurynter is that it is most suitable for induction of labour in conditions in which it is desirable that delivery should be completed within a short time, but that the bougie is better for contracted pelvis, when it is of no consequence if the onset of labour is delayed.

It is unnecessary to discuss the rubber bags of Barnes introduced into the cervix. They are not at all suitable for induction unless introduced into the uterus and used as a mechanical stimulant to uterine activity.

The Injection of Fluids underneath the Membranes—Cohen's Method.—This method is very seldom employed. Even the more recent modification of Pelzer, the injection of glycerine, has been entirely given up because of the danger attendant upon its employment. Simpson,[1] amongst others, has discussed the method and pointed out its dangers. There is really nothing to be said in its favour, for it possesses no advantages over the two previous methods already described.

The other methods, enumerated on pp. 445 and 446, are only of historical interest. If anyone is interested in them, I would commend Kleinwachter's most excellent monograph,[2] in which each is fully described.

Nor need I say anything on the subject of forcible dilatation of the cervix by means of the hands or the various metal dilators. That subject is fully considered in connexion with accouchement forcé. Although Heller[3] gives very satisfactory results from the operation in Leopold's Clinic, few are inclined to adopt it. Personally, I have only done so once or twice when I found that the cervix was so soft and dilatable that there was no danger or difficulty in stretching it.

Induction of Abortion.

By induction of abortion is meant the emptying of the uterus before the child is viable. It is an operation, therefore, which is only performed for some grave disease threatening the mother's life.

The indications for the operation have been considered at sufficient length in the earlier part of this chapter, when induction of premature labour was under discussion. Doubtless some of the rarer forms of

[1] *Edin. Med. Journ.*, April, 1893.

[2] 'Der Kunstlichen Unterbrechung der Schwangerschaft,' 3rd edition, 1902.

[3] *Op. cit.*

disease jeopardizing the pregnant woman's life have not been mentioned, but sufficient has been said to indicate when and under what circumstances the uterus should be emptied.

The induction of abortion is an operation which must never be lightly undertaken; every physician appreciates this, and in consequence makes it a rule to have a consultation with a confrère before he has recourse to it. The disinclination of the accoucheur to perform the operation, however, must not be carried to an extreme. It has been my experience on many occasions to see cases in consultation where the medical practitioner has postponed too long the consideration of the operation, and has in consequence allowed his patient to become so reduced in health as to prevent her life being saved even by the emptying of the uterus. It is evident, therefore, that the time for interfering and inducing abortion is very difficult to decide, and can only be arrived at by carefully watching the patient from day to day, and estimating how far she is resisting the disease and to what extent she is responding to the prescribed treatment.

From the middle of pregnancy until the twenty-eighth week—the recognized viable age—the operation should be carried out in a similar manner to that recommended in induction of premature labour, for a labour in that period resembles very closely an ordinary parturition.

When one comes, however, to inducing abortion in the earlier weeks of pregnancy, the operative procedures to be adopted are somewhat different. I must admit that the emptying of the uterus during this period is very often troublesome, for the uterus is often difficult to stimulate to activity. Indeed, some of the most troublesome cases which I have encountered in practice have been those in which I have had to induce abortion about the twelfth or fifteenth week.

There are, of course, several recognized methods of emptying the uterus in the earlier months of pregnancy. The most important are: (1) Rupturing of the membranes; (2) dilating the cervical canal and plugging the same with gauze; (3) dilating the canal gradually with laminaria tents or rapidly with metal dilators.

While recognizing the value of these methods, and while employing them whenever possible, I have been disappointed more than once with the results obtained. I think that once or twice I failed to save my patients by these operative methods owing to the delay they involved or the strain they threw upon the already embarrassed circulation. The choice of operation must depend very largely upon the patient's condition. If her life is in such danger that the uterus must be emptied within a matter of a few hours, it is profitless to attempt dilatation of the cervix by means of laminaria tents or gauze tampons. One has, therefore, in such cases only the alternatives of rapidly dilating or

incising the cervix. Every one must have found that it is often a matter of extreme difficulty to dilate the cervix in the earlier weeks of pregnancy; indeed, in most of the cases in which I have employed rapid dilatation, or seen it employed, the cervix has been torn. But, in addition, there is another very serious drawback. Rapid dilatation produces a very considerable amount of shock unless the patient is deeply anæsthetized, and, seeing that the patient is already gravely ill, this strain on the heart is often just sufficient to remove her last chance of recovery.

In such cases, therefore, in which the uterus must be emptied immediately and with the least amount of shock to the patient, I have recourse to incision of the cervix—vaginal Cæsarean section. This operation can always be carried out with the greatest ease in the first twenty weeks of pregnancy. It takes very little time, and, as far as I have seen, gives more satisfactory results than forcibly dilating the canal.

The technique of vaginal Cæsarean section is fully considered in Chapter XXVIII., so that I need not consider it here. The only objection to it is that it requires a certain amount of experience, and is certainly not an operation which a general practitioner could undertake without proper assistance. As, however, in such cases he will usually have a consultant associated with him, or, if the patient is in poor circumstances, will have her removed to hospital, I do not consider that the operation is outside the bounds of practical obstetrics. In spite of the fact that many modern writers are opposed to this operation in such circumstances as we are considering, I am convinced in my own mind that it is an operation of the very greatest value, and, as I have already said, it is one that I have found give most satisfactory results.

Turning now to the more usual cases where one can take time to empty the uterus, the two methods—rupturing the membranes or inserting laminaria tents or gauze into the cervix—can be suitably employed. The simple method of rupturing the membranes is seldom sufficient, and there is no doubt that the risk of infection is very considerable when it is employed, even if every possible precaution is taken against infection.

The best course to pursue when one has the choice is to insert into the cervix the largest-sized laminaria tent, and keep it in its place with a vaginal tampon of gauze. It is hardly necessary to state that this must be done with every precaution against sepsis. In twelve to twenty-four hours the gauze and tampon should be removed, when the cervix will be found dilated to some extent and very generally softer. After this the cervix should be douched with hot antiseptic

solution, and further dilated with the finger, or, better still, with the larger sizes of Hegar's dilator. The canal and vagina should then be firmly plugged with gauze, which should be left in for other twelve or eighteen hours. On removal of this gauze the uterus should, if possible, be emptied, but if the canal is still not sufficiently dilated to permit of this, it should be repacked or incised.

In spite of following such a course as I have indicated, I must candidly admit that I have had on more than one occasion considerable trouble in emptying the uterus. Besides, women the subject of any debilitating condition necessitating the terminating of a pregnancy bear repeated anæsthesias very badly.

It is hardly necessary to caution against the employment of the curette for emptying the uterus, for, although this instrument is suitable enough for the removal of very early abortions—say of two or three weeks—it is quite unsuitable for the removal of those which are older; in the latter cases the fingers and ovum forceps are a much better means for removing the uterine contents. This subject, however, is more fully discussed in Chapter XXXI., where abortion is considered.

CHAPTER XXVIII

ACCOUCHEMENT FORCÉ, INCLUDING VAGINAL CÆSAREAN SECTION

The operation of accouchement forcé, as we know it, was an outcome of the great revival in midwifery initiated by Ambrose Paré, and the term was introduced by his pupil Guillemeau. It is, however, of much more ancient date, for references to it may be found in the writings of Celsus and Galen.

At different epochs since Guillemeau's time the operation has come into prominence, as, for example, when Levret, in France, and Osiander, in Germany, reintroduced pronged instruments for stretching the cervix, and, later, when Wilson invented expanding tents, and Barnes and Tarnier devised rubber bags. The most recent revival occurred only a few years ago. In great part it was the result of the extension of surgical asepsis to obstetric practice, although I believe the real cause was the reintroduction of expanding dilators by Bossi and others, and the extensive incisions of the cervix devised by the late Acconci and Dührssen.

Indications for Accouchement Forcé.

It is quite impossible to lay down hard-and-fast general rules regarding the employment of accouchement forcé. Broadly speaking, it is indicated when, the cervix being still undilated, the life of the mother or child demand the immediate emptying of the uterus.

The favour in which the operation is regarded varies greatly, for, while some operators have recourse to it only on very rare occasions, others employ it freely. What makes it especially difficult to give a general idea of its place is the fact that many who condemn the treatment in certain conditions employ it in others.

Personally, I have made use of the operation for a great variety of conditions, such as accidental hæmorrhage, placenta prævia, eclampsia, hyperemesis, cardiac disease, and rigidity of the cervix.

Regarding *concealed accidental hæmorrhage*, as I shall explain in speaking of that complication, my results have been most unsatisfactory. This was also the experience of those who spoke on the subject at the recent meeting of the British Medical Association at Oxford.[1] In *placenta prævia*, although the results have not been so unsatisfactory, on two occasions in the Glasgow Maternity Hospital very severe rupture of the lower uterine segment occurred. My feeling, then, is that accouchement forcé is not a suitable treatment for either of these conditions.

With *eclampsia* it is quite different. If saline transfusion and morphia or chloral do not control the seizures, there is no alternative but to empty the uterus. When this becomes necessary, and the cervix is already slightly dilated or very soft, forcible dilatation with the hands or metal dilators gives most satisfactory results; but when the os is quite closed, the cervix not taken up, and especially when pregnancy is several weeks short of term, there are considerable risks in employing metal dilators, on account of the danger of lacerating the cervix. In such cases the classical, and some claim the vaginal, Cæsarean section have a place.

The same treatment is indicated in those rare cases of hyperemesis gravidarum, heart disease, etc., which do not respond to medicinal treatment, and where the slow methods of inducing labour cannot be adopted because of the patient's critical condition.

As regards the operation employed in the *interests of the child*, one should remember that while the life of the child must on every possible occasion have the greatest consideration, the child, after all, comes second to the mother. Frequently the two lives are directly opposed to one another, for the more one considers the child, and directs one's treatment to preserving its life, the greater will the mother's life be endangered. This, naturally, makes it very difficult to decide upon the course to follow. In this connexion, however, the important factor, which finally must determine the treatment to be followed, is the prospective life of the child. In many cases in which accouchement forcé is indicated, the child, although alive, is not a 'good life.' It is not only premature, but it is probably the subject of disease. In addition, it is hopelessly handicapped by the operative interference necessary for its delivery. Consequently, the operation of accouchement forcé should seldom be performed in the interests of the child.

Before going further, the exact meaning of the term 'accouchement forcé' must be agreed upon, for it has come to be loosely applied

[1] *Brit. Med. Journ.*, 1904, vol. ii.

to any rapid extraction of the child. The two essential features of accouchement forcé are rapid and forcible enlargement of the cervical canal and immediate extraction of the child.

Two methods of enlarging the cervical canal are open to the operator—dilatation and incision—while as regards extraction, it may be completed by forceps or version.

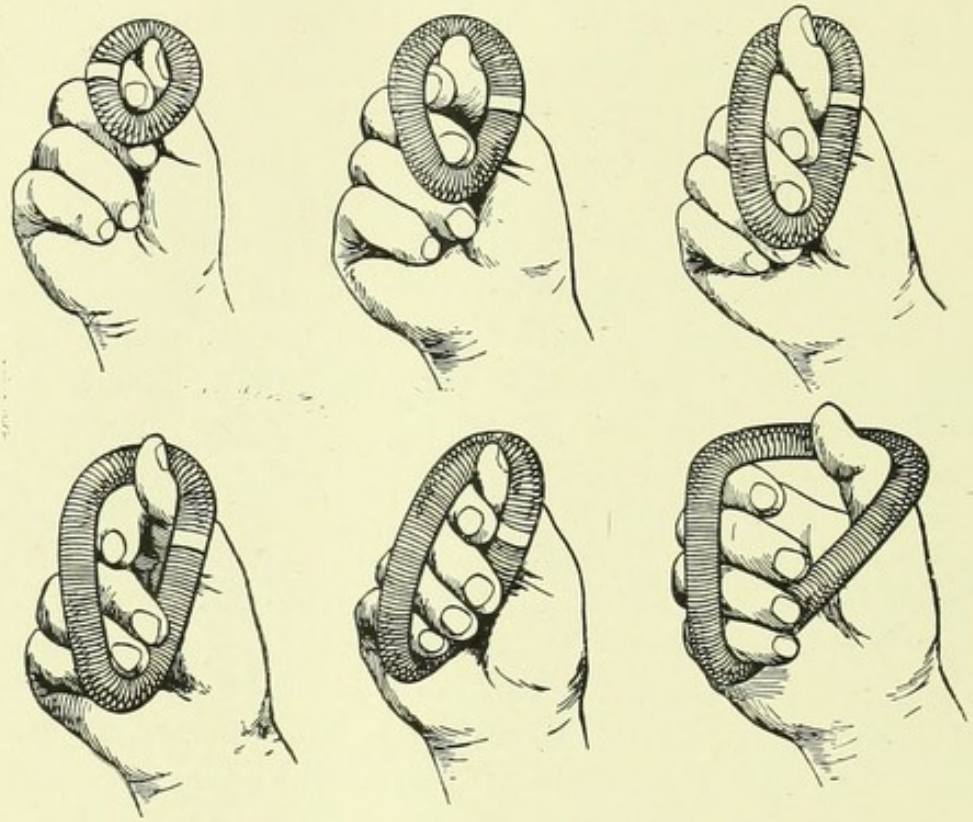


Fig. 195.—Manual Dilatation of the Os. (After Edgar.)

Methods of Dilating the Cervix.

Dilatation, as a step in the operation of accouchement forcé, may be carried out with the hands, tents, rubber bags, or expanding metal dilators. Strictly speaking, only rapid dilatation with the fingers or with metal dilators can be termed accouchement forcé; still, it is found convenient to include here tents and metreurynters. We must consider each of these separately, in order to compare the advantages and disadvantages of each.

Before employing any of the methods for dilating the cervix, let me emphasize the extreme importance of taking every precaution against sepsis. In this operation the risks of infection are very great. The hand is frequently introduced into the vagina, and, as the operation is a tedious one, the tendency is for the operator to be less careful in the later stages. An additional precaution which must be

taken in all methods of dilating the cervix is the employment of deep anæsthesia.

Manual Dilatation.—The obvious advantages of manual dilatation, naturally the oldest of all methods, are that the operator requires no instruments and that he appreciates exactly what he is doing. The disadvantages are that the operation takes time, is usually impossible if the cervix is undilated and rigid, and is often very fatiguing.

Before dilatation proper can be commenced, the os uteri must admit at least a finger. If that is not possible, the graduated dilators of Hegar should be employed.

The hand, *thoroughly cleansed and encased in a rubber glove*, is passed into the vagina. The forefinger is then introduced into the cervix, and gradually pushed further and further in. In doing this,

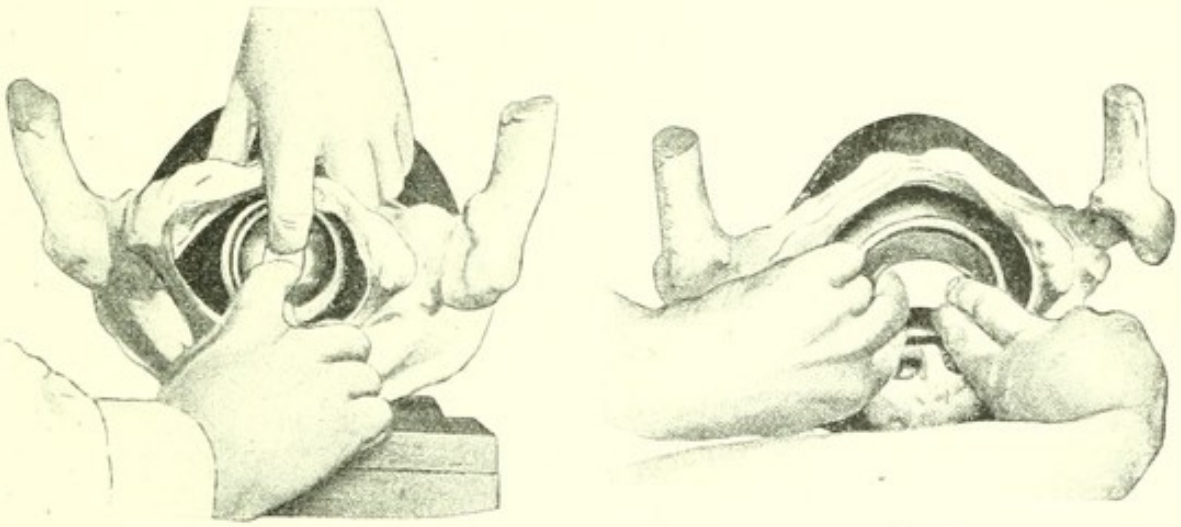


FIG. 196.—Bimanual Dilatation of the Os.

it is often better to push the uterus down upon the finger, with the hand applied externally over the fundus, than simply to try and push the finger up into the uterus. One finger having been well introduced, should be withdrawn, and the tip of a second inserted with the first, or, as Harris indicates, the thumb may be employed instead. The rest of the operation may be carried out by getting more and more of the hand through (Fig. 195), or by employing the fingers of the two hands—Bonnaire's method (Fig. 196).

Could one always dilate the cervix quickly enough by this method, it would, without doubt, be the best, for there is less chance of tearing if one moves the dilating fingers about, stretching sometimes antero-posteriorly and sometimes laterally. Besides, one can tell better what one is doing. There is another point also—during manipulations the cervix often becomes softer.

Let me with extreme brevity give a few illustrative cases :

1. Mrs. L——, a 6-para, twenty-four weeks pregnant. Eclampsia. Os with difficulty admitted finger, and was extremely rigid; manual dilatation, version and extraction. Duration of operation one hour and a half.

2. A 2-para, almost term, seen in consultation with Dr. McM——. Accouchement forcé on account of dyspnœa. Manual dilatation and extraction with forceps took fifty minutes. Child alive ; recovery complete.

3. A 2-para, twenty-four weeks pregnant. Eclampsia. Seen with Dr. L——. Os admitted finger ; dilatation with bags and fingers, followed by version ; os very rigid. Operation took fully sixty minutes. Recovery complete.

4. A 2-para, about thirty weeks pregnant. Seen in consultation with Dr. P——. Acute mania. Dilatation with fingers, followed by version and extraction. Operation took fifty minutes. Recovery complete.

These have been casually chosen from amongst my cases of manual dilatation. In my experience, the shortest time taken to dilate manually, and deliver a woman not in labour, has been fifteen minutes. This was a case of contracted pelvis, in which I intended to induce labour, but finding the cervix very soft, I dilated and extracted the child. The longest time was fully two hours.

Taking my cases, I would say that, on an average, to dilate and deliver a multipara not in labour, and with the cervix not obliterated, forty minutes at least are required ; and to do the same in a primipara about sixty to eighty minutes. I do not include, of course, cases of abortion. In such cases a very considerable time is often necessary to dilate the cervix manually ; indeed, it is sometimes quite impossible.

As I shall point out later, when speaking of expanding metal dilators, dilatation is distinctly more difficult and more liable to be complicated with laceration in the early months of pregnancy and if the cervical canal is unobliterated.

Dilatation by Means of Expanding Tents.—Dilatation by means of expanding tents is a slow process, and occupies hours instead of minutes. It is suitable in cases where there is no hurry in emptying the uterus. Laminaria tents are the only variety now employed (Fig. 197). In recent years special attention has been directed to them by Sinclair.[1] They may be sterilized by dry heat or by soaking in 1 in 1,000 perchloride of mercury and alcohol for forty-eight hours.

The method of proceeding when tents are employed is as follows : The patient, having been anæsthetized, should have a further thorough disinfection of the external parts. The pubis should be shaved,

[1] Lond. Obst. Trans., vol. xlviii., p. 185.

and the vagina washed out with some soapy disinfectant, such as lysol.

The cervix is then seized with a pair of vulsellum forceps, the anterior and posterior vaginal walls being retracted if necessary. Before introducing the tent I have usually employed the ordinary dilators of Hegar, which must be pushed in until one feels the point has passed beyond the internal os. No great force should be used; if that is necessary, one should desist.

The largest tent which can be introduced is placed in the cervix. In doing this care must be taken that the tent is not pushed in too far. This is especially apt to occur when the gauze packing is being placed in the vagina. In order to prevent this accident a loop of strong silk should be passed through the tent in place of the thin cord generally found there. Through this loop is passed a piece of gauze about half a yard long, which, pushed into the fornices, anchors the tent and prevents its displacement. The rest of the vagina is packed firmly with gauze. Sometimes there is not a tent large enough for the cervix; in such cases one can usually dilate with the fingers, but if this should be impossible, two or more tents can be used together. If one inserts these separately, they invariably slip out,

Fig. 197.—Laminaria Tent.

but by tying them together they retain their position as expansion proceeds. Larger tents made of several pieces of laminaria glued together cannot be recommended. Tents should be left in for twelve hours at least.

On their removal, the cervix should be sufficiently dilated to permit of the fingers being introduced, and the further dilatation and extraction of the child being proceeded with. If that is not possible, several tents tied together as described may be again inserted, and left for another twelve hours; or, better still, a metreurynter may be introduced.

Dilatation with Hydrostatic Dilators—Metreurynter.—At the present time metreurysis is much in favour, and many important contributions to the subject will be found in recent Continental and American literature.

Rubber bags, like tents, dilate the cervix very slowly. Another objection is that they can only be used after the cervix has been sufficiently dilated to allow of their introduction. The method is

consequently quite unsuitable for cases in which rapid delivery is of primary importance, and for those cases of difficult dilatation to which I have already referred.

Without doubt, the hydrostatic dilator of Champetier de Ribes or Müller is the best, and this is in entire agreement with the views of all German, French, and American obstetricians. Most modern English writers also, such as Herman, Jellett, and Tweedy, favour it. Barnes's rubber bags (Fig. 198) I have always found of little real service when the cervix is at all rigid, for they simply balloon up inside the uterus. In the Maternity Hospital, therefore, we have ceased using them. A more complicated metreurynter is that of Pomeroy (Fig. 199).

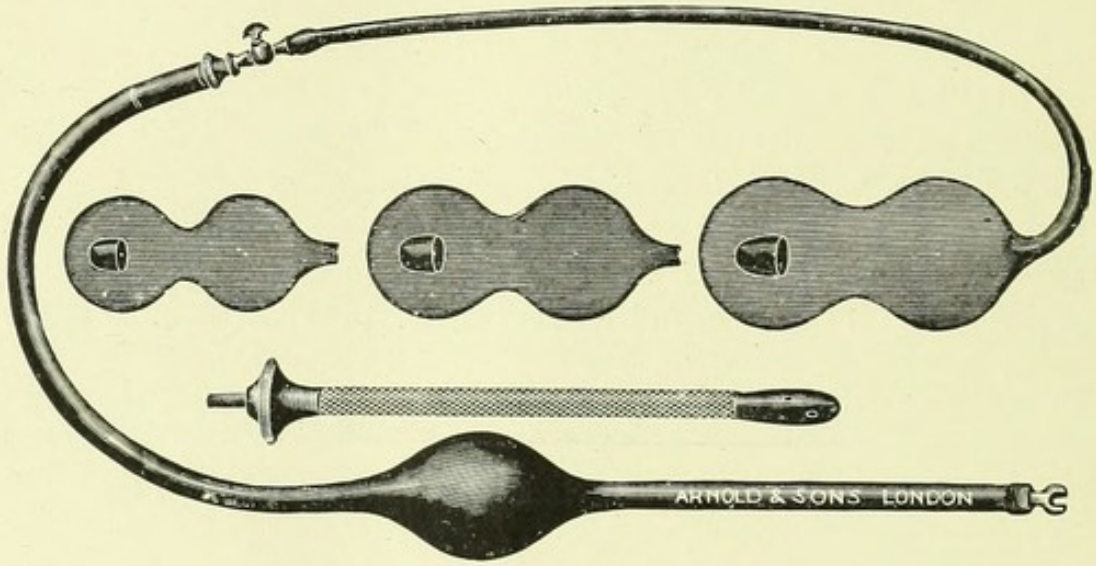


Fig. 198.—Barnes's Hydrostatic Dilator.

The metreurynter of Champetier de Ribes is the most serviceable (Fig. 200). It is pear-shaped, and made of waterproof silk. From the apex a rubber tube passes, and through this the bag is filled with sterile solution. Before use it should be thoroughly tested by firm pressure between the hands, as it is liable to burst if at all old. Only the other day one burst in my hands when I tested it. Bursting of the bag after its introduction into the uterus has been recorded by several writers.

The mode of procedure in employing a Champetier de Ribes hydrostatic dilator is as follows :

The patient, being anæsthetized, is brought to the edge of the bed and placed in the lithotomy position. The pubis, vulva, and vagina are then thoroughly cleansed. If necessary, the cervix is steadied by vulsellum forceps. Having grasped the bag with a long pair of clamp forceps, or the special forceps for the purpose (Fig. 201), the bag is

carried up into the uterus and the forceps withdrawn. I have occasionally found it easier to insert the bag without employing the forceps, simply using my fingers. The bag is then slowly filled with sterilized solution. The tubing is then wrapped up in gauze, and the patient is put back to bed. Generally one allows the natural forces to expel the bag; but if it is deemed necessary to hasten the dilatation, traction may be exerted on the tubing through a cord attached to a weight brought over the foot of the bed. A very light weight is all that is necessary, say a couple of pounds. I have already referred (p. 448) to the question whether or not the membranes should be ruptured before the bag is inserted.

When a large Champetier de Ribes bag has passed through the os it is sufficiently dilated to allow the passage of an average-sized

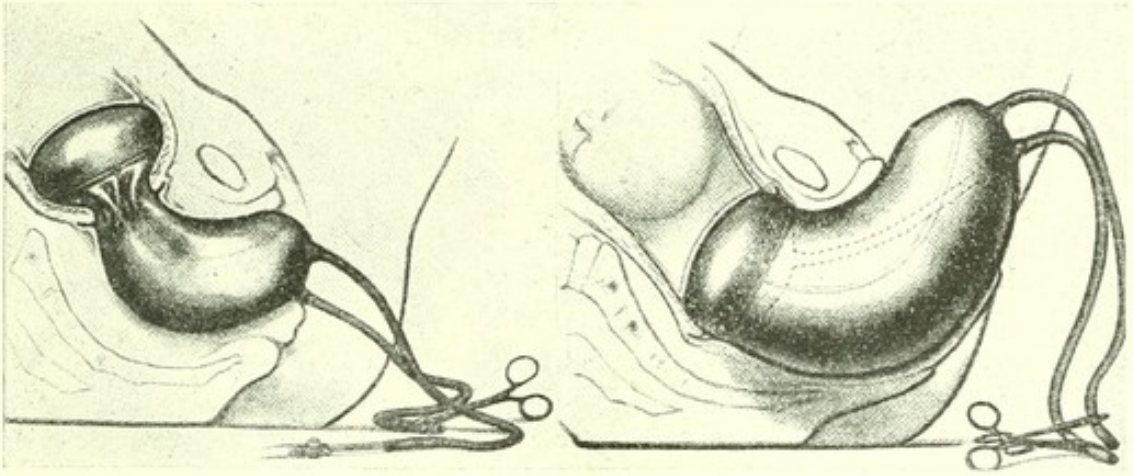


Fig. 199.—Pomeroy's Metreurynter.

child. If, however, the child is larger, the cervix will require to be more widely dilated with the hand. In my experience it is usually about twelve hours before the bag is expelled. Naturally, in a multipara, whose cervix is soft and dilatable, it occurs sooner than in a primipara.

Dilatation with Expansile Metal Dilators.—Of all methods of dilating the cervix, none is so rapid as that carried out by means of expansile metal dilators.

Pronged dilators are of ancient date, and at different times have been brought forward and advocated. The most recent revival of the instrument occurred in 1890, when Bossi introduced the one which in the last three or four years has been so much discussed. Bossi's instrument consisted of three prongs, but later a fourth was added (Fig. 202). Frommer's modification of the instrument consists of eight prongs, which theoretically was considered a distinct improve-

ment, for it allowed of pressure being more equally distributed round the margin of the os. In practice, however, in common with others, I found it inferior, for it did not allow the operator to get his fingers between the prongs to feel how the cervix was stretching. The only real improvement in Bossi's latest pattern is De Seigneux's instrument,[1] with its graduated caps and pelvic curve (Fig. 203). A very

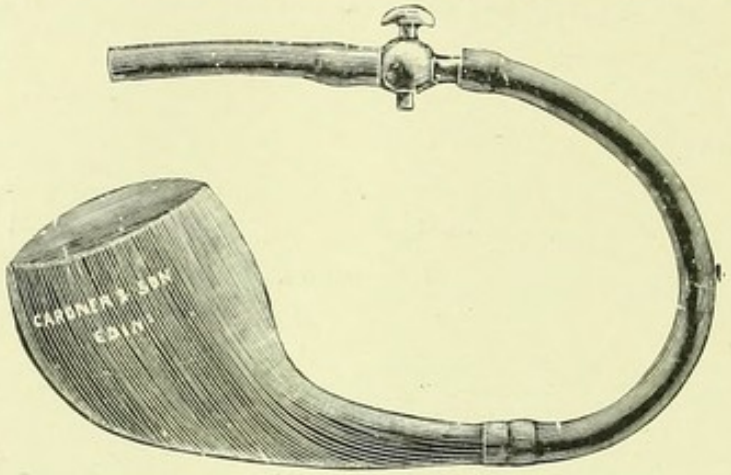


Fig. 200.—Champetier de Ribes' Bag fully expanded.

simple dilator is the écarteur of Tarnier (Fig. 204), which slowly expands by the steady compression of the elastic bands at the end of the handles.

The operation of dilating the cervix with expansile metal dilators is not difficult. There is, however, great danger of tearing the cervix,

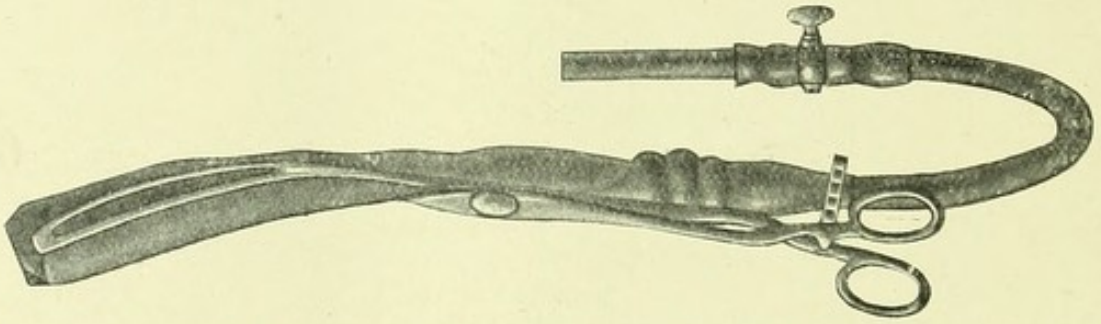


Fig. 201.—Champetier de Ribes' Metreurynter (collapsed), with Forceps for introducing it.

and it is upon the extent and frequency of this occurrence, as we shall see, that criticism must be based.

The preparation of the patient is as for any vaginal operation. She should be deeply anæsthetized, otherwise the shock is considerable. The blades of the instrument should then be passed through the os. The os must, therefore, be sufficiently dilated to allow of this being done. I would not advise employing the instrument without the caps unless there are no Hegar's dilators at hand. When the

[1] *Cent. f. Gyn.*, 1905, p. 717.

cervix is obliterated there is no difficulty in getting the instrument introduced; but when it is still not taken up there is considerable difficulty. Most operators are now agreed that the instrument is unsuitable in these latter cases. If it is employed, especial care must be taken to have the edge of the flange on the cap well beyond the internal os. I do not advise the seizing of the cervix with vulsellum

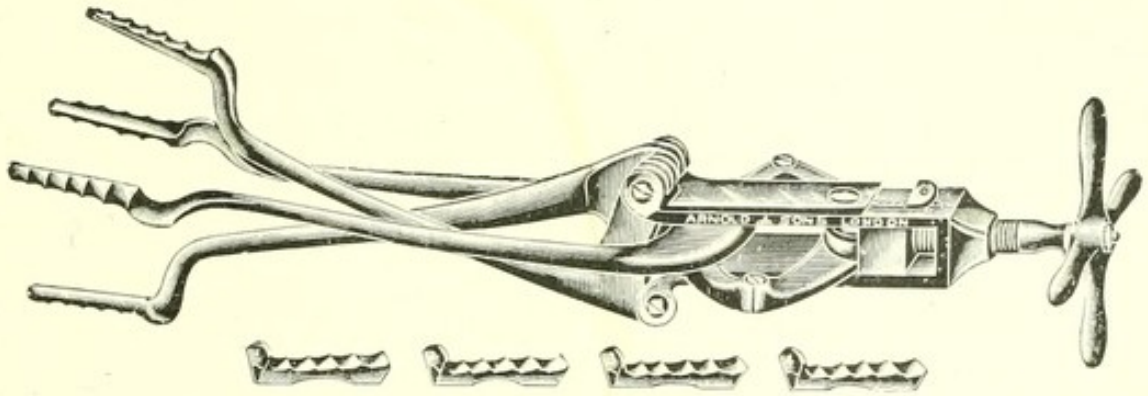


FIG. 202.—Bossi Pronged Dilator (Open).

forceps while the blades are being introduced, for by pulling on the cervix one elongates it, and so renders the introduction of the flanges beyond the os internum difficult.

By pressing the instrument well back against the perineum, the prongs slip into their places more readily.

Having placed the instrument in position, as described, the handle which expands the blades should be turned. This must be done

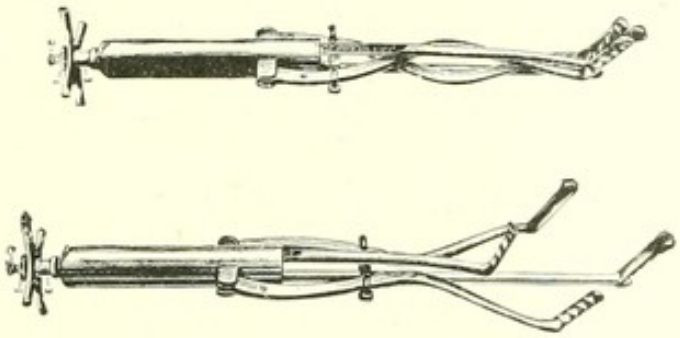


FIG. 203.—De Seigneux's Uterine Dilator.

very slowly, and only in the intervals between the pains. I usually turn the handle not more than a sixth of a circle at a time, and at the later stages even less than that. One should always desist during a uterine contraction, and even sometimes turn the handle backwards, to take the strain off the cervix for a moment or two. Every now and again, also, one should feel between the prongs how the cervix is

yielding, both on the cervical and vaginal surfaces. *In my experience, when tears have occurred, they have always taken place in the lateral walls, and usually first on the cervical, not on the vaginal surface.* I remember one case in which a bad laceration occurred, when I suddenly felt the resistance of the cervix disappear. I found no tear in the vaginal surface, but a moment or two afterwards it was also found torn. The graduated caps of Seigneux's instrument without doubt give a wide surface of pressure, and to some extent lessen the risk of tearing.

The time taken to screw up the instrument to the required amount depends upon the condition of the cervix. If it is a flabby cervix, twenty minutes may suffice; but if it is hard, and especially if it is not taken up, more than twice that amount of time may be necessary.

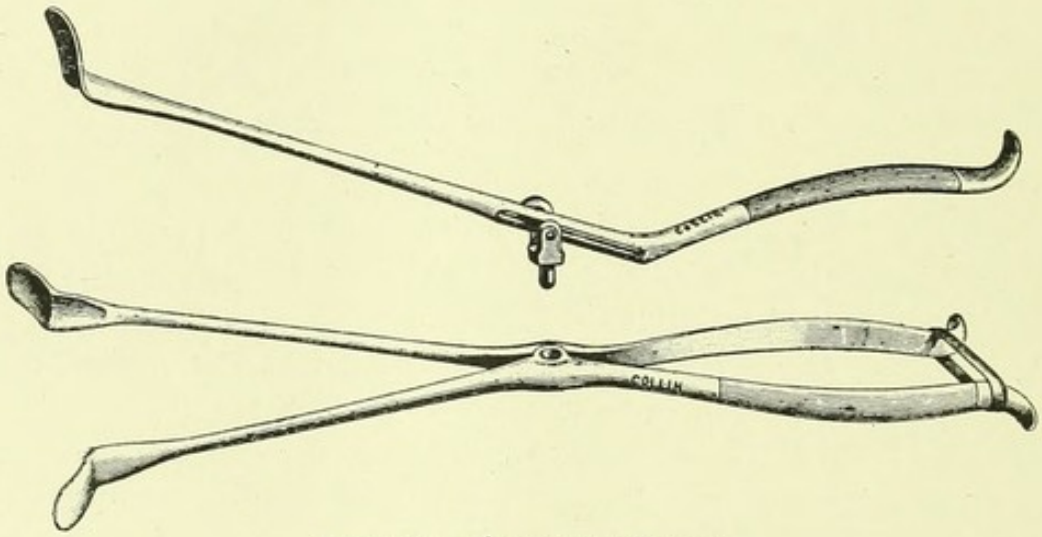


Fig. 204.—Écarteur of Tarnier.

It is only after some experience that one can gauge this properly; at first one is liable to be in too great a hurry. I have not said anything about changing the position of the instrument so as to alter the points at which the caps press on the cervix, as has been recommended by some writers, for the latest instruments have a pelvic curve.

The extent of dilatation required depends entirely upon the size of the fœtus. When the index is at 10, one may usually stop, unwind the handle, and remove the instrument, for such dilatation will permit a small child readily passing through.

If the case has been one in which the cervix has not been taken up, one is almost certain to be disappointed at the extent of the dilatation. In these cases I have never found it as well dilated as I expected.

After removal of the instrument, one should note very carefully if there are any lacerations, for there is no doubt that many of the tears

which follow this method of accouchement forcé result, not from the dilatation, but from the subsequent extraction of the child.

Such, briefly, is the method of employing expansile metal dilators. Many have found them most valuable. Doubtless the more enthusiastic have been inclined to overestimate their importance, and to practically place no restriction upon their employment, just as others condemn them utterly. Amongst those who have tried to take an unbiased view, and who have had some considerable experience of the different varieties of dilators, opinions are pretty uniform regarding the dangers, and how these are to be avoided. The principal danger is laceration of the cervix.

Writing on the subject in November, 1903,[1] I mentioned four factors, which, as far as I could judge, influenced the occurrence of laceration :

(*a*) *The manner in which the dilatation is carried out.*
(*b*) *The number of the pregnancy.*
(*c*) *The degree to which the cervix has been taken up.*
(*d*) *The age of the pregnancy.*

At the present time, with a very much more extensive experience of cases from hospital and private practice, I still am of opinion that these are the most important factors. I am now inclined to dilate much more slowly, and the most recent experience of obstetricians is the same. It should always be remembered that Bossi recommended twenty minutes up to one and a half hours. Then, again, although as a rule the cervix of a multipara yields better than that of a primipara, if there are deep cervical lacerations from former labours, these tear very readily, and often before much dilatation. On two occasions I have witnessed this. On one occasion the laceration which resulted while I was dilating extended into the lower segment, and had to be packed with gauze before the hæmorrhage could be arrested.

But the other two factors are the most important—the degree of dilatation of the cervix and the age of the pregnancy. With a patient in labour and the cervix ' taken up,' dilatation with Bossi's or any other metal dilator is not difficult, and lacerations should be very infrequent and very slight. Some say, Why not use the hands in such cases ? Of course, there is no possible objection to doing so ; but it is infinitely more fatiguing for the operator, is much slower, and unless rubber gloves are worn is attended with greater risk of infection.

When the cervix is closed, and not taken up, it is a very different matter, and there is a general opinion now that metal dilators are unsuitable in such cases. Even if care and time be taken, the danger of severe lacerations is very great ; besides, the extraction of the child

[1] Trans. Glas. Obst. Soc., vol. iv., p. 167.

is often difficult, for the cervix grasps the child whenever traction is made upon it. The condition of the cervix should guide one. If it is soft and dilatable, then Bossi's instrument may in a few cases be employed safely. If, on the other hand, it is hard and rigid, and the uterus must be emptied quickly, I would strongly advise against employing it.

But quite as important, although not as a rule so much appreciated, is the age of the pregnancy. The earlier the pregnancy, the greater the difficulty in dilating the cervix; so much so that unless it happens to be abnormally soft, I have given up using metal dilators in the earlier months, and have chosen instead vaginal Cæsarean section.

The results obtained with metal dilators in this country—those, for example, of Fothergill, Haultain, Ballantyne, Jardine, Armstrong, and others—are very satisfactory, especially in cases where they are employed when the cervix has been taken up. The later figures from Leopold's Clinic in Dresden—those furnished by Ehrlich[1]—are also good. He puts severe laceration as only occurring in 4 per cent. of cases. There were, however, five not included where the laceration was quite decided, although not severe. A most interesting paper by Lichtenstein,[2] taking up the later effects of dilatation with metal dilators in Leopold's Clinic, appeared two years ago.[2] It was an answer to Bardeleben's unfavourable criticism of the treatment. Lichtenstein succeeded in getting eighteen of the old cases to come back and be most carefully examined. The two cases in which there had been a severe laceration had healed fairly satisfactorily. With few exceptions, the women were remarkably well. Some had slight catarrh, and one had retroflexion; but such occurrences may follow even normal labours. *There was no evidence to show that expansile dilators judiciously employed caused future uterine disturbances.*

In the latest discussions on the subject, those which took place at the Versammlung der deutschen Gessellschaft für Gynaecologie in June of 1907, and at the annual meeting of the British Medical Association in the same year, all who favoured metal dilators restricted them to cases in the later weeks of pregnancy where the cervix had been already taken up.

Enlarging the Cervical Canal by Means of Incisions.

Incisions of the Cervix.—Before considering the latest and most extensive method of incising the cervix, known as vaginal Cæsarean section, I must refer briefly to the small incisions of the cervix which

[1] *Archiv f. Gyn.*, 1904, Bd. lxxiii., Heft iii., p. 439.

[2] *Ibid.*, 1905, Bd. lxxv., Heft i., p. 1.

have been employed from early times in certain conditions, as, for example, rigidity of the cervix, and atresia of the cervix. It is a

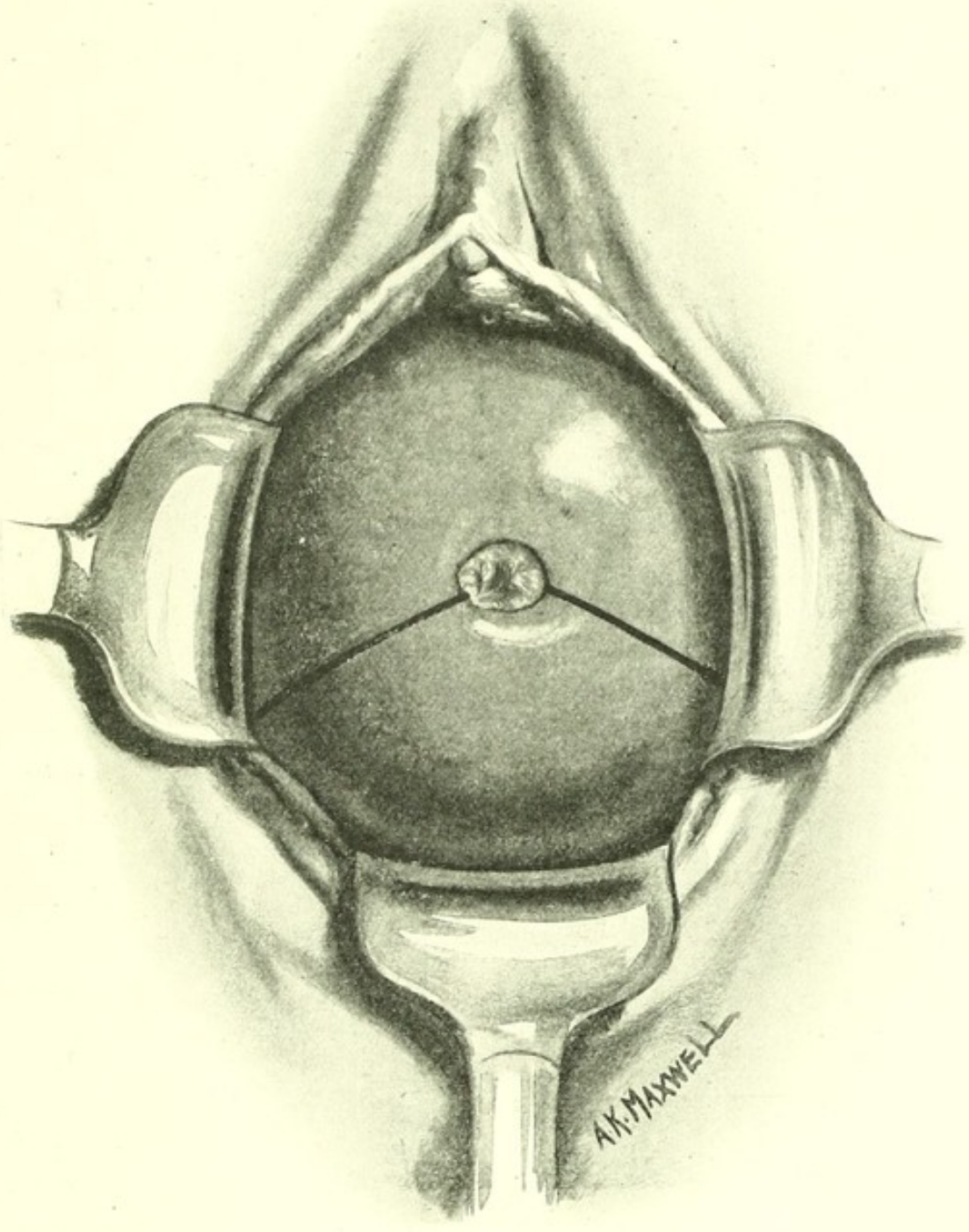


Fig. 205.—Incision of the Cervix where the latter is taken up, but the Os Externum is only slightly dilated.
Dark lines show direction in which incisions should be made.

matter of historical interest that such incisions were recommended by Simpson[1] and others for uterine and vaginal carcinoma obstructing

[1] 'Obstetric Works,' vol. i., p. 498.

the parturient canal. In atresia of the os externum we have seen that a cervical incision should be made over the os, and labour allowed to proceed. In rigidity of the cervix, when that condition does not yield to opium or chloral, or the local application of cocaine (p. 200), multiple small incisions with scissors are usually recommended. Sometimes these are sufficient, but on other occasions they are not, and deeper incisions have to be made. These, however, should only be employed if the cervix is completely taken up. Here are two cases, one from my private and the other from my hospital practice. The illustration (Fig. 205) explains the direction of the incisions. Prior to employing them, the vagina and vulva are cleansed, as has been described, and the patient placed in the lithotomy position, and brought over to the edge of the couch.

Case 1.—One afternoon in 1905 I was asked by Dr. G—— to see a primipara who had been twenty-four hours in labour. I found her having severe pains, which were coming on every few minutes. The cervix was completely obliterated, but the os only admitted one finger. The pulse and temperature were normal, and so I advised waiting, the administration of opium or chloral, hot douching, and the application of cocaine to the cervix. But although she got some rest from the opium, little if any progress was made. After some forty hours, Dr. G—— again asked me to see her. By this time I found the os little more dilated, the pains still coming on severely every few minutes, but the temperature 100° and the pulse-rate about 110. I had no hesitation in deciding that the uterus must be emptied. To accomplish this, the choice lay between the use of manual dilatation, Bossi's dilator, and deep incisions. I chose deep incisions, which I made in the direction already recommended. I then ruptured the membrane, applied forceps, and delivered a living child without much difficulty and without laceration of the perineum. The operation took from four to five minutes; the child was asphyxiated, but soon recovered. After waiting for the placenta to separate, it was expressed without difficulty. I then douched out the uterus and stitched up the cervix with catgut. The patient made a good recovery. Some months later I examined the cervix, and found it had healed perfectly.

In passing, let me remark that I have seen three other cases of this protracted dilatation of the cervix. Two I left entirely to Nature until the head was at the outlet, when I applied forceps; both children were born dead. The other case I treated as described in the one I have just recorded.

Case 2.—A primipara about term, and aged twenty-five, was sent into my wards in the Maternity Hospital in March, 1904, on account of eclampsia. She was comatose, and had had many fits; her pulse was about 140. The cervix was obliterated, but the external os only admitted one finger. As the pulse was so unsatisfactory I decided to incise the cervix, rather than dilate with Bossi's instrument. I incised the cervix as before, applied

forceps, and delivered a live but very deeply asphyxiated child. This was accomplished without perineal laceration in four minutes. After some time the child was resuscitated. It still lives. The placenta was removed, the uterus douched, and the cervix stitched. When the patient left the hospital the cervix was examined and found quite healed.

The advantage of this method of operation is that the uterus can be rapidly emptied, and with less shock than when a metal

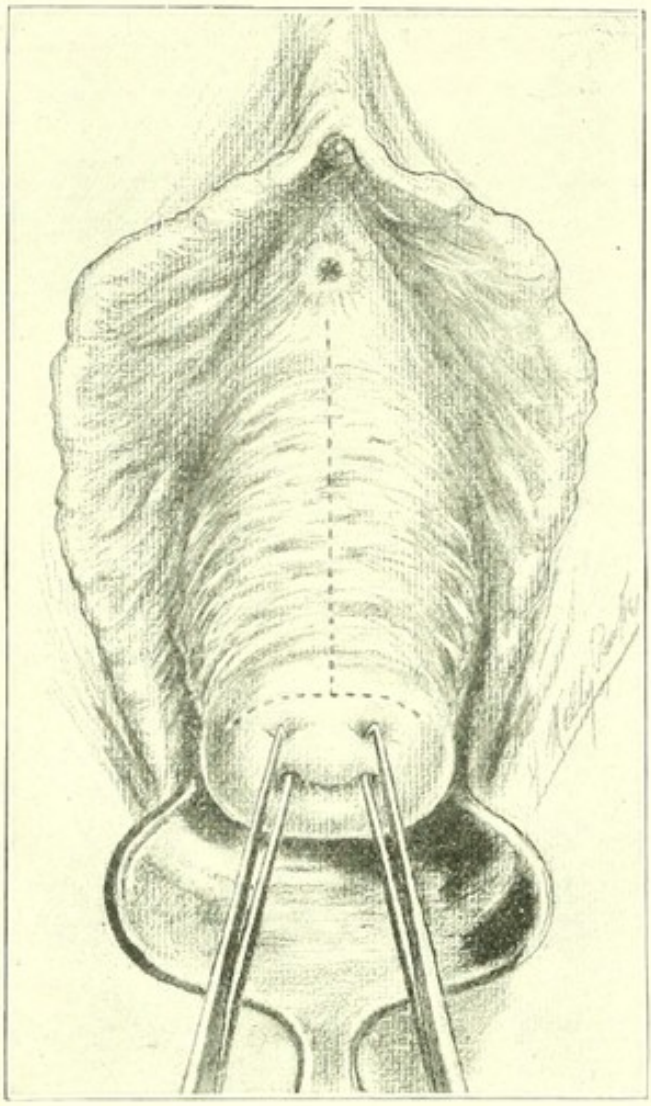


FIG. 206.—The Two Vulsellum Forceps applied to the Cervix.
The dotted lines show direction of incisions. (The Year-Book Publishers.)

dilator or the hands is employed. In certain cases—*e.g.*, valvular disease of the heart—this question of shock is a very important one.

Vaginal Cæsarean Section.—Within the last few years incisions of a very much more extensive nature have been under consideration. The names of two obstetricians are connected with the subject—Dührssen and Acconci. I do not intend considering who should have priority. Those interested in the question will find it fully discussed

by Dührssen.[1] Since Acconci's death, Dührssen's name has come to be almost universally associated with the operation. He first described it in 1895. His monograph, entitled 'Der Vaginale Kaiserschnitt,' appeared the following year. Since then he has published other papers, and made many communications on the subject. The operation is commonly known as vaginal Cæsarean section, and certainly, from Dührssen's description of the extensive incisions he

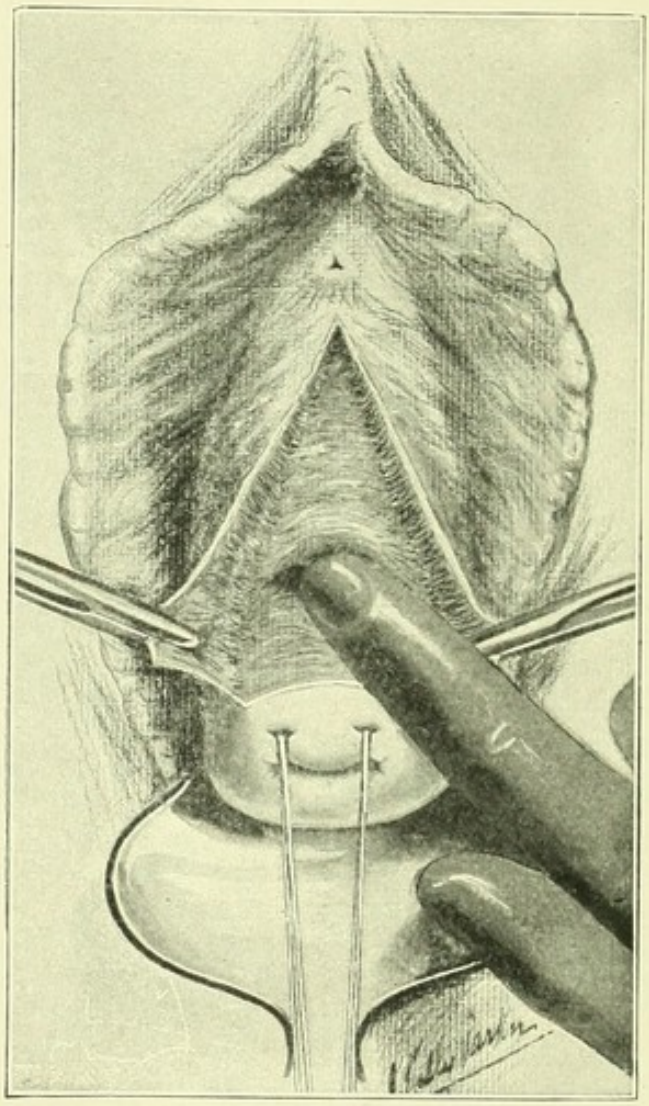


Fig. 207.—Pushing the Bladder from Anterior Uterine Wall. (The Year-Book Publishers.)

makes, it must be admitted that the name given to it is not out of keeping with the magnitude of the operation.[2]

The ease or difficulty in performing the operation of vaginal Cæsarean section depends chiefly upon the size of the uterus and the age of the pregnancy. In the first half of pregnancy the uterus can be pulled down, and the uterine contents removed through a much

[1] Winckel's 'Handbuch,' 1906, Bd. iii., Teil ii., p. 609.

[2] The term 'vaginal Cæsarean section' is an old one; it was considered unsuitable by Baudelocque (Heath's translation, vol. iii., p. 351).

smaller opening than is necessary if the pregnancy is more advanced. I will first describe the operation for the simpler cases, and then indicate the more extensive incisions which may be necessary when the fœtus has to be removed in the later weeks of pregnancy.

The patient is placed in the lithotomy position, and the vulva and vagina thoroughly cleansed. With a retractor the assistant pulls back the posterior vaginal wall. The cervix is then seized laterally

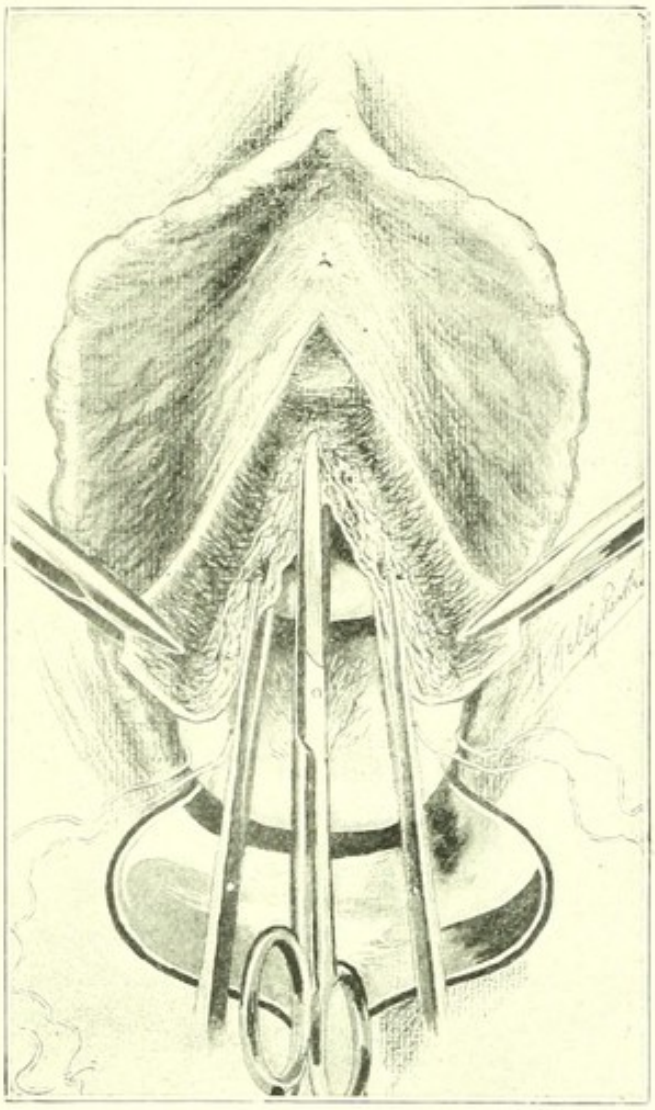


FIG. 208.—Edges of Uterus being drawn down and Scissors cutting the Lower Uterine Segment. (The Year-Book Publishers.)

by two vulsellum forceps, which are replaced by two ligatures, as the latter take up less room. A transverse incision is now made across the cervix immediately below the reflection of the bladder. This transverse incision should embrace the anterior half of the cervix (Fig. 206). It is well also to make a longitudinal incision when operating in the later weeks of pregnancy. The bladder is then pushed out of the way with the finger (Fig. 207), both in the middle line and at the sides. It is most important to separate the bladder completely. The anterior

cervical wall, now bare, is split up the middle line by means of scissors to the extent of permitting the fingers being introduced into the uterus (Fig. 208). The membranes now protrude, and if the opening into the uterus is of sufficient extent, these are ruptured, and the child seized by a foot and extracted. With a fœtus of even twenty weeks there may be a little difficulty with the after-coming head; if so, the head is perforated with a pair of sharp-pointed scissors.

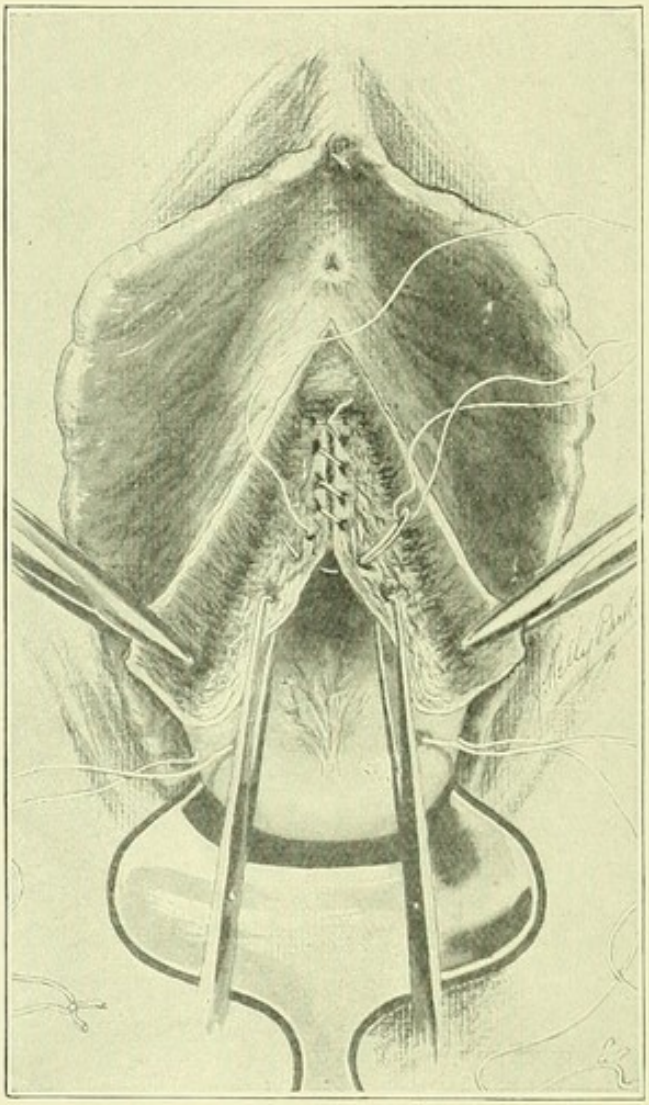


Fig. 209.—Continuous Suture being applied. (The Year-Book Publishers.)

The membranes and placenta are then removed, and ergotine injected, if this has not been done before commencing the operation. An intra-uterine douche of a temperature of 118° F. is then given to stimulate the uterus to retract. If retraction is not satisfactory, the uterus should be plugged firmly with gauze. The uterine wound is then stitched, and this is best done with a continuous catgut suture (Fig. 209). The carrying out of this is greatly facilitated by making traction on the ligatures which have been applied through the cervix, for they bring the uterine wound within easy reach, and

arrest any bleeding from the wound. As a rule the catgut suture is introduced from without, but Dührssen recommends the application and tying of the ligatures from the cervical surface. The bladder is then pulled back and tacked into position, and the edges of the vaginal wound united. If it is the pleasure of the operator, a small strip of gauze may be inserted in front of the cervix to act as a drain. This strip of gauze and the gauze in the uterus, if they have been inserted, are removed in twenty-four hours.

When the operation has to be performed in the later weeks of pregnancy more extensive incisions of the cervix are necessary. Bumm has found the splitting of the anterior uterine wall sufficient even in these cases, but Dührssen recommends an incision of the posterior wall also. The latter operator proceeds as follows: The resistance of the lower third of the vagina, in the case of a primipara, is removed by a right-sided vaginal and perineal incision. If by this incision the levator ani is cut through, a large fist can be introduced into the vagina, and the vaginal vault and the vaginal portion of the cervix readily brought into view by means of short, broad retractors; these arrest, by compression, any bleeding from the wound. The vaginal portion of the cervix is then seized laterally by two vulsellum forceps, which are then replaced by two threads, and the posterior lip of the cervix incised as high up as the insertion of the vagina. The posterior vaginal vault is then divided transversely, and a retractor pushed through the opening. The peritoneum in the pouch of Douglas is then pushed off the posterior uterine wall. In the manner already described, the anterior vaginal vault is divided, and the bladder pushed out of the way. One has then the whole of the anterior and posterior cervical walls laid bare. The anterior and posterior uterine wounds are then extended. The opening through which the membranes protrude, if they are still intact, must be so large as to allow the easy passage of a large fist. The membranes are then ruptured, a foot seized, and the child extracted. If the uterus is well retracted one may wait until the placenta becomes separated; but if it is not, the placenta and membranes must be removed manually. If the uterus does not retract sufficiently after a hot douche it should be plugged, and this is very easily carried out, as the two broad retractors can be placed against the opening into the uterus, and between them a large quantity of gauze introduced. The anterior and posterior wounds are then carefully stitched, as already described, and the bladder brought down into position. If need be, a gauze drain is inserted behind and in front of the cervix. If a vaginal perineal incision has been made, the stitching of it completes the operation. It should be carried out in such a way that the

vaginal surface is stitched with catgut and the perineum with silk-worm-gut sutures.

Such is the latest obstetric operation, one which all must admit is of great magnitude, and requires considerable experience in vaginal technique. So far it has not received much support in this country, although Wilson, Savage, myself, and a few others, have practised it. The same also applies to America and France; even in Germany there are several who are opposed to it, although a number of the most distinguished obstetricians favour it, as, for example, Bumm, Everke, Krönig, and Veit.

My experience of vaginal Cæsarean section has convinced me that the operation is one of very great value, and is a most important addition to obstetric surgery. I have, therefore, no sympathy with those in this country and elsewhere who condemn vaginal Cæsarean section. I am quite convinced it is an operation which has its place in obstetric practice, and I would mention, in support of my contention, the views expressed recently by Olshausen,[1] who is always broad-minded in his attitude towards gynæcological and obstetrical problems. I do not for a moment doubt the operation is at present being employed far too extensively in some quarters. That always follows the introduction of any new treatment; but that will soon be righted, and the operation relegated to its proper place.

As the operation at present occupies such an unstable position, being so emphatically condemned by some and so enthusiastically recommended by others, I purpose giving here only my own views and experience, leaving to a future date the consideration of the views of others.

When vaginal Cæsarean section was first introduced I was at once impressed by the sound surgical principles that the operation embodied. Prior to that time all methods of rapidly enlarging the cervical canal were crude and unsurgical. Secondly, it was at once apparent that by means of this operation one could empty the uterus in a few minutes, and so deal with certain cases that would be lost by employing the older and very much slower methods of dilating the cervix.

Being impressed with the operation, I determined to perform it when a suitable case presented itself. After waiting some years, a case I deemed suitable was admitted into the hospital.

A 3-para, about five months pregnant, was admitted to the Glasgow Maternity Hospital under my care in October, 1903, on account of persistent vomiting. Every medicinal remedy had been tried without success. With

[1] *Cent. f. Gyn.*, 1905, p. 805.

absolute rest in bed, and feeding by the bowel, the sickness was arrested, but whenever one attempted to feed her by the mouth the sickness returned. One evening my house-surgeon informed me that the patient had become very ill, and that he was most anxious about her. When I reached the hospital a little later I found her extremely collapsed, with a feeble pulse of about 160. Although I had very little hope of saving her, I determined to empty the uterus.

After an injection of $\frac{1}{30}$ grain strychnine she was anæsthetized with a mixture of ether and chloroform. Examining vaginally, I found the cervix completely closed. With a little difficulty I succeeded in passing Hegar's dilators, up to No. 10. I could not, however, introduce a larger size, although I repeatedly tried to do so. I decided, therefore, that the only course was to split open the cervix. This I did without any difficulty, in the manner already described. In a very short time the uterus was completely emptied and douched out, the cervix stitched, and the patient put back to bed. She made an uninterrupted recovery, and the cervical wound healed perfectly.

As a contrast to the ease with which the uterus was emptied in the above case, let me describe two others seen in consultation, where a different treatment was pursued :

Case 1.—One morning in 1904 I was asked by Dr. M—— to see a case of persistent vomiting in a young married lady of twenty-six years, who, as far as could be calculated, was twelve weeks pregnant. The late Dr. R. S. Thomson was also called in consultation. After considering the case most carefully, we agreed to continue to temporize, and to feed her entirely by the rectum. For a few days she improved, but at the end of a week it became evident that she was becoming weaker, and that the only hope of saving her lay in emptying the uterus. She was by this time extremely emaciated, with a pulse of 140 and a temperature of 100°. Under an anæsthetic I found I could only dilate the cervix to admit a No. 10 Hegar. I consequently packed the cervix and vagina. Fully twenty-four hours later I removed the packing, and found the cervix very little softer. With great difficulty, and after nearly an hour's labour, I succeeded in dilating the cervix to permit of me removing the ovum. During the night following the operation the patient had frequent attacks of syncope, and Dr. M——, who remained with her all night, was extremely anxious about her. She ultimately made a good recovery.

Case 2.—In October, 1907, I was called to a neighbouring town by Dr. F——, to see a young married lady, three months pregnant, extremely collapsed by reason of excessive vomiting. Everything had been tried, but without avail. Her condition was very critical. She was very thin and emaciated, and her pulse was 130 and of very poor tension. We were both satisfied that the uterus must be emptied. When she was anæsthetized I proceeded to dilate the cervix, and, as before, found it would only dilate to the extent of a No. 10 Hegar. I therefore packed the cervix and vagina. The following day I removed the packing, and found the cervix only a little

softer. Having now my assistant and two nurses, I decided to perform vaginal Cæsarean section. This was done without difficulty, and the uterus was emptied in a few minutes. The cervix was then carefully stitched, and the woman put back to bed. She rallied for a little after the operation, but, unfortunately, died some eight hours later.

As a result of several cases in which vaginal Cæsarean section has proved highly successful, and with the experience of the last two recorded cases and of others of a like nature, I am convinced *that up to the twenty-fifth week the operation under consideration is the best way of rapidly emptying the uterus.* By adopting it shock is lessened, and repeated anæsthesia, so fatal in such cases, is avoided.

There is one disadvantage which the operation possesses. In the first place, it is not suitable for ordinary practice, as at least two assistants are necessary, one to give the anæsthetic and the other to help the operator. Some may put forward another objection—that the uterine cicatrix may give way at a subsequent parturition, but the results of recorded cases in which there have been subsequent labours give no support to this objection. Why should the cicatrix yield? A well-stitched uterine incision heals with the minimum of cicatricial tissue.

In the later weeks of pregnancy, when the uterus has to be emptied rapidly, I am not convinced that vaginal Cæsarean section is suitable, or so sound in principle as operating by the abdominal route. The uterus in the later weeks of pregnancy is anatomically very different to that in the earlier weeks. In the later weeks the lower uterine segment is already formed, and, if the vaginal route is chosen, a large body has to be rapidly pulled through a canal which, even after extensive incisions, is imperfectly dilated. The part of this canal which will suffer most injury is the lower uterine segment, which in abdominal Cæsarean section is purposely avoided. My personal experience of the vaginal operation in the later weeks of pregnancy supports these theoretical objections, so that I prefer the abdominal route in such cases.

The Extraction of the Child after Dilatation of the Cervix.—Naturally, version is the simplest method of delivering a very premature fœtus. When, however, the fœtus is viable, the choice lies between version and forceps. Most operators prefer version, and I think it is the best procedure if there is no chance of saving the child, for one can perforate the after-coming head and complete the delivery more easily than with forceps. If, however, the child is alive, and likely to survive, forceps should be employed, as the fœtal mortality is lower than if version is had recourse to.

CHAPTER XXIX

OPERATIONS INVOLVING DESTRUCTION OF THE CHILD: CRANIOTOMY—DECAPITATION—EVISCERATION—SPONDYLOTOMY—CLEIDOTOMY

The operations which we must now consider have for their object the diminution of the bulk of the child, in order to permit of its more easy passage through the parturient canal. They are often termed 'destructive,' but in the present position they hold in obstetric surgery this term is not so applicable as formerly, as they are performed only in exceptional cases upon a living child. The operations which come under discussion are Craniotomy, Decapitation, Evisceration, and Cleidotomy. I will deal with them in the order mentioned.

Craniotomy.

The operation of craniotomy is of great antiquity. In former years it was most laborious, for the instruments employed were of rude form and workmanship. Indeed, those employed for the extraction of the child, which consisted of hooks of various devices and a simple form of toothed forceps, were quite inadequate for the purpose.

It is really only within recent years that the operation has been simplified and rendered thoroughly scientific, and this has in great part resulted from the perfecting of the three-bladed cephalotribe. I put this in the forefront of my remarks, because I find from several current English text-books this instrument is not fully appreciated. Only a year or so ago the reviewer of a most excellent American treatise on obstetrics in one of our best-known weekly medical journals questioned the advantages possessed by the three-bladed instrument. I cannot understand how anyone who has used this instrument can fail to be impressed by its excellence. In the Glasgow Maternity Hospital we have used it for the last ten years.

The Indications for the Operation of Craniotomy.—Before discussing in detail the indications and limitations of the operation of craniotomy, let me say a few words regarding the question of perforating a living child—a question which has interested obstetricians in all ages. Even at the present day there is no uniformity of opinion, for on the one hand are those who would lightly destroy the child, and consider only the mother, while on the other hand one has such a distinguished obstetrician as Pinard emphatically stating that under no circumstances should a living child be sacrificed. I refer, of course, only to the child which is mature, or nearly so.

I have frequently cautioned my readers against taking up an extreme position with regard to any of the obstetric operations, and here again, in this matter of perforating a living child, I would point out that there is a middle course, and that it is sometimes in the best interests of the mother, the family, and of the State to destroy the living child. A healthy mother's life is of more value to the family than an infant's. If the mother is young, her prospects of life are much better than is the child's, and she may produce more children. In addition, it must not be forgotten, if the child's life has been endangered by a labour which has been long protracted, the chances of its surviving are very uncertain. I have been in the habit of teaching, in cases of great disproportion between fœtal head and pelvis, that it is justifiable to destroy a living child under the following circumstances :

(*a*) When the child is hydrocephalic.
(*b*) When the child is on the point of dying, as indicated by the condition of its heart sounds or the pulsations in its cord.
(*c*) When extraction with forceps has failed, and symphysiotomy is deemed unsuitable.
(*d*) When there is a probability that the parturient canal has become already infected.

All obstetricians will agree regarding the case of the hydrocephalic child. If any operator should have qualms about performing the operation in such a case, he may tap the head either through the presenting fontanelle or through the spinal column, if the child presents by the breech (Chapter VI.).

But it is regarding perforating a living child in the three other conditions that the greatest differences of opinion exist. I may state, however, that the majority of operators hold the same views regarding these matters as here stated. Certainly I know of no English obstetrician who takes up an essentially different position. What prospect is there of delivering by Cæsarean section or symphysiotomy

a child that will survive if its fœtal heart is extremely embarrassed? Before the patient could be prepared for Cæsarean section or extraction could be made after symphysiotomy, the child would almost certainly be dead. Again, as regards the two other conditions where forceps delivery has been attempted, version performed, or where the canal is already infected by previous examination by midwife, handy woman, or careless medical attendant, what is the prognosis as regards the mother and child? It is extremely bad. Cæsarean section performed under any of these latter conditions is attended with an enormous maternal mortality, something between 20 and 30 per cent., and symphysiotomy is little better. In the Glasgow Maternity Hospital so bad were our maternal results that we have ceased to perform Cæsarean section in such cases, and in many of the Continental clinics the same position is taken up. Besides, a considerable number of the children are extracted dead, or, if alive, succumb a few days after delivery from the injuries already inflicted.

As regards the ethical and legal aspects of the subject I offer no opinion. There are no hard-and-fast ethical rules, nor are there any definite laws on the subject. If the matter were put before a committee of representatives of the medical and legal professions and educated lay public, I feel certain the opinion would be given unhesitatingly that the mother's life must never be unduly endangered, and that it is sometimes right to destroy a living child.

In one respect the operation of craniotomy is too seldom performed by the general practitioner. How seldom does he have recourse to craniotomy, even although he knows the child is dead! Instead, he prefers to drag the child from the parturient canal with forceps. I have seen him often doing this, even when the pulseless cord was hanging down at the side of the child's head.

Craniotomy is an operation of great simplicity in all cases except those in which the pelvis is extremely deformed. With a pelvis of small capacity, however, the operation becomes progressively more difficult, and there comes a stage when it becomes dangerous to the mother, and even impossible. The lowest limit at which the operation should be had recourse to depends not only upon the actual capacity of the pelvis, but upon its form, the size and consistency of the fœtal head, and the experience of the operator. Naturally, with a pelvis extremely deformed in all directions, the operation is more difficult than when one diameter is specially affected. Thus, it is more difficult in extreme degrees of general contraction and in osteomalacic pelvis than in flat pelvis. Personally, I have always looked upon $2\frac{1}{2}$ inches (6·2 centimetres) as the lowest limit for craniotomy. Indeed, even with a conjugata vera of that size I have

often found the operation very tedious and troublesome, while below that figure it has been one of extreme difficulty. It has been my practice never to perform the operation if the conjugata vera is less than $2\frac{1}{4}$ inches, and I only have recourse to it with such a pelvic deformity if the child is dead, and I feel convinced that the risks to the mother from Cæsarean section are extreme, when, indeed, I can hope for little else than a mortality of 20 to 30 per cent.

In discussing this important matter of the lowest limit for safe craniotomy, one naturally can only consider the results and opinions of recent operators, for Cæsarean section until quite recent times was attended with such an enormous mortality that craniotomy was preferred. Even as recently as 1886 Barnes wrote: 'I have arrived at the settled conviction that cephalotripsy is quite practicable with a pelvis measuring $1\frac{1}{2}$ inches in the conjugate diameter, and that the risk to the mother is inconsiderable compared with that attending the Cæsarean section.'[1] Few, I fancy, would express such an opinion at the present time. Herman[2] states: 'As a general rule, a space of 2 by 4 inches represents the minimum through which it is prudent to attempt delivery by craniotomy.' Galabin[3] writes: 'In the higher degree of pelvic contraction, such as with a conjugata vera of $2\frac{1}{2}$ inches or less, I regard Cæsarean section as the easier operation, and to be recommended in all cases.'

Edgar[4] writes: 'I believe that it is generally considered that cranioclasis and extraction through a pelvis represented by a conjugata vera of $2\frac{1}{2}$ inches or under is equally as dangerous as Cæsarean section.' Williams[5] writes: 'Craniotomy is positively contra-indicated when the conjugata vera measures less than 5·5 centimetres, since in such cases the extraction of the child, even after the skull has been crushed, is attended by a greater maternal mortality than Cæsarean section.' Nagel[6] places the lowest limit at 6·5, and states that he has perforated and successfully extracted a child where the conjugata vera was 6 centimetres (2·4 inches).

We will take it, then, that $2\frac{1}{4}$ inches (5·6 centimetres), roughly speaking, represents the very lowest limit for the operation, and even then it should only be performed in exceptional cases.

I cannot think that it is desirable, as some have suggested, to combine symphysiotomy with craniotomy, and I feel quite sure this is the view of almost all obstetricians.

[1] 'Lectures on Obstetric Operations,' p. 337.
[2] 'Difficult Labour,' 1902, 3rd edition, p. 410.
[3] *Brit. Med. Journ.*, October 11, 1902, p. 1124.
[4] 'Practice of Obstetrics,' 1903, p. 974.
[5] 'Obstetrics,' 1903, p. 418.
[6] 'Operative Geburtshülfe,' 1902, p. 317.

As regards the indications for craniotomy in other conditions than contracted pelvis, little need be said. Obstruction of the parturient canal, caused by cystic tumours of the ovary, myoma of the uterus, carcinoma of the cervix, can seldom form an indication for this operation, as it is always a bad practice, especially with ovarian tumours and myomata, to drag a child, even after craniotomy, past obstructions produced by such growths. It sometimes happens, however, where the rapid emptying of the uterus is of importance to the mother—as in certain cases of eclampsia, heart disease, etc.—that after perforation the child can be extracted before complete dilatation of the os. In these cases the operation should only be performed if the child is dead or dying, or is so premature that there is no possibility of it living.

I need not discuss—for it is referred to elsewhere—the operation of craniotomy in such conditions as 'locked twins,' 'double monsters,' or hydrocephalus.

Prognosis.—The prognosis of the operation of craniotomy depends upon several circumstances, but the two conditions which influence it most are the degree of pelvic deformity, and the previous operative interference and probable infection. As can readily be understood, the mortality becomes higher as the pelvis becomes smaller, and where frequent examinations and attempts at delivery with forceps have been made before the patient is subjected to the operation.

During the years 1901 to 1906 inclusive, in the Glasgow Maternity Hospital, I and my assistants performed the operation of craniotomy sixty-three times with eight deaths, a mortality of 12·6 per cent. This is fully 3 per cent. higher than my mortality for Cæsarean section. It is entirely to be accounted for by the fact that in most of the fatal cases the parturient canal was very much injured and invariably infected before the patient was admitted to the hospital. It is interesting to find that not a single death occurred in cases which had been brought into my wards uninterfered with.

Galabin, for Guy's Hospital, states that from 1891 to 1901 the mortality was 9 per cent.; in the Rotunda Hospital, 1896 to 1900, the mortality was 16 per cent. Pinard, from the years 1892 to 1899, places it at 11·5 per cent. Liermberger, in 1902, referring to 232 craniotomies in Chrobak's Clinic in Vienna, puts the mortality at 7·7 per cent. Bretschneider,[1] Zweifel's Clinic, Leipzig, for 132 cases, places it at 7 per cent. But, as these two latter operators mention, in many cases the fatal terminations were not really attributable to the operation. Although these figures show a high maternal death-

[1] *Archiv f. Gyn.*, Bd. lxiii., Heft i., ii., p. 225.

rate, the ultimate results are even worse, for the morbidity is naturally very great. In Chrobak's Clinic, for instance, according to Liermberger, it was 22 per cent., and in the Leipziger Clinic 28 per cent.; in my sixty-three cases the morbidity was fully 30 per cent.

Operation.—The preparation of the patient for this operation must be most thorough, for in many cases, unfortunately, the operation is had recourse to only after many vaginal examinations and attempts at delivering with forceps. In a large proportion of the cases sent into the Maternity Hospital the cervix, vagina, and perineum are already lacerated. Sepsis being so very common after craniotomy (in my sixty-three cases the mortality was 12 per cent. and the morbidity 30 per cent.) the parts about the vulva and vagina must be most thoroughly cleansed.

The first step in the operation is perforation. This is carried out by the perforator, of which there are two different types—the scissors form and the trephine form. In this country the only perforators now employed are of the scissors variety, but in some Continental

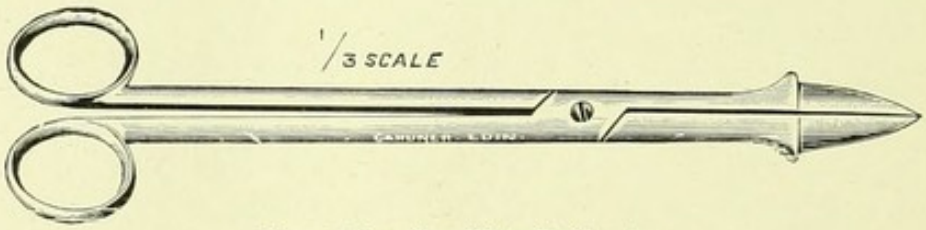


Fig. 210.—Smellie's Perforator.

clinics the trephine is still occasionally used. The advantages claimed for the trephine are that it does not slip so easily off the fœtal skull, and that consequently there is less danger to the soft parts of the mother; also that the opening made allows a more free escape of the brain contents. It is questionable, however, if these slight advantages compensate for the inconvenience of the instrument. Be that as it may, the instrument is now hardly ever employed.

The earliest form of scissors perforator was devised by Levret. Smellie (Fig. 210) altered the instrument slightly, and improved it by adding a shoulder to each blade, so that the blades might be prevented from passing completely into the skull. In these two early forms of scissors perforator the opening in the skull is made by separating the handles. Obviously, such an arrangement in time was found unsuitable, and the more modern instrument, by which the opening is made by compressing the separated handles, became gradually perfected.

There are many different forms of scissors perforator, but the two most generally employed at the present day are those of Naegele and

Simpson (Fig. 211), although Oldham's (Fig. 212) is quite a suitable instrument. As seen in the illustrations, the perforator has two cutting-blades, each being limited by a shoulder. The handles, when the blades are in apposition, are wide apart, and held firmly there by a hinged crossbar fixed to the ends of the handles. This crossbar is so hinged that it only permits of separation of the handles when the two sides of the bar are pulled together.

The steps in perforating are as follows: The handles are fixed by means of the crossbar. The instrument is then grasped in the right

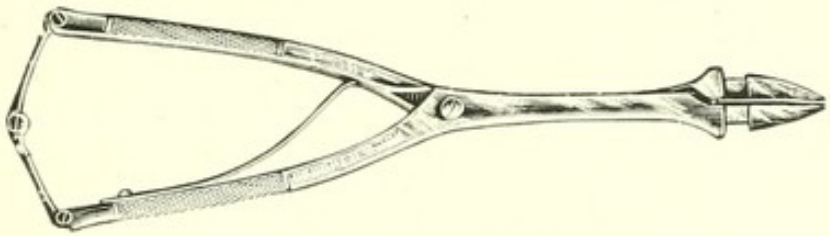


FIG. 211.—Simpson's Perforator.

hand, and carried into the vagina protected by two fingers of the left hand. The head of the child, if it is not sufficiently fixed, is steadied by an assistant grasping the head from the outside. Under protection of the fingers of the left hand, the perforator is then pushed through the skull (Fig. 213). The situation of the opening made in the skull

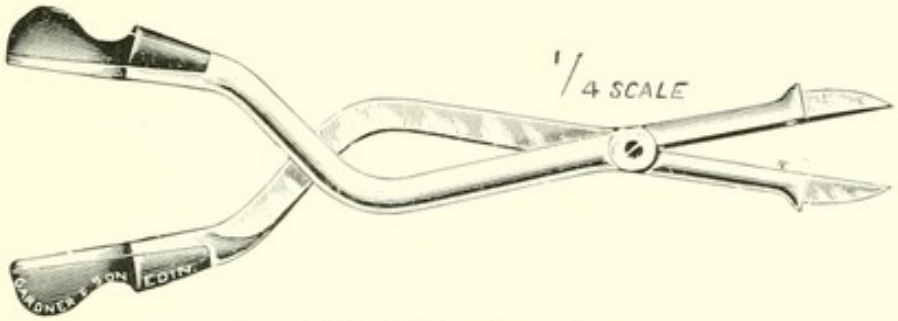


FIG. 212.—Oldham's Perforator.

will be considered in a moment. Sometimes it will be found necessary to move the perforator from side to side so as to bore the point of the instrument through the bone. In pushing or boring the instrument through the skull, the direction of the instrument should be, as far as possible, at right angles to the surface of the child's head, otherwise there is danger of the instrument glancing off the skull and doing injury to the soft parts of the mother. And here I may remark that it is of the greatest importance to have the perforator sharp; with a sharp perforator there is almost no danger, but when the points of the instrument are blunt a greater amount of force is required to push the instrument through, and naturally there is greater danger

of it slipping. In most cases it will be found necessary, in order to get the perforator at right angles to the surface of the skull, to depress the handles of the instrument against the perineum. The blades of the instrument, having been pushed through the skull as far as the shoulders, should then be separated, and this is done by unlocking the crossbar and pressing the handles together (Fig. 214). A large tear in the skull having now been made in one direction, the instru-

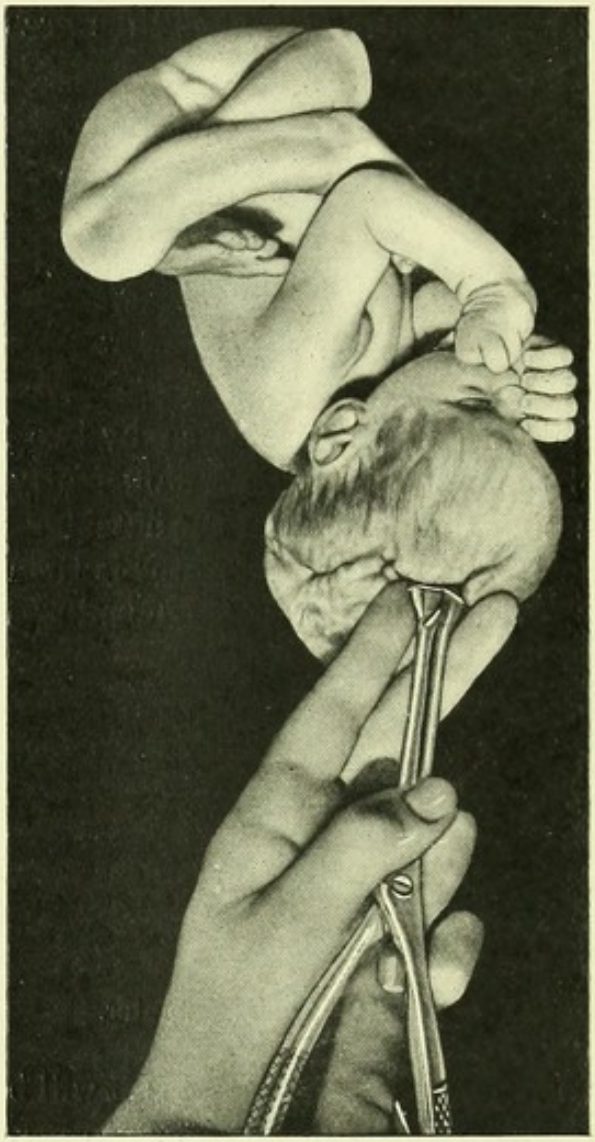


Fig. 213.—The Perforator, having been carried up the Vagina under Protection of the Fingers of the Operator's Left Hand, is being pushed into the Skull in the Neighbourhood of the Anterior Fontanelle.

ment should be turned round and a similar tear made at right angles. The handles are again fixed by the crossbar. This having been done, the points of the instrument should be pushed into the skull and the brain broken up in all directions. The instrument is now withdrawn under protection of the left hand.

I have referred to the danger of the perforator slipping, a danger

which is practically nil if the instrument is sharp and the operator is at all careful. There is another danger which it seems almost unnecessary to mention did I not know that once or twice it has been made; it is mistaking the projecting promontory for the fœtal skull. Such an unfortunate mistake cannot occur unless the operator is careless or excited.

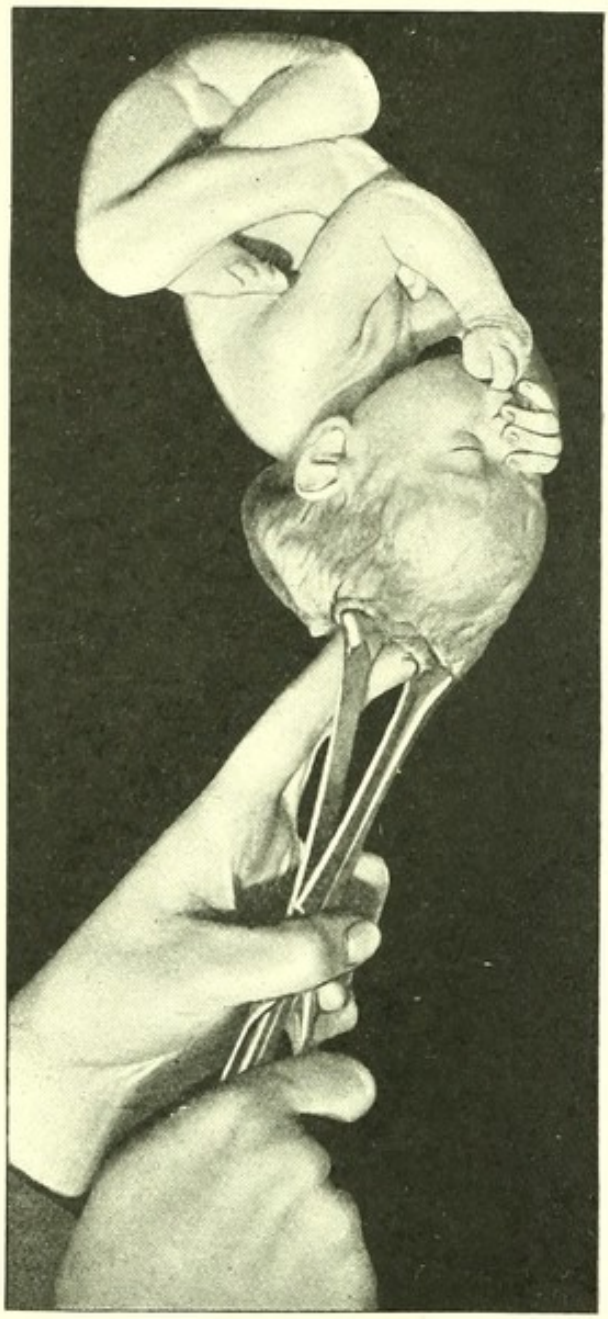


FIG. 214.—The Blades are being separated by pressing together the Handles.

An important matter is the situation of the opening made in the skull. Naturally, if the perforator is simply pushed through the presenting part, the situation of the opening will depend upon the presentation. In the vertex it will be situated somewhere towards the anterior or posterior fontanelles, in the brow through the frontal

bones, in the face through an orbit or through the mouth (Fig. 215). In the after-coming head it will be in the neighbourhood of the postero-lateral fontanelle. Now, all these points are the situations

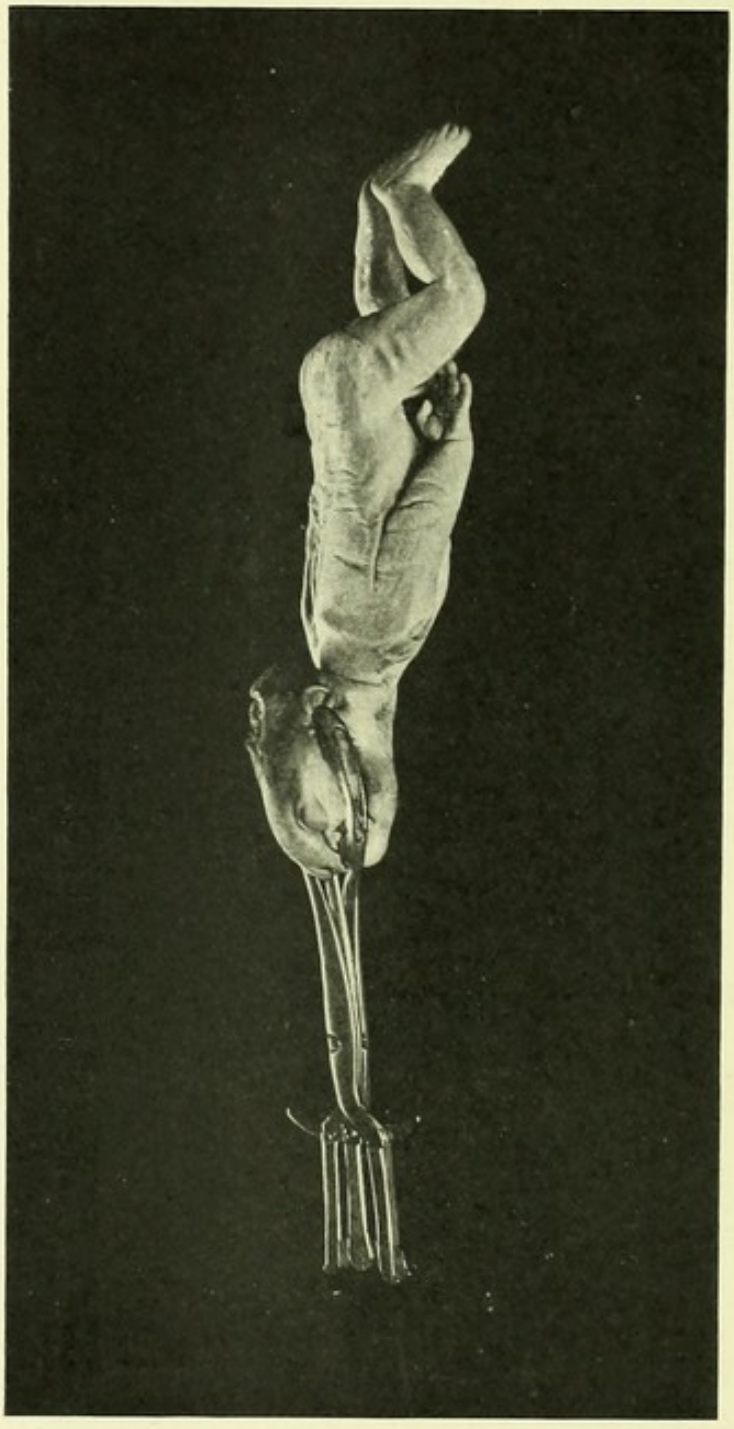


Fig. 215.—Perforation and Application of the Three-bladed Cephalotribe through the Mouth in a Case of Face Presentation.

most easily reached in the particular presentations; and as regards the brow, face, and after-coming head, they are the best situations. In the various vertex presentations, however, it is somewhat different; with them it is often of advantage to have the opening in the skull as

near the anterior fontanelle as possible. The reason for this is that with the modern instruments employed for extracting the head it is of great importance to get one blade well down over the face of the child. Let us consider a few examples.

In the ordinary flat pelvis the head engages in the transverse diameter of the pelvis with the anterior and posterior fontanelles

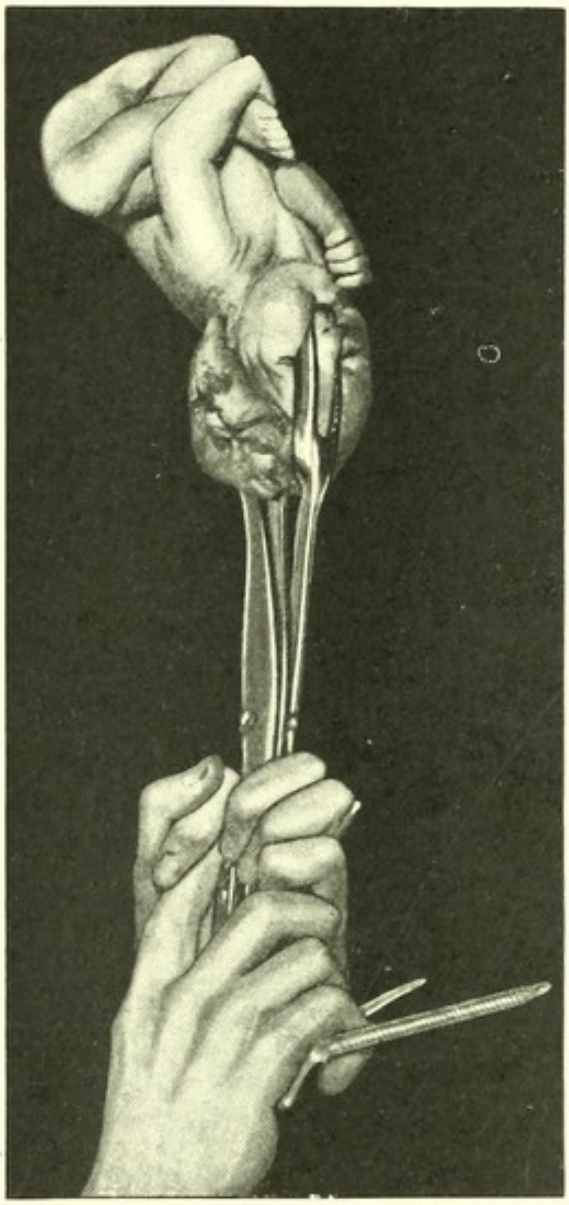


FIG. 216.—Showing Ideal Grasp of Head with the Three-bladed Cephalotribe : One Blade well down over Face, and the Other over Occiput.

about the same level. In the simple cases where the sagittal suture is equidistant from the promontory and symphysis, the hole can readily be made in the middle line, through or near the anterior fontanelle, and the blades of the extracting instrument can be applied over the face and occiput (Fig. 216). When, however, the sagittal suture is placed nearer the promontory or the symphysis, and an anterior or posterior 'parietal presentation' exists, the opening in the head

will come to be through the presenting parietal bone, and the extracting instruments, when applied, will tend to grasp the head to one or other side of the middle line. We have seen, when considering

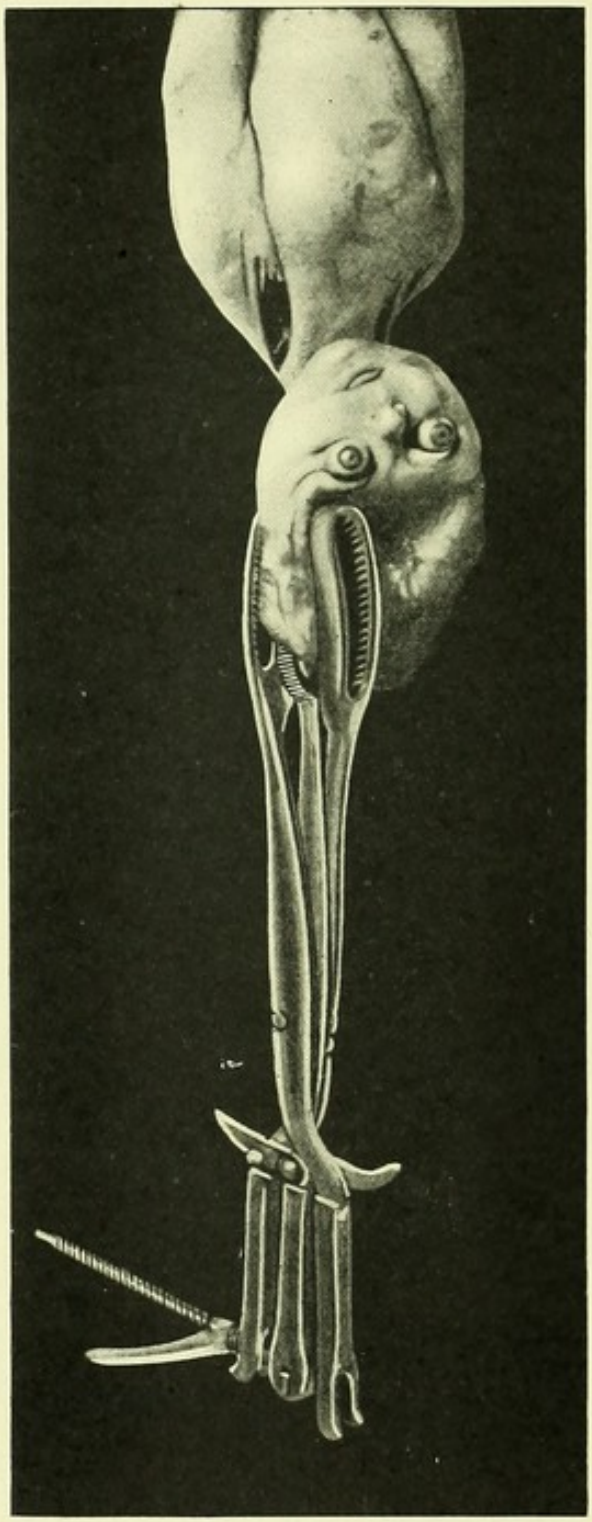


Fig. 217.—Showing the Effect of crushing only One-half of the Head in Cases of Posterior Parietal Presentation.

forceps extraction, that an anterior parietal presentation is very much more favourable than a posterior, and that the child can be much more easily extracted. The same applies also to extraction after

perforation, for even although the grasp of the head is not exactly in the middle line with an anterior parietal presentation, it is sufficient for extraction; whereas with the posterior parietal presentation the instrument, not having a sufficient hold for the increased traction necessary, slips, and only one-half of the head is properly crushed

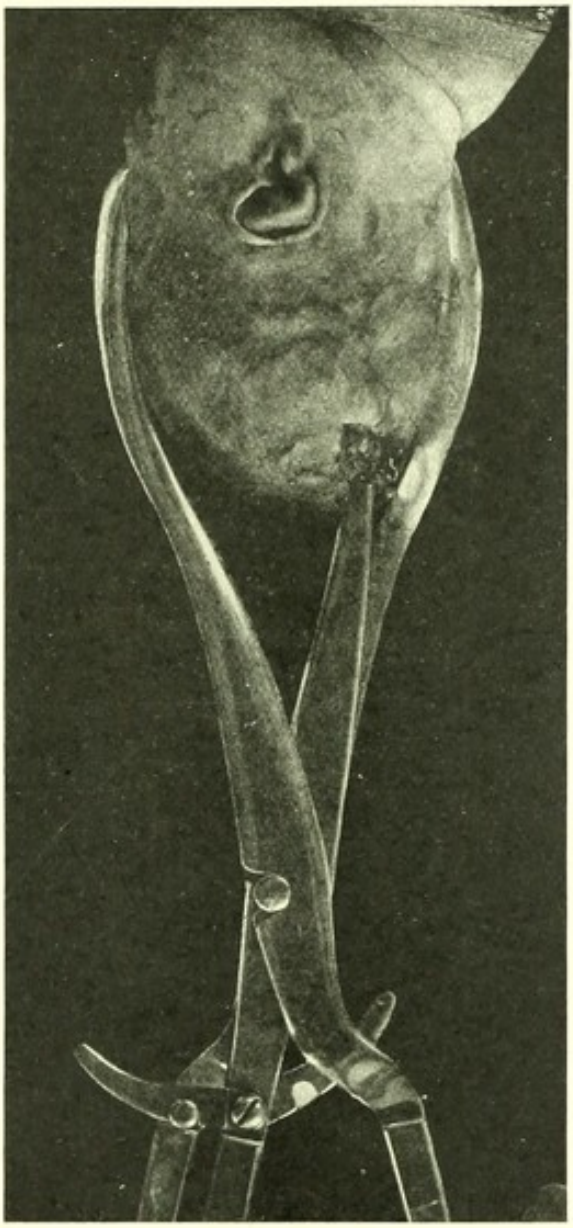


FIG. 218.—Showing the Perforation through Posterior Fontanelle in Case of Extreme Flexion of the Head.

It will be observed that the blade placed over the face does not reach further than the forehead.

(Fig. 217). As I have already stated, the posterior parietal presentation is very much more frequent than the anterior in cases of extreme pelvic deformity.

The most difficult cases of all are those in which the maternal pelvis is generally contracted. In these cases, it will be remembered, (Fig. 218) the head becomes extremely flexed, and the presenting part is somewhere in the neighbourhood of the posterior fontanelle, so

that, if the presenting part is perforated, the blades of the cephalotribe, which should reach over the face, cannot be placed over the face further than the child's forehead (Fig. 218), and the head, when traction is made on the instrument, slips from it (Fig. 219). The advantage of perforating as near the anterior fontanelle as possible was fully appreciated by the older writers when the cranio-

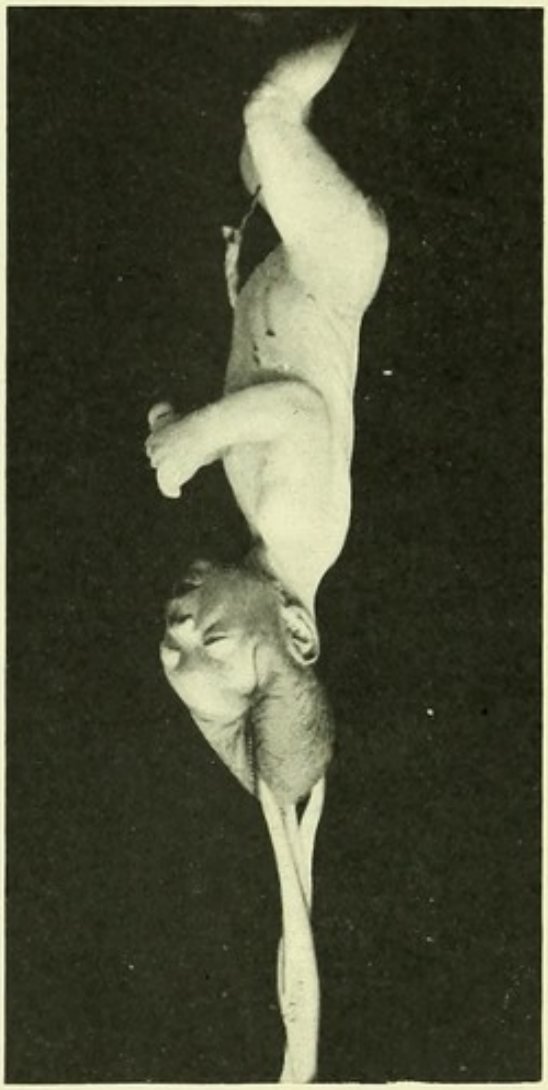


FIG. 219.—Showing the Cranioclast slipping because the Anterior Blade is not applied far enough down over the Face.

clast was in use, and several of them recommended what I have frequently found advantageous, the making of a second opening in the skull. I do this as follows: Having inserted the middle blade and applied the outer one over the occiput, I push the occipital end of the head upwards until I bring the anterior fontanelle within reach. I then make a second puncture in that region.

I have already said that after perforation the perforator should be pushed into the skull and the brain substance thoroughly broken up. This having been done, the skull may be washed out with a double-

channelled uterine douche tube (Bozeman). One can never wash away all the brain material by this means, but one can certainly get rid of a good deal.

Extraction of the Head.—At different times it has been the custom to leave the perforated head to be expelled by the unaided forces. This has been entirely abandoned, and very rightly, for we now have suitable instruments for extracting it.

In the slighter degrees of pelvic deformity the ordinary obstetric forceps is sometimes quite sufficient, and I have several times employed it; but when the pelvic dimensions are small, and the bulk of the head has to be diminished, the obstetric forceps fails to retain a sufficient grasp of the perforated head.

The earliest instruments for extracting the perforated head consisted of hooks and simple forms of toothed forceps. The hook in its perfected form is known as the crotchet (Fig. 220). At one time it was very extensively used, and, indeed, is even yet employed by some

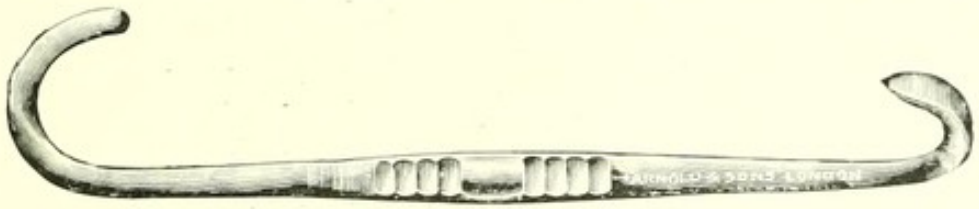


Fig. 220.—Blunt Hook and Crotchet.

of the older accoucheurs. It is passed into the skull, and the point is made to catch on some bony ridge. Two fingers are then applied outside of the skull opposite the point of the instrument, and traction is made on the head. Naturally, one can exert very little traction upon the fore-coming head by such a manœuvre; even when one can fix the crotchet into the orbit or mouth it is apt to tear through the soft bones. For extracting the after-coming head, however, it is very serviceable, as we shall see. Modern operators, in consequence, have almost abandoned the crotchet, except in extracting the after-coming head. Similarly, the procedure of turning after craniotomy has been given up because of the great danger of lacerating the uterus. We now trust entirely to the perfected forms of cephalotribe.

The first great improvement in the older bone forceps was the instrument that is known as the cranioclast (Fig. 221), various forms of which were devised by Simpson, Barnes, Braun, and more recently by Peters. This instrument, which consists of two blades, was extensively employed last century, and has only been recently displaced by the three-pronged instrument of Auvard, Winter, Zweifel, Dührssen, and others. The cranioclast, as I said, consists of two blades, one which is pushed in through the opening in the skull, and

the other which is applied to the outside, preferably over the face. In the cranioclast the two blades can be forcibly brought together by a strong screw at the end of the handles. The instrument, without doubt, was a great improvement on the older forms of bone forceps, which were only of use for pulling away portions of the skull; but it frequently slipped, especially if the external blade was not applied well over the face. In many clinics, therefore, it has been entirely abandoned, and for the last ten years we have never employed it in the Glasgow

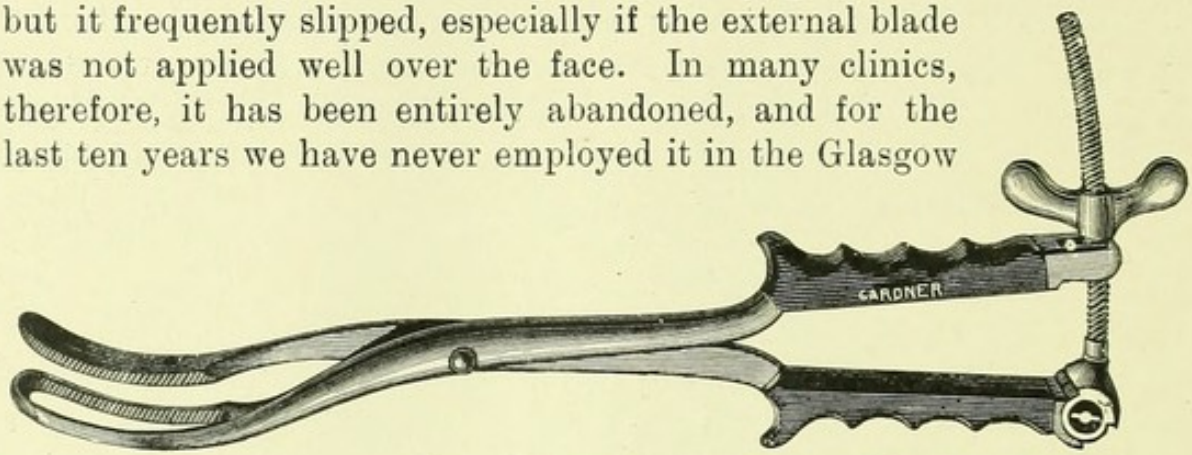


Fig. 221.—Braun's Cranioclast.

Maternity Hospital. The proportion of cases in which the cranioclast failed, and the head had to be broken up and removed piecemeal, is variously stated, but it may be estimated at about 12 to 16 per cent.

Older, however, than the perfected bone forceps or cranioclast is the instrument known as the cephalotribe, which was first introduced by Baudelocque. Baudelocque's instrument was most cumbrous and

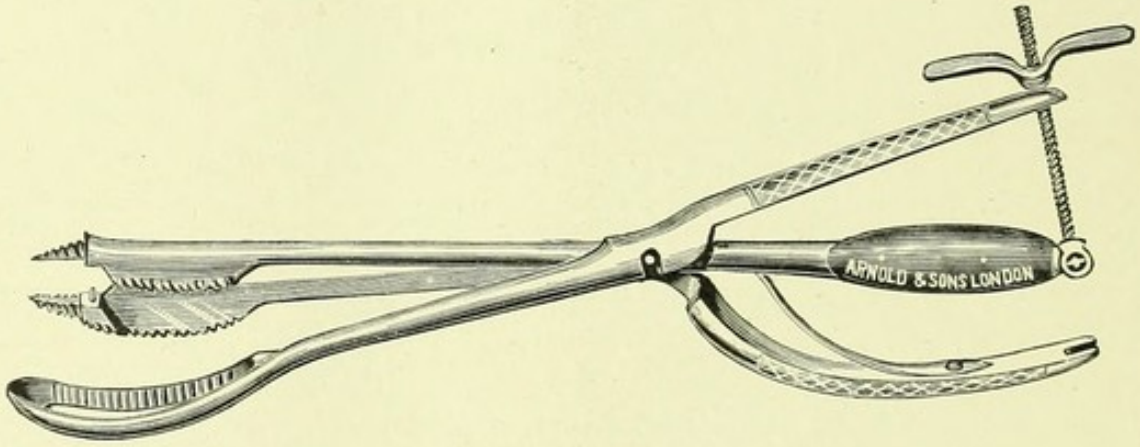


Fig. 222.—Simpson's Basilyst.

unwieldy. It was immensely improved (Fig. 223) by Eduard Martin, Tarnier, and in this country by Simpson and Braxton Hicks. The cephalotribe also consists of two blades, but with this difference, that both were designed for external application very much in the same manner as forceps. By means of a screw at the end of the handles the blades are brought together and the head very completely crushed. In many respects the cephalotribe is a more useful instrument than

the cranioclast; it, however, possesses this great disadvantage, that the head frequently slips from between the blades.

For breaking up the base of the skull various instruments have been devised. They are termed basilysts (Fig. 222).

The modern instrument, which is in some respects a much more complicated one, is a combination of the cranioclast and cephalotribe. As can be seen from the illustrations (Figs. 217, 218, 224), it consists of three blades, one of which is placed within the skull through the opening made by the perforator, while the other two are applied externally. Long before Tarnier introduced his instrument three-bladed cranioclasts had been devised by Valette, Huter, and others, but little attention was given to them; indeed, even Tarnier's instrument was not fully appreciated until Auvard modified it. Since Auvard altered the instrument, and brought it prominently before the profession, several slight modifications of it have been made by Winter, Dührssen, Veit, and, last of all, by Zweifel.

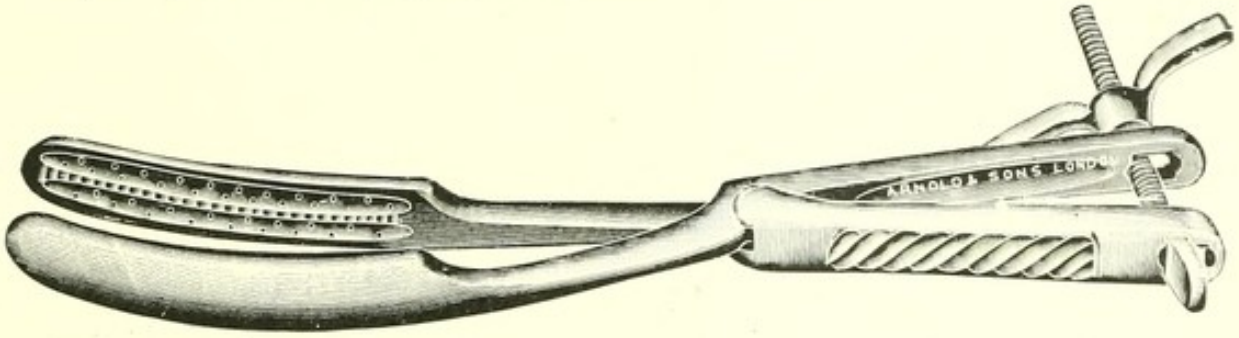


Fig. 223.—Simpson's Cephalotribe.

In the Maternity Hospital we employ Auvard's instrument, in which the blades and shanks are of more than usual length. This lengthening of the blades is in order to avoid having the lock in the vagina. We have found it a most useful instrument. It has simplified the operation of craniotomy immensely, for in place of taking an hour or two, as was the case with the crotchet, and the bone forceps, it seldom takes more than one-third or one-fourth of that time. I cannot speak too highly of the three-bladed instrument.

The three blades, one which is passed through the opening in the skull, and the other two, which are applied over the external surface of the head, are brought together by a strong screw, and when approximated and the head crushed are kept in their place by the two shoulders, which are pulled down into position, and serve as a means of exerting traction. The instrument is straight; it has no pelvic curve. It is employed as follows:

The opening having been made with a perforator, the middle blade is pushed through the opening up to the base of the skull.

This middle blade is not employed as a perforator. In some instruments the middle blade is screwed into the base of the skull—preferably into the foramen magnum. This is not altogether free from risk, unless the hand is passed into the uterus and applied to the base of the skull, so as to ensure that the point of the instrument is actually being bored into the base.

Having passed the point of the instrument well up to the base of the skull, one of the external blades is now applied. It will be found best, when at all possible, that the first external blade should be applied over the surface of the face. If the occiput is first grasped by the external blade, and the screw applied, there will result an increase of flexion, unless the head is perforated very far forwards, and the second blade, which is to be passed over the face, will not extend far enough down over that part. The blade is placed in position by first carrying it upwards, under protection of the left hand, to the side of the promontory, and rotating it into position, as one does with forceps. While this is being done, it is of great service if an assistant steadies the head externally and keeps it extended, for seldom does the inner blade hold it sufficiently firmly in position. The handle of the instrument should be pushed well backwards against the perineum, so that the blade will be brought as far forwards as possible. The external blade being brought into position over the face, the screw is now turned, and the front part of the head crushed. One can always tell at this stage that a good grasp of the head has been obtained when there is considerable resistance to approximating the blades. If they are easily brought together with the screw, one can be perfectly certain the grasp is defective. It will be found very undesirable to apply the other blade, and attempt to crush the head, when the grasp of the instrument is unsatisfactory, for once the head has been crushed in a wrong direction, it is not easy to apply the instrument in a proper direction, as the blades always tend to slip into the first position. The other external blade is now introduced from the opposite side of the pelvis, usually in the neighbourhood of the sacro-iliac synchondrosis, and rotated into its proper position over the occiput. In doing this it is sometimes easier to place the third blade into its proper position, and at other times to keep the third blade fixed, and rotate the occiput on to it with the other two blades. The third blade is now locked, the screw applied (Fig. 224), and the head again crushed. The position of the blades and the appearance of the crushed skull are as in the illustration already given (Fig. 216), and if this ideal grasp is obtained I have never seen the instrument slip during the process of extraction.

The instrument having been applied as described, the operator

now proceeds to extract the crushed head. In doing this the blades should be encouraged to rotate into the smallest diameter, which, in the deformed pelvis most commonly encountered, is the antero-posterior. Usually, by simply pulling upon the head, the instrument will rotate spontaneously, sometimes towards one side, sometimes to

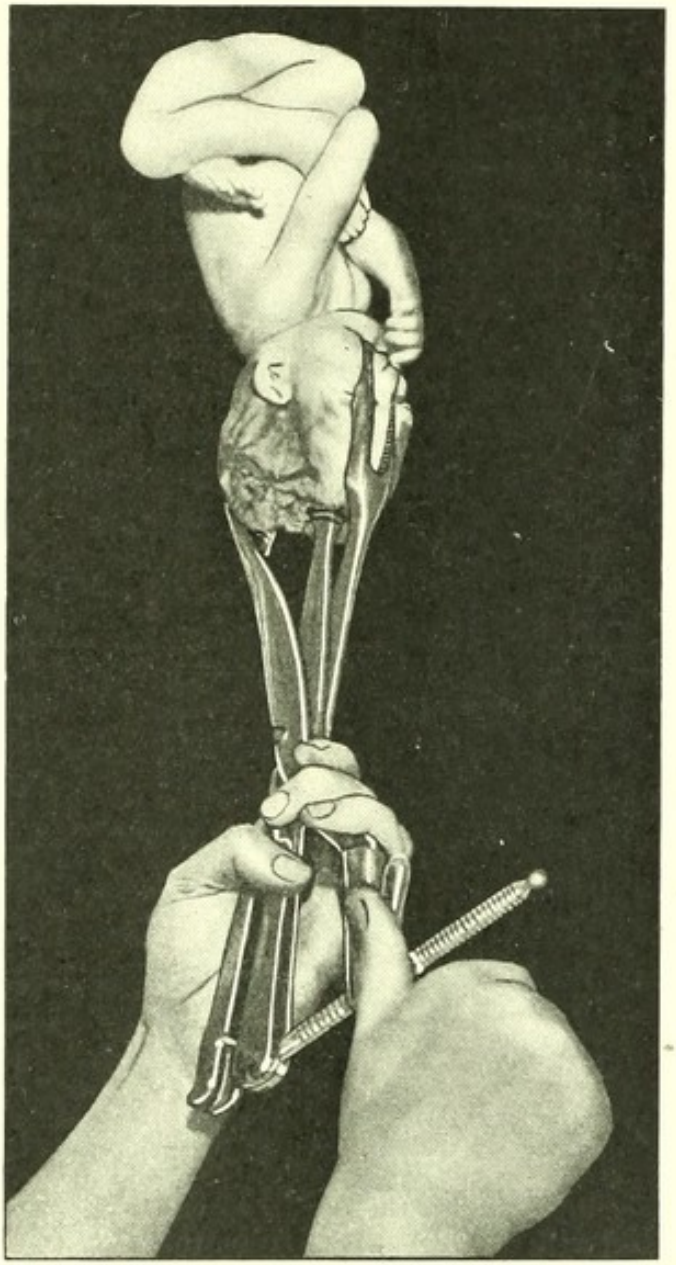


FIG. 224.—The Blade applied over the Face has been fixed, and the other Blade placed over the Occiput is being screwed up so that the Head is completely crushed.

the other; but if it does not do so, the operator may carefully encourage rotation. Very frequently one sees the beginner forgetting this, with the result that the crushed head catches on the brim. He must remember, also, to direct his traction well back. In the ordinary rachitic pelvis, once the head has passed the brim, the further extraction of the child is easy; but in other forms of pelvis,

where the whole cavity is contracted, as in extreme degrees of general contraction, or where the outlet is narrowed, as in kyphotic pelvis, there may be difficulties down through the whole pelvis, and even at the outlet. By steady traction, directed as far back as possible, the head is slowly pulled down through the pelvis.

As a rule, unless the deformity is extreme, a slight amount of force is sufficient to accomplish the delivery of the head. When, however, the deformity is great, or when the grasp of the head is not satisfactory, a more than usual amount of force is required. In these latter cases the danger of the instrument slipping is greatly increased. The operator should therefore watch carefully for this, and during traction should keep the fingers of the left hand against the head, and make sure that, while he is pulling, the head is descending along with the instrument. These fingers in the vagina, which inform him as to how the head is descending, serve the other purpose of protecting any splinters of bone from injuring the soft parts. With the modern instrument, this danger of laceration of the soft parts by splinters is reduced to a minimum, for the scalp being still intact, except for the perforation hole, prevents the broken bones from doing any injury.

Having extracted the head, the trunk is removed without difficulty. Sometimes the shoulders give trouble when the child is of unusual size. In such cases the division of the clavicles is necessary to facilitate extraction. This operation, termed cleidotomy, will be referred to later. After the shoulders are born, the rest of the trunk is easily delivered.

I have never required to employ the cranioclast or cephalotribe in breech presentations; but if it should be necessary, the middle blade should be passed into the rectum, and the two others over the pelvic walls of the fœtus.

Craniotomy on the After-coming Head.—As the operation of craniotomy upon the after-coming head differs considerably from the operation upon the fore-coming head, it is necessary that we consider its details. In some circumstances it is easier; in others it is more difficult. Provided the pelvis is not too deformed, the operation can readily be performed, and the extraction is easier; but in extreme degrees of deformity it is more difficult, as the head is far out of reach, the brain substance does not readily escape, and the cephalotribe is difficult of application.

Some years ago Donald published a very interesting paper,[1] in which he pointed out the advantages of craniotomy on the after-coming head, and in which he recommended, when craniotomy was decided upon, and the child could still be easily turned, that version

[1] Lond. Obst. Trans., vol. xxxi., p. 28.

should be first performed. His paper was freely discussed, but the majority of those who spoke were rather sceptical of the advantages claimed by the author.

The operation is carried out as follows: The arms of the child having been brought down, the assistant grasps the feet, and directs

Fig. 225.—Perforating the After-coming Head through the Postero-lateral Fontanelle.

traction upon them, in the direction desired by the operator. The operator carries the perforator, protected by the two fingers of the left hand, along the dorsal aspect of the trunk, until he reaches the skull. He then pushes the instrument through the skull, in the neighbourhood of the postero-lateral fontanelle (Fig. 225). Sometimes this point is difficult to reach, and he can only perforate

through the occipital bone in the middle line. In these cases he must make sure that he really perforates the skull, and not the uppermost part of the vertebral column; for if this mistake is made not only will he find it difficult to gain entrance to the skull, but, having fractured the vertebral column, he will have rendered extraction of the head more difficult.

The perforator is pushed through the skull, and an opening made

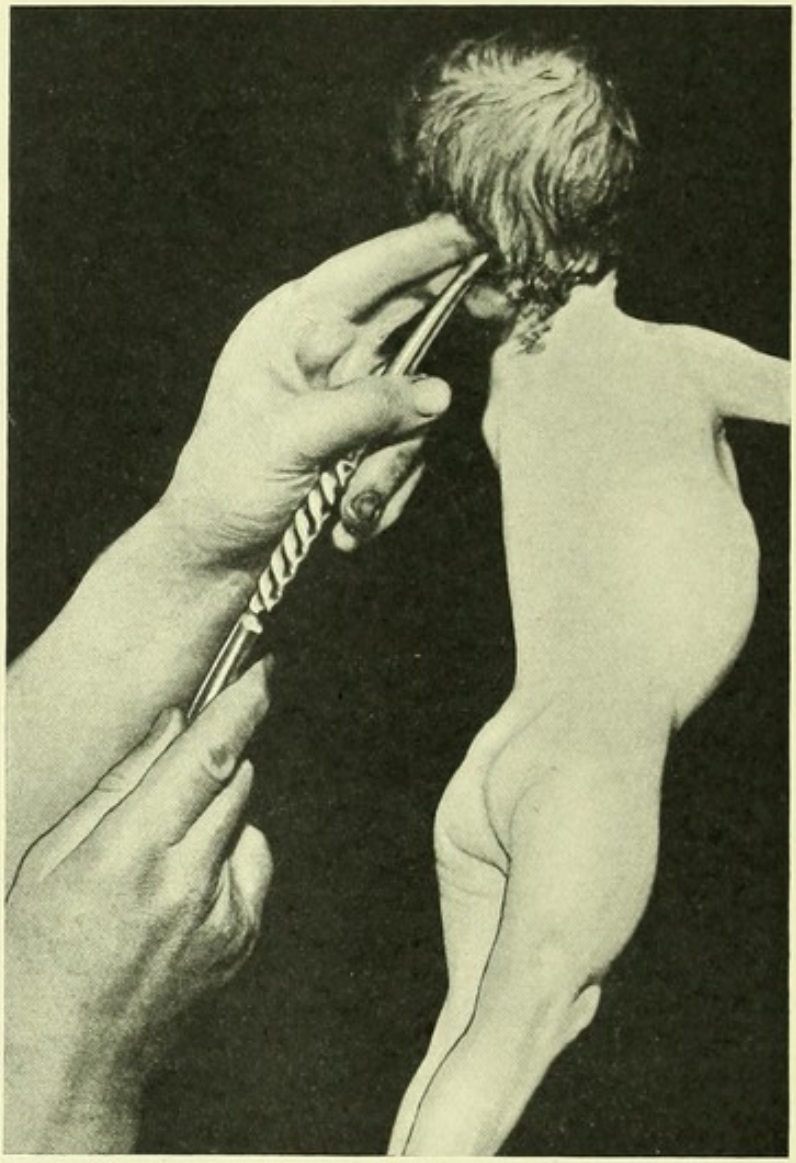


Fig. 226.—Extracting the After-coming Head with the Crotchet.

in the manner already described for perforation of the fore-coming head.

The brain matter having been broken up and washed out, extraction is now proceeded with. It will be found in many cases this can readily be accomplished with the crotchet, the point of which should be turned towards the vertebral column. With this instrument a

very firm hold of the skull can be obtained, seeing that the bones at the base of the skull are so strong. The illustration (Fig. 226) shows the manner in which the operator protects the soft parts of the mother with his fingers, while he exerts traction with the crotchet. The traction should be steady and gradual, so as to permit of the bones of the cranial vault collapsing. If with moderate traction the head does not collapse, it is not safe to exert an undue amount of force, for the body may be dragged from the head and the latter left in the uterus. Should one fail to deliver with the crotchet, the cephalotribe must be employed. This, however, is sometimes difficult, especially if there is general deformity of the pelvis, for there is so little room for the instrument and the neck of the child in a deformed pelvic canal.

It is claimed by some that the roof of the mouth is a better site for perforating the skull, as the brain substance escapes more freely through such an opening. It is, however, difficult to reach that part in some cases, and the hold one obtains with the crotchet is very feeble, as the bones are so soft. Occasionally it might be a quite useful procedure to make two perforations, one through the occipital bone and the other through the palate.

Decapitation.

The operation of decapitation consits in the severing of the head from the trunk, followed by the extraction of the trunk and then of the head. It is an operation of considerable antiquity, for we find it recommended by Celsus.

The operation has always been looked upon as one of great difficulty. I cannot say that it is easily carried out, but in most cases it may be performed without much difficulty, and my colleagues and I in the Maternity Hospital prefer this operation to the much slower one of evisceration. Personally I have only once found the operation impossible, and that was in the case of an impacted transverse presentation with a contracted pelvis, where the child's arm was prolapsed, and owing to the size of the child the neck could not be reached. I therefore perforated the chest, divided the trunk, extracted the lower part of the trunk, removed the arms, and finally extracted the head after perforating it (evisceration, spondylotomy, and craniotomy).

I find decapitation is very seldom performed by practitioners in this country. This is most unfortunate, for there are a number of

cases in which it is the only safe treatment. There have been in recent years a considerable number of patients sent into the hospital in which practitioners have made fruitless attempts at version, and where with very little difficulty we have decapitated and terminated the labour.

The indication for the operation is an impacted transverse presentation, where the uterus is grasping the child so firmly that version

Fig. 227.—Decapitating Hook (Ramsbotham's).

is dangerous. It is not a little difficult to decide when one should desist from making attempts at version, for even when the waters have drained away, and the uterus is closely applied to the surface of the child, by deeply anæsthetizing the patient the uterus relaxes to a surprising extent, and version is sometimes more easily performed than one expected. It is my custom, therefore, before proceeding to decapitation, to try and estimate the relative danger

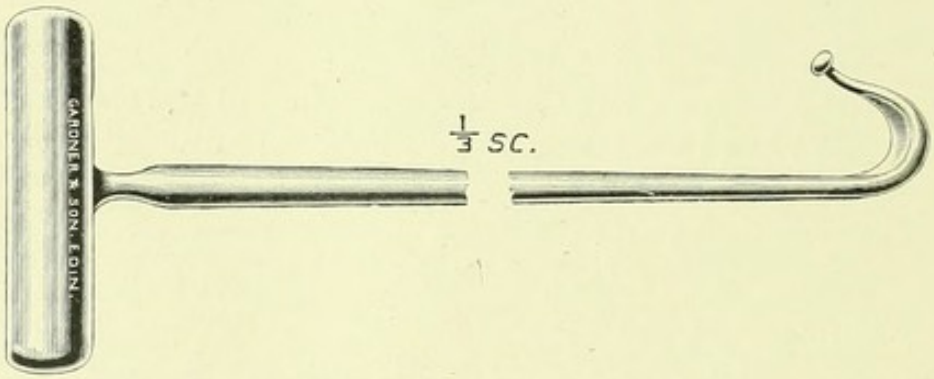


Fig. 228.—Decapitating Hook (Jardine's).

of performing version. I decide to desist from version and have recourse to decapitation in all cases if the child is dead or dying (judged by the pulsations of the umbilical cord); and, if it is living, where the lower uterine segment is very much thinned out, the head is below the retraction ring, and the uterus still grasps the child even although the patient is deeply anæsthetized. The reason why I apparently sacrifice the child in these latter cases is because, if a transverse presentation has become impacted, the

prospect of the child surviving a difficult version and extraction is so small as to be almost negligible. This matter is considered in Chapters VI. and XXII.

The severing of the head of the child from the trunk may be carried out with a variety of instruments; it has been done with cord, wire, chains, ecraseurs, and scissors, but the two more common instruments employed are the decapitating knife, of which the best-known form is that of Ramsbotham (Fig. 227), and the hook devised by Braun. In recent years both of these have been much modified; Schultze and Jardine have modified the former, Zweifel and others have modified the latter. The objection to Ramsbotham's knife is that it is too large, and is often difficult to manipulate; and the objection to Braun's hook is that owing to narrowness of the curve it

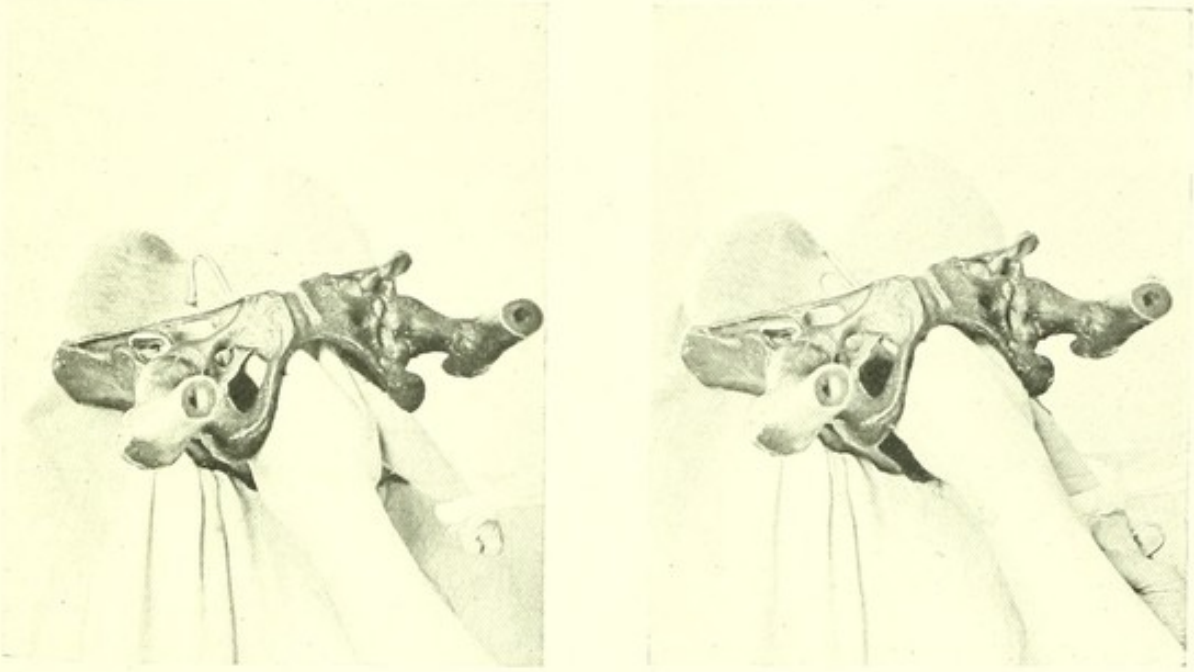


FIG. 229.—Showing the Manner in which the Decapitating Hook or Knife is employed.

is not always easy to get it over the child's neck. Besides, the method of twisting the head off with a hook is crude as compared to dividing the neck with a knife. Schultze's knife is a distinct improvement on Ramsbotham's, but, I think, even better than the latter is the combined hook and knife of Jardine (Fig. 228).

The operation of decapitation is carried out as follows:

The exact position of the neck having been determined, the decapitating instrument, protected by the palm of the left hand, is passed up over the child's shoulder (Fig. 229). The point is then turned over the neck. In dorso-anterior positions this can be accomplished more easily from the posterior aspect of the neck, but in dorso-

posterior positions it is more easily done from the anterior. In the latter cases I always get a finger over the neck and guide the knife or hook into position.

In a great number of cases the arm is prolapsed, and this is usually an advantage, unless the arm and shoulders of the child are unusually large, for by traction on the arm the neck can be brought more

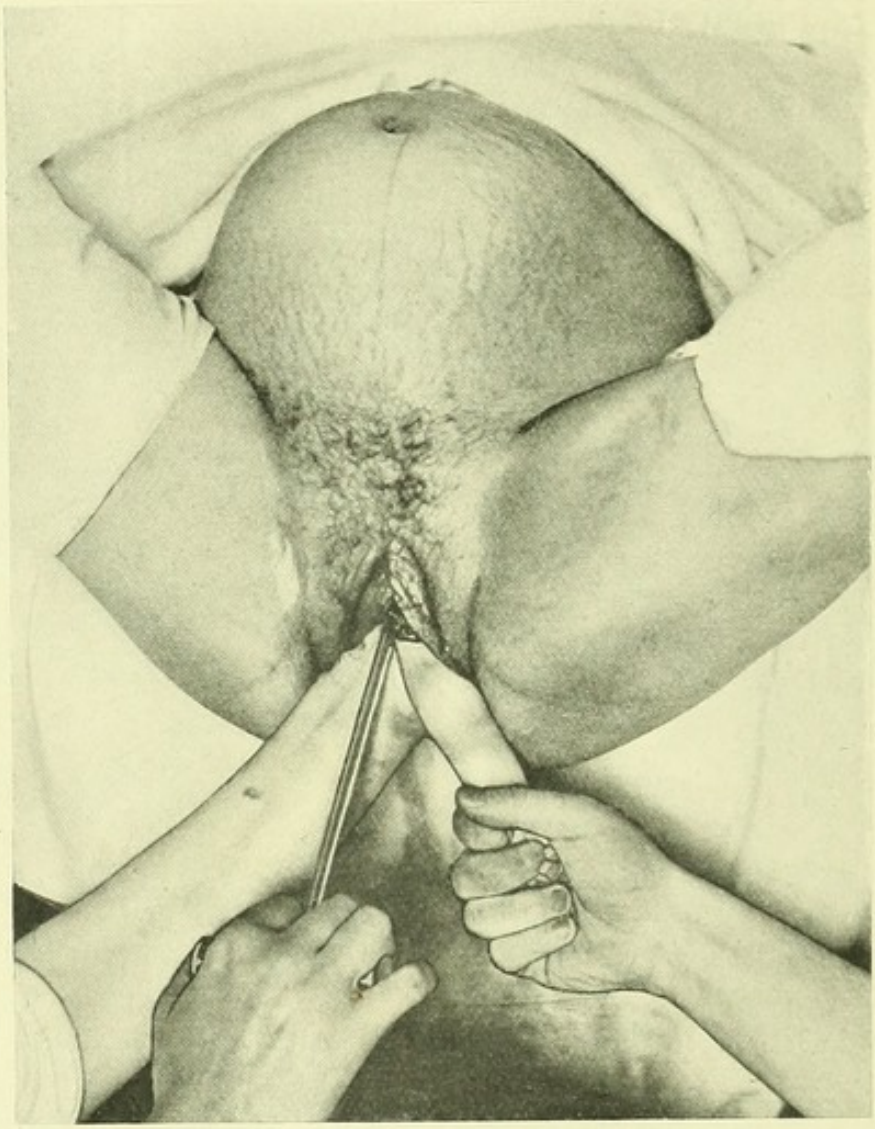


FIG. 230.—The Assistant pulls upon the Prolapsed Arm so as to steady the Fœtus and bring its Neck within reach. The Operator then passes the Decapitating Hook over the Neck under Protection of his Left Hand. He is here dividing the Neck.

readily within reach (Fig. 230). If the knife is used, by a backward and forward movement it is carried through the neck, but if Braun's hook is the instrument employed, then it is twisted round and round until the neck is completely severed, the head being steadied from the outside. By this latter method, which I have indicated is very crude, the bones of the spinal column are shattered. There is then only a band of skin to be divided with scissors.

After the head is completely severed, the trunk is removed by making traction on the prolapsed arm. There now remains the removal of the severed head, and this is easily accomplished manually or with forceps, unless the pelvis is deformed. Should the pelvis be contracted, the head is steadied by suprapubic pressure, perforated, and then removed with the cranioclast, crotchet, etc. (Fig. 231).

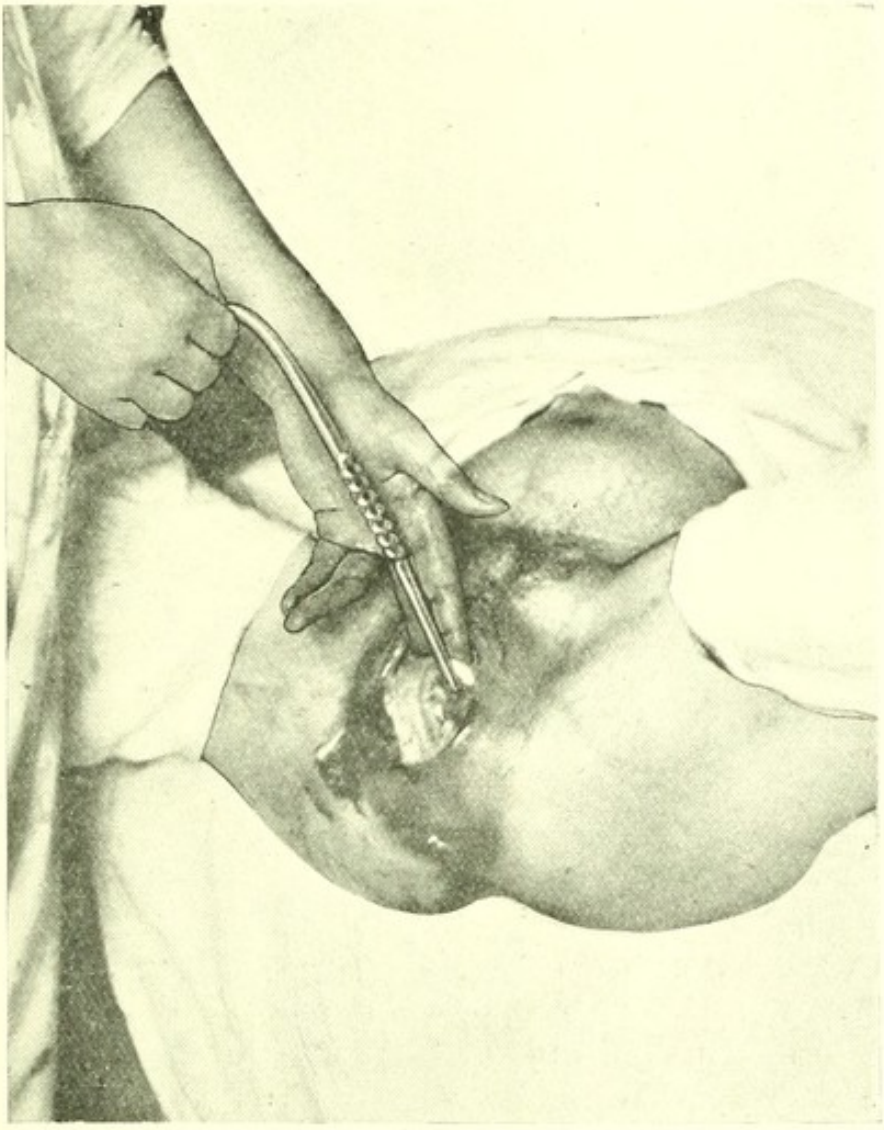


Fig. 231.—Removing the Detached Head with the Crotchet.

Care must be taken in extracting the head that the ragged neck does not injure the soft parts, for usually, when the head is severed, the greater part of the neck is left attached to the head, the line of cleavage being close to the shoulders.

The operation of decapitation has been attended with excellent results in the Maternity Hospital. During the years 1901 to 1906 inclusive it was performed fifteen times without any maternal deaths, although in all cases the women were very ill when brought into the hospital.

Evisceration.

The operation of evisceration consists in the removal of the abdominal and thoracic contents, with the object of diminishing the bulk of the child, and so permitting of its being extracted.

The most common indication is an impacted shoulder presentation in which decapitation is impossible owing to the neck being out of reach. The operation is also occasionally necessary in monsters, and where the abdomen or thorax of the child is distended with fluid or new growths.

The operation is performed by first making a large opening with a perforator into the abdomen or thorax; the viscera are then broken up and removed manually. During these manipulations, if the presentation is transverse, the trunk of the child may be steadied by means of the prolapsed arm. As the abdominal contents are the most bulky, the removal of them diminishes most the bulk of the child. Where the opening is made into the thorax, the abdominal contents can be reached through the diaphragm.

After evisceration the child can often be extracted in a doubled-up condition, provided the pelvis is of normal size and the child is small or macerated; but where the pelvis is deformed, or the fœtus large, the vertebral column has to be divided. The term 'spondylotomy' was given by Simpson[1] to this division of the vertebral column. It can best be done with scissors, but it is often a very tedious operation.

In cases where the presentation is transverse, and the trunk has been divided, the lower part of the trunk is first extracted by making traction on the legs. The extraction of the other half of the child must be carried out with great care if there is much of the trunk left, because when pulling upon the trunk the ragged edges of bone may injure the parturient canal.

In the simpler cases where the child has to be eviscerated on account of the bulk of its abdominal or thoracic contents, the operation is more simple. The abdomen, if the presentation is a breech, can be easily reached when the legs are brought down. In head presentations, however, there may be a little more difficulty, for the abdomen may sometimes require to be opened through the diaphragm, although in all cases in which I have required to perform the operation I have been able to perforate the abdomen direct.

[1] 'Obstetric Works,' vol. i., p. 502.

Cleidotomy.

The operation of cleidotomy, or division of the clavicles, has for its object the reducing of the bulk of the shoulder girdle. In all probability the operation was performed in times past, but attention

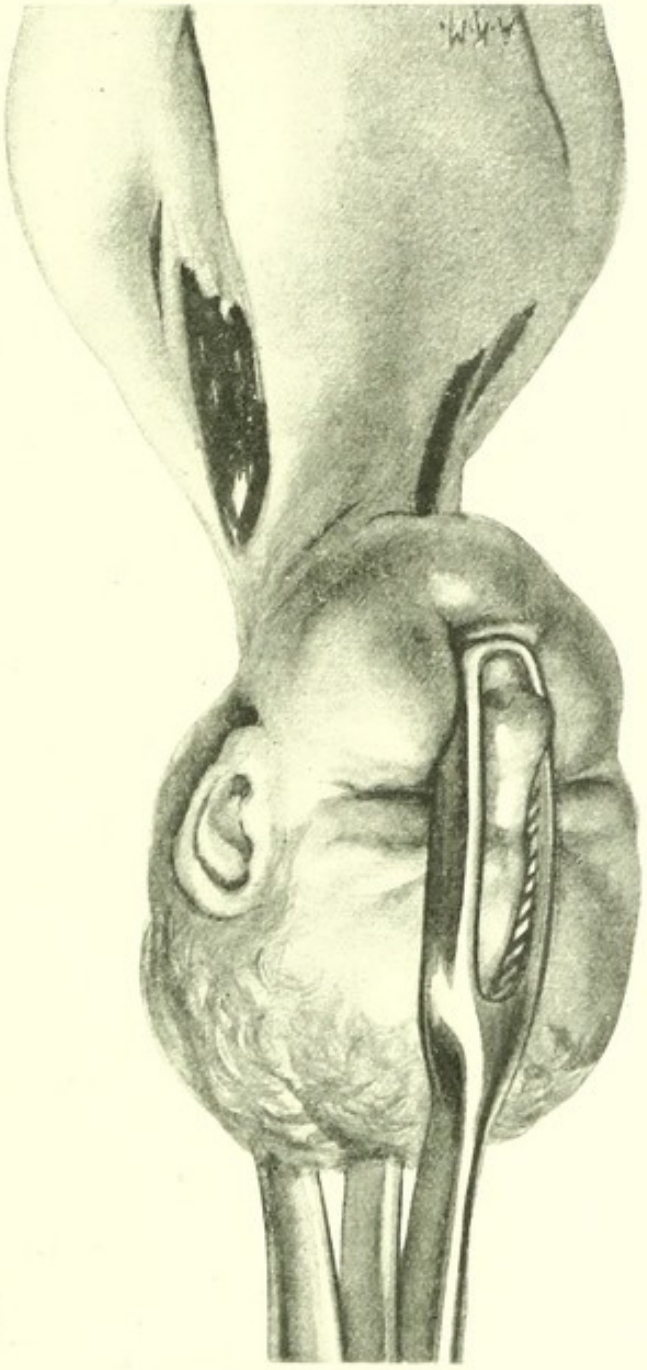


FIG. 232.—Showing the Collapsed Shoulder Girdle after Cleidotomy.
The child was a very large one, and had to be extracted with the cephalotribe.

was first directly drawn to the advantages of the operation by Spencer, in a paper entitled, 'On Delivery of Certain Cases of Impaction of the Trunk of the Fœtus.'[1] He says: 'It may be necessary to reduce the

[1] *Brit. Med. Journ.*, April 13, 1895, p. 808.

width of the child's shoulder. With this object I have found it a useful plan to snip through the clavicles with scissors.' A few weeks later Phänomenoff[1] made a contribution under the title, 'Zur Frage über Embryotomie. Über die Durchschneidung des Schlusselbeins (Cleidotomia).' Knorr and Strassman in Germany, Bonnaire in France, and Ballantyne in this country, have drawn special attention to the operation. Ballantyne's paper[2] is the most complete on the subject in the English language.

I have performed the operation frequently in the Glasgow Maternity Hospital, and I entirely agree with all that has been written in its favour.

The operation is a very simple one. The clavicles are divided either by a pair of strong, straight scissors, or a symphysiotomy knife, such as Pinard's. The two fingers of the left hand are passed along the ventral aspect of the child, and under the protection of these the knife or scissors is introduced and the clavicle divided. The other clavicle is divided in a similar manner. The illustration (Fig. 232) shows a case in which both clavicles have been divided.

The only danger is injuring the soft parts of the mother, but if the operator takes care to protect the soft parts with the fingers of his other hand when he introduces the knife and divides the clavicle this cannot occur.

[1] *Cent. f. Gyn.*, June 1, 1895, p. 585. [2] Edin. Obst. Trans., vol. xxvi., p. 24.

CHAPTER XXX

MANUAL REMOVAL OF PLACENTA AND MEMBRANES

It sometimes happens that the placenta and membranes, instead of being expelled some little time after the birth of the child, are retained in the uterus. In most cases they are separated, and are merely 'retained,' but in a few they are actually 'adherent.' According to the figures of a number of different writers who have collected series of cases, the operation of manual removal of the placenta was necessary about once in 200 cases.

Adherent Placenta.—This is the result of pathological changes in the uterus and placenta, most commonly a chronic inflammation of the uterus. It is a rare complication—much rarer than is generally supposed. It is more frequent in pregnancies which terminate prematurely than in those at full time.

The recognition of adherent placenta is not difficult; the uterus remains of the same size and shape, the ligature which was applied round the cord at the vulvar orifice to mark any descent of placenta remains in the same situation, and expression of the placenta is impossible. Strassmann has pointed out that as long as the placenta is adherent a thrill is felt in the umbilical cord whenever pressure is made on the fundus. Naturally, if there is a ligature applied at the vulvar orifice, the thrill will be arrested there. With a partially separated placenta this sensation is not experienced.

A placenta which is adherent to any extent cannot be expressed, and so, after waiting for a certain time, the hand must be introduced into the uterus and the placenta and membranes removed. It may be very rightly asked—How long should one wait? As there is no definite time for placental separation, this cannot be stated. In my experience the placenta takes on an average fifteen to twenty minutes to separate, and so, if separation has not occurred after half an hour longer, I look upon the condition as abnormal, and I proceed to remove the placenta manually.

Of extreme importance in performing the operation is surgical cleanliness, for the mortality and morbidity from it are very high. Collected cases of a variety of writers show a mortality of 7 to 10 per cent. There are several reasons for this. The operator's hand not only comes in contact with, but is rubbed repeatedly over, the raw placental site. (Prior to delivery all manipulations were carried on within the protecting bag of membranes.) Further, he is called upon to perform the operation after a prolonged and often difficult delivery, when he is tired, and consequently not so careful in the precautions taken against infection. Lastly, in many cases the parturient is extremely exhausted by a difficult parturition and an abnormal loss of blood, and in consequence her resistance to infection is lowered.

Before proceeding to remove a placenta manually, the operator's hand and the patient's vulva must be thoroughly cleansed over again. When the whole placenta has to be removed, as in the condition we are at present considering, rubber gloves may be worn with advantage, but when it is a matter of removing small portions of membrane or placenta I have found it necessary to remove the gloves. One can, of course, as some operators do, employ cotton gloves for the purpose; the naked hand, however, is much the best.

The operation of removing the placenta is not difficult, provided the patient is anæsthetized, which should always be done. To attempt the operation without an anæsthetic has several disadvantages. In the first place, it is very painful; but even more serious than that is the fact that it is more difficult to introduce the hand, and greater force is required to push it through the vulvar orifice; thus there is greater danger of carrying in organisms. Lastly, there is the danger of injuring the parturient canal. Quite recently a case was brought into hospital where the medical attendant ruptured the uterus while manually detaching a very adherent placenta.

In removing a placenta that is adherent, the fingers should be passed up between the uterine wall and the placenta, and the latter stripped off. Wide sweeps should be made until the whole placenta is separated. It should then be grasped in the hand (Fig. 233), and the uterus made to force out the hand and placenta together. During the whole process of removing either placenta or membranes the external hand must steady the uterus and work along with the internal.

The uterine surface after detachment of the placenta is always ragged; it can never be made smooth, even by scraping; so that it is unwise to do this, for there is a distinct danger that by scraping the placental site too energetically injury may be done to the uterine

wall. As I shall point out when considering rupture of the uterus, cases of weakening of the wall and rupture at a subsequent pregnancy have followed such a procedure.

After the removal of the placenta or membranes, it is advisable to give an intra-uterine douche of boiled water at a temperature of 116° to 118° F. The object of this douche is to wash out any débris and

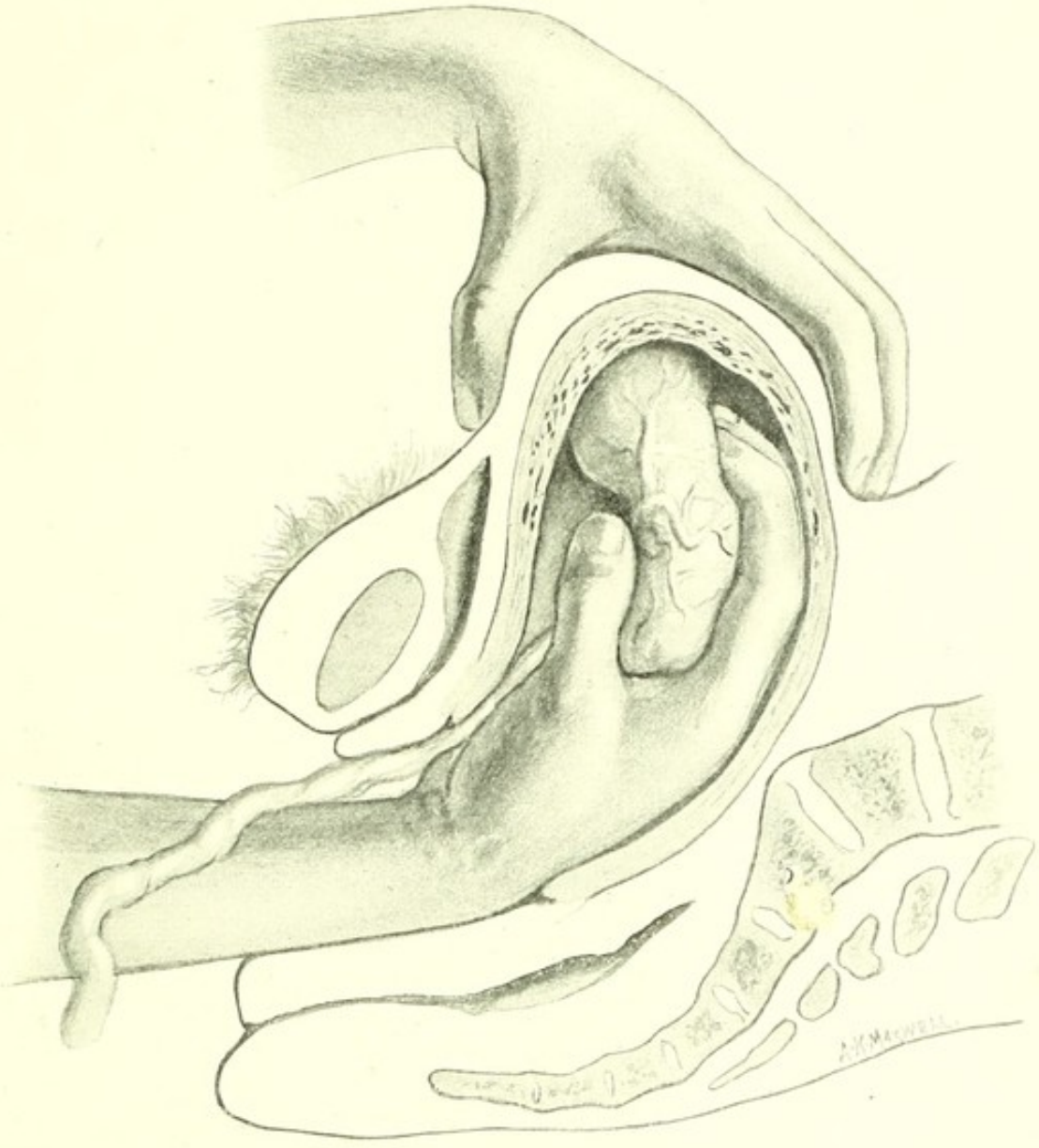


Fig. 233.—Manual Removal of the Placenta.

to stimulate the uterus, which is usually in a condition of inertia after these manipulations and deep chloroform anæsthesia. It is also well to give an intracellular injection of ergotine.

Retained Placenta and Membranes. — While the abnormal 'adhesion' of placenta to uterine wall is a condition quite beyond one's control, it is not so with 'retention' of the membranes and placenta in whole or in part. In most cases—there are, of course,

many exceptions—this complication is the result of improper management of the third stage, especially hurrying it unduly. That being so, it is well that we consider what occurs normally after the child is born.

If one observes a case of normal delivery, one finds that the uterus remains retracted and quiescent, just as it does after the birth of a first child in a twin pregnancy. After a time, varying from five to fifteen minutes, active contractions begin, and these go on at regular intervals, as they did during the first and second stages. During the period of quiescence, and especially during contractions, separation of the placenta occurs. I do not propose discussing here how this separation occurs. As is well known, many different views are held regarding the matter, some attributing it to retraction of the placental site, others to relaxation of the uterine wall after contraction, while many still support Schultze's view of the formation of a retro-placental hæmatoma. These are all still disputed points, and not questions that can suitably be considered here. What we do know is that the placenta takes time to separate, the uterus does not attempt actively to expel it for some little time, and the expulsion of the placenta is very generally followed by the escape of a considerable quantity of blood.[1]

Without doubt, theoretically, the ideal course to pursue would be to leave the expulsion of the placenta entirely to Nature; but in practice such a course is hardly possible, for, from statistics in which such a course has been followed, the placenta has often not been expelled for many hours. It is, therefore, universally admitted that some assistance should be given to the uterus to expel the secundines. To put a time limit upon what should be the duration of the third stage is quite impossible, for, like every other stage, it must vary in duration. It is quite unnecessary for me to say that the other extreme of forcing the placenta out immediately after the child is born is a highly reprehensible practice. But even when that is appreciated, and a considerable time is allowed to elapse before the placenta is expelled, portions of membrane are often retained. In great part I am convinced this results from the erroneous practice of early kneading the uterus. The intelligent and careful accoucheur knows that he should keep his hand upon the uterus during the third stage; but the mistake he makes is, instead of allowing his hand to lie quietly on the uterus and watch that it does not become over-distended with blood, he begins to knead it immediately, with the result that he sets up a tetanic contraction of the uterus, especially of the lower part of the body; he forgets the fact that the uterus must have a

[1] It must not be forgotten that the placenta is often retained because the bladder is over-distended.

period of rest before it begins to contract. Personally, I believe, although this is a debated question and opposed to the views of many distinguished writers, that the early kneading and compression of the uterus destroys the quiet formation of the retroplacental hæmatoma, which, to my mind, is a most important factor in normal placental separation and expulsion.

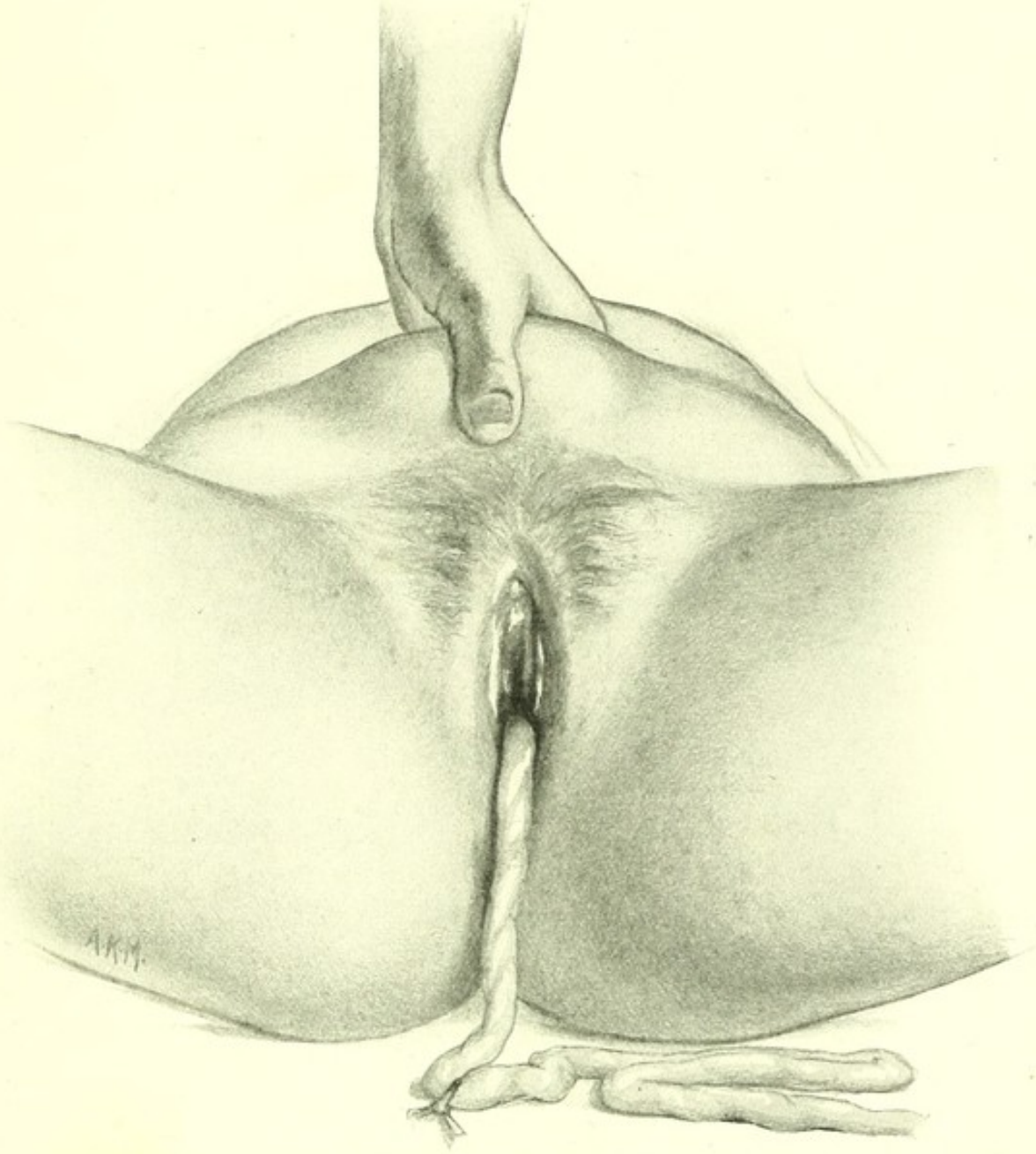


Fig. 234.—Method of expressing the Placenta. (After Bumm.)

The course to pursue is as follows: Keep the hand quietly resting upon the uterus, wait for fifteen minutes or so until contractions commence; if they do not occur, establish periodic contractions by kneading the uterus at intervals of three to five minutes. Do not attempt to expel the placenta until it has passed from the body into

the lower uterine segment. This is indicated by the altered shape of the uterus; the fundus rises up higher, and the shape comes to be less globular. In addition, more of the cord slips out of the vulvar orifice, and traction upon the cord indicates that the placenta is not as intimately connected with the uterus as it was.

By the end of thirty minutes or so, if the placenta has passed out of the body of the uterus, pressure may be exerted on the fundus, and the placenta slowly forced out of the vagina.

The method of expressing the placenta generally employed is associated with Credé's name, although there is no doubt that the

Fig. 235.—Removing the Membranes by twisting the Placenta so that the Membranes are formed into a Twisted Cord.

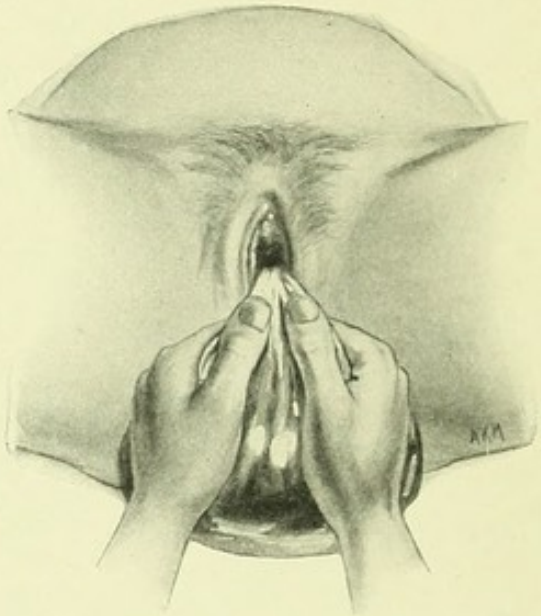


Fig. 236.—Removing the Membranes by Direct Traction upon them.

Rotunda School rightly claims priority. The operation is carried out as follows:

The uterus is kneaded firmly by the hand until it actively contracts — the fingers are passed behind and the thumb in front of the uterus (Fig. 234). Not only is it profitless to try and express the placenta before a contraction is established, but there is even the danger that by trying to do so an inversion of the uterus may be produced. Having secured an active contraction, the uterus is squeezed between the thumb and fingers, and the placenta is slowly forced out of the vagina. No great force is required, as a rule—indeed, if it is necessary, it is evidence that the placenta is not yet ready to be forced out. As I have already indicated, the passage of the placenta is often retarded by contraction of the lower part of the body (Bandl's

ring). This, as stated, often results from too early kneading of the uterus.

Special care must be taken that the after-birth is not expelled too rapidly, for then the membranes are very liable to be torn and retained.

As the placenta appears at the vulvar orifice it should be received by the hand of the accoucheur, and the membranes should be carefully removed by traction upon them. It is frequently recommended that as the placenta is removed it should be twisted so that the membranes form themselves into a cord (Fig. 235). Personally, I am very doubtful about the wisdom of this common procedure, and certainly I think it unwise when the membranes show signs of tearing along the edge of the placenta. It is better, I think, if there is any difficulty with the membranes, to grasp them and exert gentle traction upon them (Fig. 236). I have sometimes sat holding them for many minutes, until the spasm of the uterine muscle has quite passed off. Occasionally, when there is a little difficulty in removing the membranes, the sudden withdrawal of the hand that is pressing down the fundus allows the latter to spring back a little, with the result that the membranes come away easily.

Manual Removal of Portions of Placenta and Membranes.—Should it happen that a portion of the membranes is retained in the uterus, the question will naturally arise as to whether or not the hand should be introduced into the uterus for their removal. The answer is sometimes a little difficult. I certainly think the membranes should be removed manually if the bulk of them is retained; but when only small portions are left behind, or when one is doubtful as to whether or not any is retained, I think the wiser course is not to insert the hand, because of the great danger of introducing infection. The statistics of all maternity hospitals prove that this danger is very great, and my personal experience in private practice is the same. If one removes any portion of membrane that may be in or projecting into the vagina, the expulsion of the remainder may safely be left to Nature, as it will come away in a few days in the lochial discharge. Should there arise, by any chance, in such cases a rise of temperature or any other symptom of infection, intra-uterine douches must be given. I need hardly remind my readers that in examining the membranes both the chorion and amnion must be looked at. Very frequently the amnion comes away without the chorion—indeed, this is most commonly the case where portions of membranes are retained.

So far I have purposely not mentioned the retention of portions of placenta, for that condition is on quite a different footing to reten-

tion of small portions of membranes. No portion of placenta should ever be left behind; consequently, even in cases of doubt with regard to the placenta, the hand should be introduced. It may sometimes

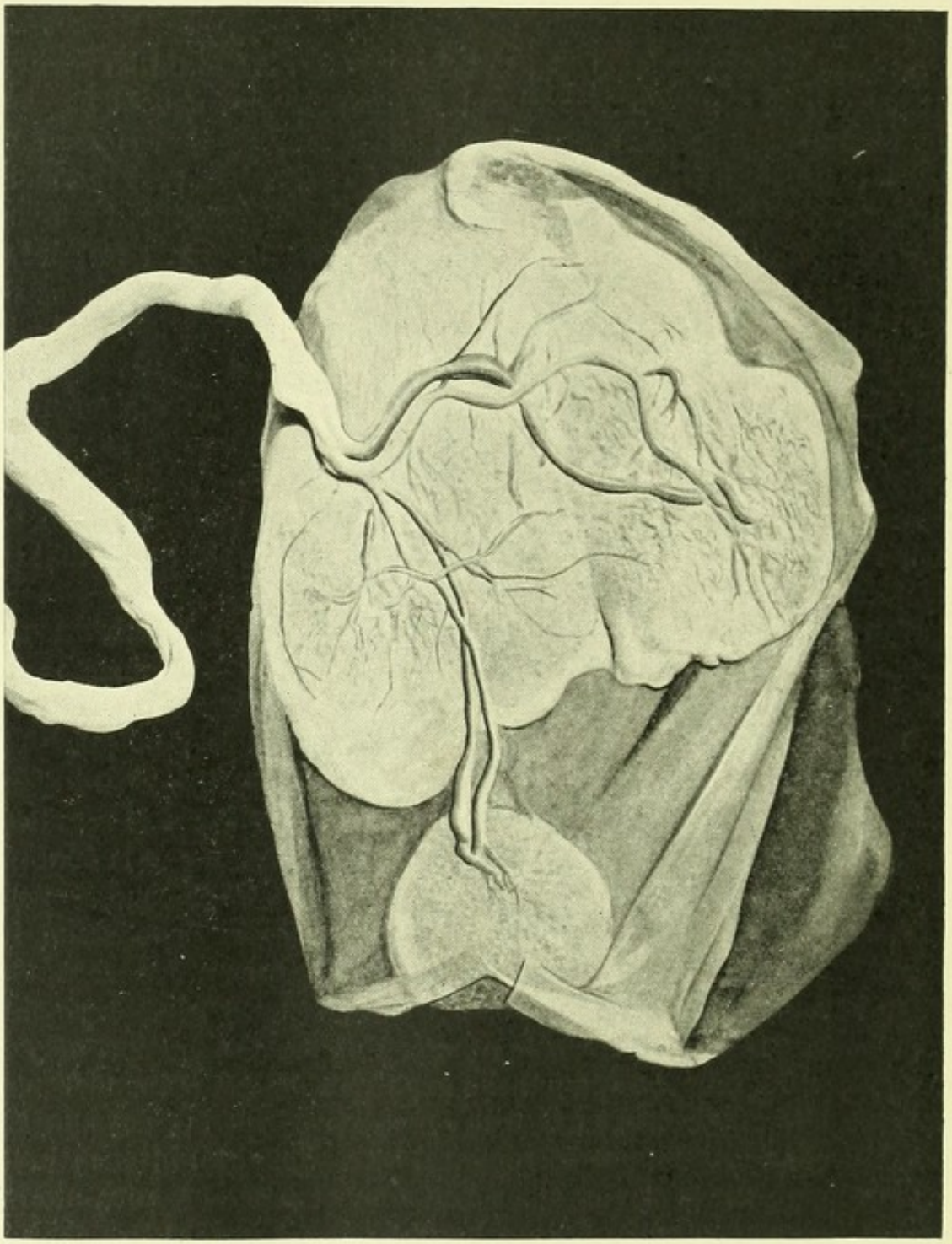


Fig. 237.—Placenta Succenturiata. (Author's Collection.)

happen that a placenta succenturiata (Fig. 237) is left behind in the uterus. Such a condition is impossible of recognition, for, although in such cases a portion of the membranes is wanting, the operator naturally thinks that only membranes are retained.

In removing the whole placenta, adherent or retained, I advise using a rubber glove. I have found, however, that it is quite impossible to remove small portions of placenta or membranes with the gloved hand.

One should try to remove the membranes with the first introduction of the hand, for each succeeding introduction of the hand increases the risk of infection.

The later effects of retained portions of placenta, and also to a slight extent of retained membranes, are sapræmia, secondary post-partum hæmorrhage, subinvolution of the uterus, and placental polypus with menorrhagia.

CHAPTER XXXI

INTERRUPTED GESTATION—ABORTION AND HYDATIDIFORM MOLE

In considering interrupted gestation, it is customary to distinguish two distinct groups, according as the pregnancy is interrupted before or after the fœtus is viable, interruption before the viable age being termed 'abortion' and after that time 'premature labour.' The viable age generally fixed is twenty-eight weeks, or seven lunar months.

Abortion.

Abortion, or miscarriage, may be defined as interruption of pregnancy before the fœtus is viable—that is, before the twenty-eighth week. In some text-books a distinction is drawn between 'abortion' and 'miscarriage,' abortion being the term applied up to the end of the sixteenth week and miscarriage from that time until the twenty-eighth week. Such a distinction has been very generally given up, for clinically the two are the same, so that the two terms are used indiscriminately, with the exception, perhaps, that abortion is the more technical and miscarriage the more popular.

It is an extremely common occurrence, this interruption of gestation. Certainly half, if not more, of all married women abort at least once, or, to put it in another way, at least one in every seven pregnancies terminates in abortion. But abortions are more frequent than even these figures would suggest, for many of the cases occurring early in pregnancy are never recognized, either by the women themselves or by their medical attendants. The small ovum is expelled with some blood, which is considered that of a delayed or a premature menstrual period.

Abortions come under our notice most generally in the third and fourth lunar months, because at that time the attachment of the ovum to the uterus is not very firm, and because if they occur before that time they pass by unrecognized or without any attention being

given them. Criminal abortions are usually induced at this time also, as before the third month there is always some uncertainty as to whether pregnancy exists or not; while after the fourth month, concealment of the condition being impossible, it is considered necessary not to delay longer.

The time that would have been a menstrual period had pregnancy not existed is especially dangerous, for although menstruation is suppressed during pregnancy, it is not uncommon to find local and general disturbances periodically manifesting themselves. Again, if a miscarriage has once occurred, it is liable to recur, because the pathological condition causing the abortion remains so often uncorrected; indeed, it is sometimes aggravated by the miscarriage, for women, more particularly amongst the poorer classes, do not take anything like the same care of themselves after an abortion as after a labour at full time.

Etiology.

In discussing this subject I shall be very brief. The conditions which bring about abortions are both numerous and varied. They all, however, act in two ways: they stimulate the uterus to contract and they interfere with the utero-placental circulation. In most abortions the separation precedes the contractions, but in a few that is not so; the contractions first occur, and they bring about the separation.

The conditions on the side of the fœtus which give rise to abortion are for the most part disease of itself and its membranes. The most important disease is, of course, syphilis. In most cases of disease of the ovum the circulation on the fœtal side of the placenta becomes disturbed, placental hæmorrhage occurs, and finally the circulation is arrested. The dead ovum then becomes a foreign body, which remains for a variable time, until uterine contractions are set up and bring about its expulsion.

The maternal causes are so numerous and varied that I have thought it well to divide them into the following groups:

(*a*) **Diseased Conditions in the Reproductive Organs,** especially such conditions as endometritis, metritis, retro-displacement of the uterus, and tumours of the uterus. These varied diseases all act in the same way: they favour pathological changes in and separation of the placenta. Of them all, by far the most important is endometritis, and I have no hesitation in saying that at least 70 per cent. of all cases of abortion are caused by this.

(*b*) **Diseased Conditions in the Other Systems of the Body**—for example, in the *alimentary*, diarrhœa and vomiting; in the

nervous, chorea and epilepsy; in the *respiratory*, bronchitis and pneumonia; in the *vascular*, valvular disease of the heart; in the *urinary*, nephritis and cystitis. Such conditions act differently in bringing about miscarriage. For instance, in severe coughing or excessive vomiting the uterus may be directly stimulated to contract, or in diarrhœa it may be reflexly stimulated to do so. In chronic valvular disease of the heart passive congestion and hæmorrhage into the placenta are liable to occur, and the uterus is stimulated to contract by the excessive carbonic acid in the blood, the result of defective aeration.

(*c*) **Poisons circulating in the Blood.**—In some these are the poisons of the specific fevers. The poison of syphilis is far the most striking example, and it is undoubtedly accountable for a very large number of abortions; but, besides syphilis, there are others, such as those of small-pox, typhus, enteric, malaria, etc. Some of these poisons directly kill the child, but many bring about abortion, because the waste material produced by the high temperature stimulates the uterus to contract, and favours passive congestion of the placenta.

In another group of cases the poisons are simply the result of defective metabolism and elimination. Eclampsia, icterus, and many cases of hyperemesis gravidarum, are good examples. In yet another class the poisons are metallic, slowly absorbed into the system. Examples of this are found in lead and mercury workers. Lastly, in certain cases the poison is some drug, such as ergot, savin, etc., taken intentionally or accidentally. Each of these causes abortion by stimulating the uterus to contract either directly or through the nervous system.

(*d*) **Accidental Conditions, such as Falls, Blows, and Injuries.**—These, acting directly or indirectly through the nervous system, set up uterine contractions. Also sudden emotion may occasionally bring about a miscarriage. In this connexion, however, I would remark that the healthy uterus can stand a great deal, and that abortions are comparatively rarely caused by accidents. There is usually some disease of the uterus.

(*e*) **Criminal Abortions.**—The abortion is induced by the passage of instruments into the uterine cavity, by the taking of oxytocic drugs, by jumping from a height, etc.

(*f*) But, besides all these causes, there yet remains a number of cases where, as far as one can discover, no cause exists beyond an irritability on the part of the uterus which allows the pregnancy to advance only a certain stage, and then time and again throws off the product of conception. This has led some to speak of the uterus as having contracted the habit of aborting. Repeated abortions, how-

ever, are more usually the result of special diseased conditions, which, if carefully searched for, will be discovered. It, therefore, leads to errors of treatment if one contents oneself with a diagnosis of 'habit abortion.' Still, in spite of the most careful examination, there are cases where a peculiar irritability of the uterus seems to be the only cause. That this is probably a satisfactory enough explanation in such cases is evidenced by the fact that the irritability of the uterus does vary in different individuals. One does encounter cases where women abort on slight emotional disturbance or trivial accident. Again, in cases of induction of premature labour—one finds that labour is brought about with the greatest ease in some, while in others it is most difficult—I have seen the cervix dilated and bougies inserted without avail.

Symptomatology and Diagnosis.

The symptoms of abortion are pains or uterine contractions, hæmorrhage, and dilatation of the cervix. Occasionally there are certain discomforts, spoken of as prodromal symptoms, such as a feeling of weight in the pelvis, irritability of the bladder, a mucous or sero-mucous discharge; but they are really of no importance or value from a diagnostic point of view.

The first symptom may be hæmorrhage or pain; most commonly it is hæmorrhage. The extent of the hæmorrhage varies greatly, and is sometimes quite alarming. Following the hæmorrhage, and, as I have said, sometimes before it, are 'pains' referred to the back and hypogastrium. By multiparæ they are described as resembling labour pains, but by primagravidæ they are often described as resembling intestinal colic. In abortion in the earlier months the pains are much less severe than in abortions which occur later; indeed, the ovum may in the first and second month be expelled with little or no pain. Dilatation always follows the hæmorrhage and pains, and its extent depends on the size of the ovum to be expelled.

The diagnosis of abortion in most cases is not difficult. The history of suppression of one or more menstrual periods and other symptoms of pregnancy, the hæmorrhage, and the pains, make it clear generally that one has to deal with this condition. Before definitely deciding upon abortion, one must exclude the possibility of extra-uterine pregnancy, for at an early stage they may have every symptom in common. Many may think I am laying undue stress upon this danger, and may say extra-uterine pregnancy is such a rare occurrence it may be put out of account; but that is not so: it is now known to be by no means uncommon. As evidence of the

necessity of emphasizing this danger of overlooking an extra-uterine pregnancy and diagnosing an ordinary abortion, I may mention that in fully 30 per cent. of the cases of extra-uterine pregnancy which I have had to deal with the mistake has been made. In most cases a careful bimanual examination reveals which of the two conditions exists. I go into this matter fully in the succeeding chapter, when discussing extra-uterine pregnancy.

But other conditions besides extra-uterine pregnancy may simulate abortion—for example, ulcerative conditions of the cervix, polypi of the cervix, and sometimes even menstruation during pregnancy, call for mention. In these conditions there are no 'pains,' the bleeding is very rarely profuse, and there is no dilatation of the cervix. Still, each may resemble 'threatened abortion,' and only a careful examination will settle which it is.

Malignant disease or a polypus of the cervix should not be difficult of recognition, but menstruation during pregnancy may be very confusing. In the cases which I have seen this periodic discharge has occurred at the usual regular intervals, has always been scanty, and has never continued after the third month. There are, however, cases on record where it has continued during pregnancy. I have never seen such cases; I believe they are very rare indeed. In all cases where hæmorrhage recurs during pregnancy the possibility of placenta prævia should be considered.

The cases in which I have had greatest difficulty are where, shortly after delivery and when menstruation is suppressed, a decision has to be come to between post-partum metritis and endometritis and an early miscarriage—indeed, I have once or twice found it impossible to decide in such cases. Fortunately, the treatment in both is much the same, for if the bleeding continues after rest, etc., the uterus must be explored with the fingers or the curette.

I would sum up the matter of diagnosis in cases of supposed abortion by advising every one to satisfy himself on the following points: (1) Is the woman really pregnant? (2) Is the pregnancy intra- or extra-uterine? (3) If intra-uterine, is abortion inevitable, or is it only threatened?

Varieties of Abortion and their Differentiations.

Having satisfied oneself that the pregnancy is intra-uterine, the next thing to decide is whether the abortion is threatening or inevitable. To decide this question is not always easy, especially if all blood-clots, etc., have been thrown out and are not available for inspection. If the bleeding is at all pronounced, the pains very

severe, and the os distinctly dilated, one always considers the abortion inevitable; but if there is only moderate pain and hæmorrhage, the miscarriage may often be prevented by suitable treatment. In all cases of doubt one must temporize and treat the abortion as only threatening. This not infrequently involves keeping the patient under observation in bed for some time. In these cases one may sometimes be uncertain as to whether or not the pregnancy is going to continue on account of a slight discharge persisting. If it is continuous and of a brownish character, in spite of rest in bed, the ovum is generally dead; but if there are occasional slight bright hæmorrhages, I have often seen the pregnancy continue, and ultimately terminate quite satisfactorily. The patient must be kept in bed until all hæmorrhage ceases. Let me once again remind my readers that hæmorrhages recurring during pregnancy should make one very suspicious of placenta prævia.

Having settled in a particular case that an abortion is unavoidable, one has next to decide whether it is 'complete,' 'incomplete,' or 'missed.'

An abortion is said to be complete when the whole product of conception is expelled. In the early months the ovum is expelled intact; later, however, the expulsion more nearly resembles an ordinary labour, and we usually have rupture of the membranes, expulsion of the fœtus, the placenta and membranes following after a longer or shorter interval. Sometimes, however, even in the later months the whole sac with placenta attached is expelled unruptured. I have seen this occur even at the end of the seventh month.

By 'incomplete' abortion one means the retention in the uterus of part of the ovum. In the first three months before the fusion of decidua capsularis (reflexa) and vera (Fig. 238) it very frequently happens that the ovum with the reflexa is expelled and the vera is left behind. I have even seen the whole vera expelled and the ovum and serotina retained, and that is very confusing, especially if the ovum is inserted in the upper corner of the uterine cavity ('angular pregnancy'), for the case may very closely resemble an extra-uterine pregnancy. Such a case is fully described in the succeeding chapter (p. 561).

Later in pregnancy, after the formation of the placenta, portions of the membranes and placenta, or even the entire placenta, may be retained. Sometimes a very small portion remaining behind forms the centre round which blood coagulates (placental polypus). In practice it is often a matter of extreme difficulty to tell whether an abortion is complete or incomplete, and, indeed, unless one has all the tissues expelled from the uterus for examination, or can pass the

fingers through the os and explore the interior of the uterus, it is quite impossible to speak with certainty. The size of the uterus, the amount of the discharge, and the dilatation of the canal, will help one to decide: for if there is anything retained the os remains more patent, bleeding continues, and involution is retained; while if every-

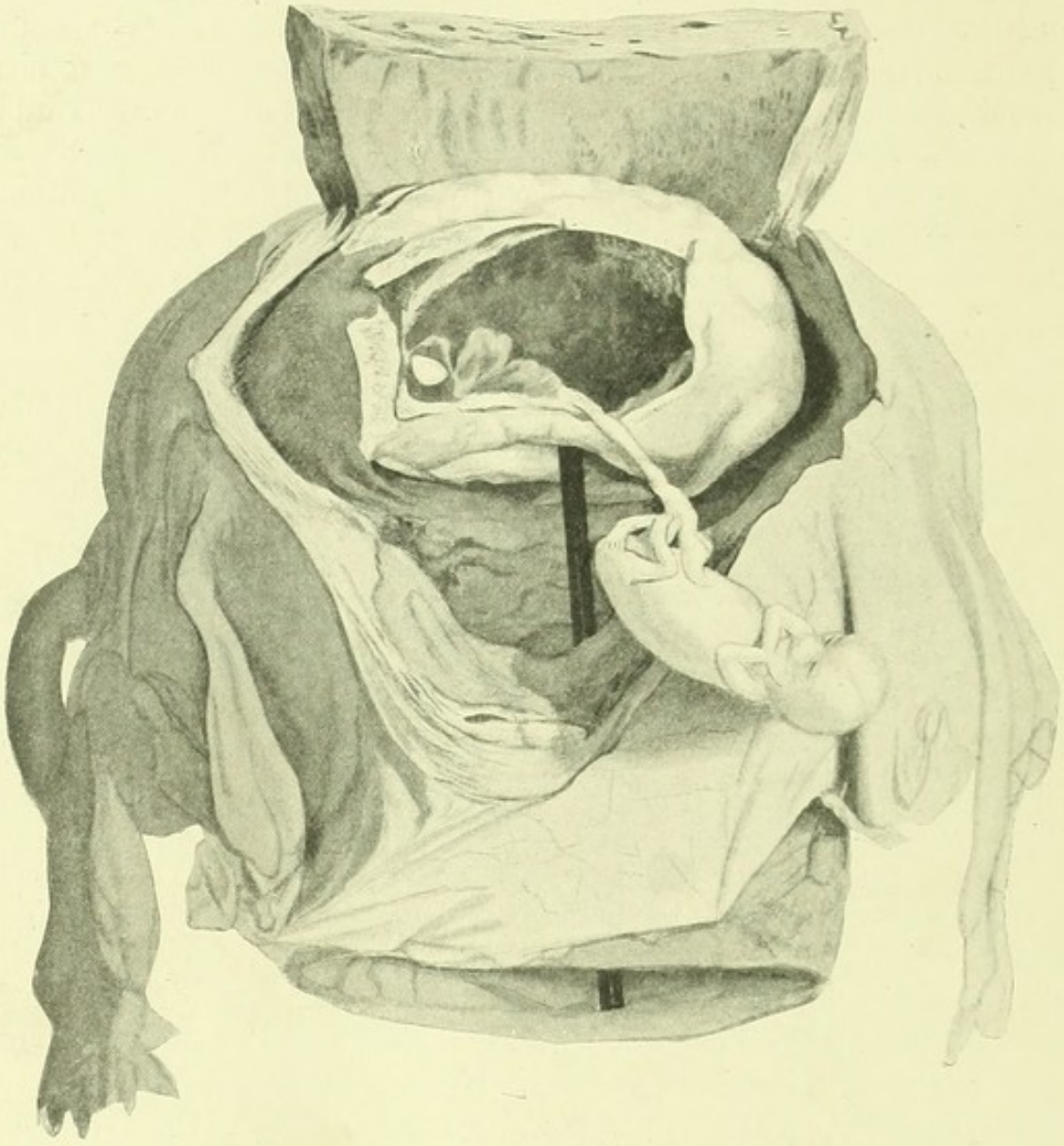


FIG. 288.—Uterus with Ovum of about Three Months.

There has been a window cut in the uterus wall and in the decidua reflexa. A piece of whalebone passed through the cervix presses upon the decidua reflexa. There is still a space between the decidua reflexa and the decidua vera. (Allen Thomson's Collection, Hunterian Museum.)

thing has been expelled, the os becomes closed, the uterus diminishes in size, and the hæmorrhage and discharge cease. Theoretically that is perfectly correct, but one meets with many exceptions. Quite recently, in considering the subject with my students, I demonstrated a case as presenting all the features of complete abortion—the os was closed,

there had been practically no discharge for some days, and the uterus appeared of about normal size. In spite of that, however, I explored the uterus, and removed a large piece of placenta. I always explore the uterus unless I am absolutely certain from what I have seen that everything has come away.

In cases of incomplete abortion, when only a small portion of tissue is left behind, it may be some time before there is any evidence that such is the case. Sooner or later it will manifest itself by menorrhagia, abdominal uneasiness, and slight sapræmia.

There remains another variety, termed 'missed' abortion. In it the ovum dies, the pains and hæmorrhage cease, and the ovum is

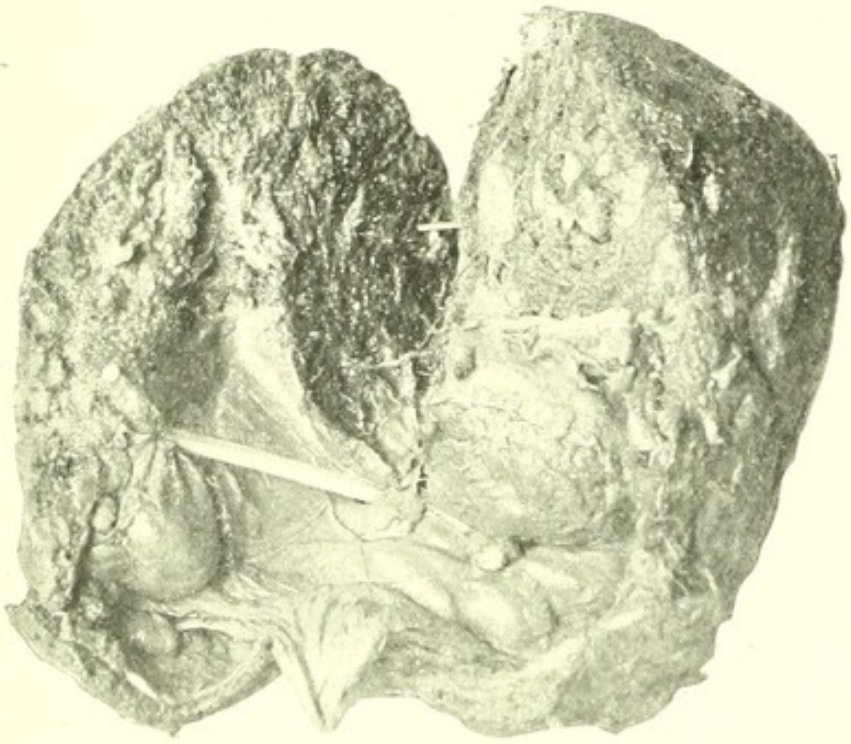


FIG. 239.—Fleshy, Carneous, or Hæmorrhagic Mole, from a case of Missed Abortion. (Author's Collection.)

retained for weeks or months. In such cases the symptoms of pregnancy, such as swelling of the breasts and morning sickness, disappear, the uterus remains of the same size, and menstruation continues suppressed, although there is occasionally a slight brownish discharge. The diagnosis of this form of abortion is by no means easy. There is not usually any difficulty in recognizing the existence of pregnancy, but there is in deciding whether the ovum is alive or dead. Time clears matters up, for if the ovum is alive the uterus steadily increases, while if it is dead it remains stationary. The ovum expelled in such cases (fleshy, carneous, tuberose, or hæmorrhagic mole) presents peculiar appearances (Fig. 239). The fœtus may entirely dis-

appear, or only a trace of it may remain ; but if it has developed some weeks before its death occurred, it becomes mummified. The length of time an ovum or part of an ovum can be retained in the uterus is variable, but very often it is retained until such time as, had pregnancy continued, normal labour would have come on. Occasionally it is retained eleven months. Berry Hart[1] pointed out this several years ago. He wrote : ' It looks, therefore, as if the uterus were occasionally cheated by the mole, which forms at or about the second or third month, and may be retained for the nine months given to a normal pregnancy.' Hart, in the same paper, remarks: ' So far as my reading goes, no case has gone beyond eleven months. There are, however, one or two which have been recorded where the dead ovum was retained for years. They are considered by Graefe.'[2]

Treatment.

Prophylactic.—Where previous abortion has occurred the patient should be carefully examined, and the cause of the abortion determined, if possible. Diseased conditions, such as chronic inflammation of the uterus or appendages, should be treated, displacements corrected, and any reflex irritation removed. Above all, the possibility of syphilis should be considered, and if there is the slightest suspicion of this poison being present, both parents should undergo a course of antisyphilitic treatment for twelve months at least before another pregnancy is permitted.

In very troublesome cases, where no distinct cause can be discovered, it is well to begin treatment by advising a cessation of all marital intercourse for some months, and this is best accomplished by sending the patient from home. During these months of absence the general health should be improved with suitable exercise, massage, and general tonics, such as iron, quinine, or strychnine. It is often advisable to curette the uterus before permitting another pregnancy.

Whenever pregnancy occurs all intercourse must be again stopped. If syphilis was the suspected cause, antisyphilitic treatment must be continued during the whole of the pregnancy. In other cases chlorate of potash (5 grains thrice daily) is recommended. It is supposed that this drug has a beneficial effect, because it parts so readily with its oxygen ; the amount of oxygen given up, however, must be very small indeed. I usually prescribe the drug, and continue it through the pregnancy

[1] *Brit. Med. Journ.*, October 24, 1896, p. 1189.
[2] ' Festschrift Carl Ruge,' Berlin, 1896.

unless it causes gastric irritation. The bowels must be most carefully regulated. A diet which gives the least amount of waste should be prescribed. The patient should be encouraged to drink considerable quantities of fluids between meals, for it is most important to keep up elimination. Fresh vegetables, if the digestion is good, and fruit-juice should be recommended.

It is, of course, impossible to say how far such treatment does good, for, in addition to it, I have always insisted that my patients remained absolutely at rest in bed throughout the greater part of the pregnancy. The importance of this absolute rest in bed cannot be too strongly emphasized. It becomes very irksome for the patient after a few months, but then she may be allowed a little more liberty; for it is in the earlier months, when the placenta is being formed, that maintaining the circulation quiet is so extremely important.

Threatened Abortion. — A threatening of abortion should be treated by at once confining the woman to bed and giving some sedative. Personally, I always give opium or morphia. Laudanum or Batley's solution by the mouth, or a morphia suppository, are the best; morphia given hypodermically is not so good. Liquid extract of *Viburnum prunifolium*, thrice daily, is strongly recommended by American obstetricians. Williams[1] recommends the following suppository: Codiæ sulphat., gr. ss.; ext. hyoscyami, gr. i.; ext. viburni prunifolii, gr. v.; ol. theobromæ, q.s. This is to be administered every four hours. Chloral, with or without bromide of potash, is also recommended, but personally I have found morphia or opium do most good. Ergot, in small doses, is said to be beneficial. Given in that way, it is claimed that it arrests bleeding, without setting up uterine contractions. For my part, I consider the treatment irrational, and I believe that the cases which terminate satisfactorily do so in spite of the ergot.

The diet should be very simple, only cold fluids being given. The patient should be kept in bed until the bleeding has ceased for some time.

The great difficulty is to know when the abortion has ceased to be threatening and has become unavoidable. In the early months a continuation of the bleeding, even if the pains are absent, usually means that the fœtus is dead, and, consequently, the sooner it is removed the better. In many cases one can only decide by examining the uterus from time to time, and seeing if it is enlarging. This, as I have already indicated, involves weeks of suspense to the

[1] 'Obstetrics,' 2nd edition, 1907, p. 618.

patient. When pregnancy is more advanced, repeated auscultations may be of service, as giving information regarding the life of the fœtus.

Inevitable Abortion. — When the abortion is inevitable, the sooner the uterus is emptied the better. The ease with which this can be done depends upon the degree of dilatation of the cervix.

In emptying the uterus in cases of abortion, the very greatest care must be taken in thoroughly cleansing the vagina and vulva,

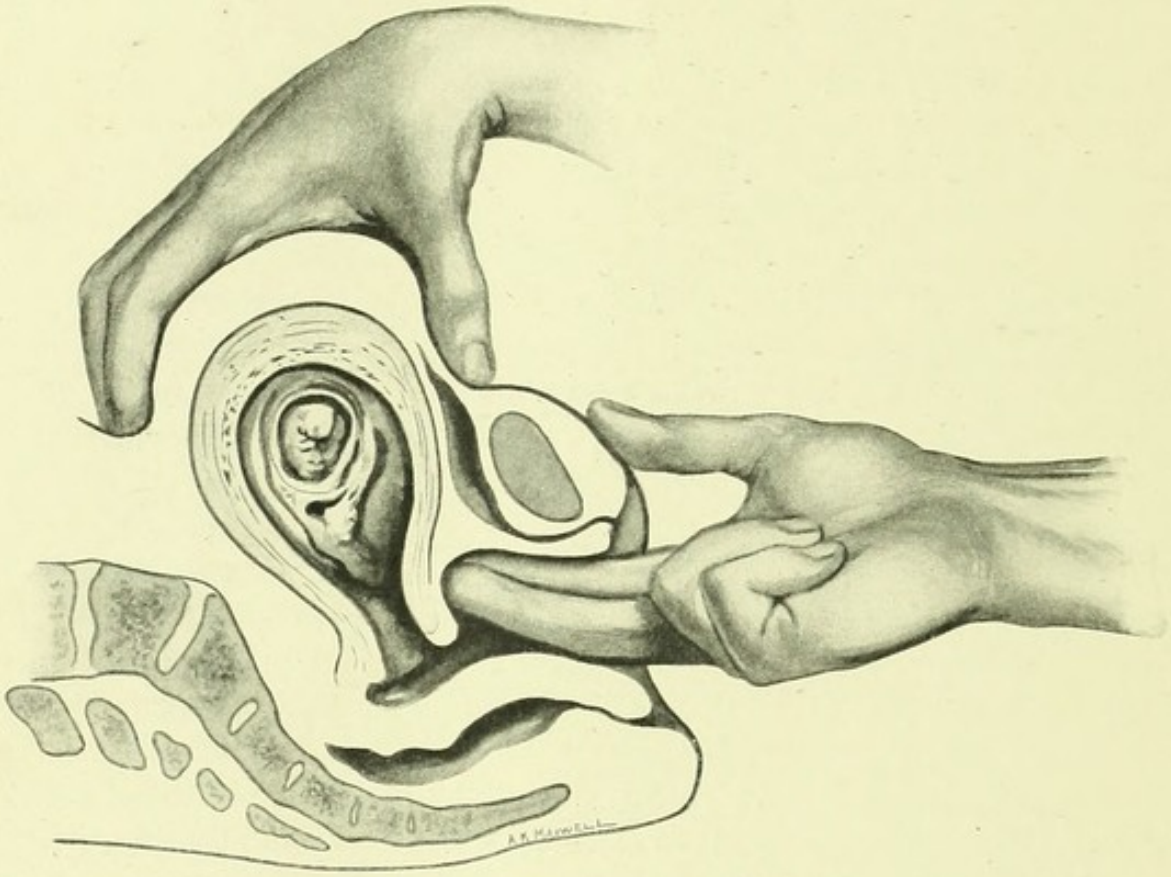


Fig. 240.—Method of expressing the Ovum.

because, with the continuous hæmorrhagic discharge, those parts are generally septic.

In the early months, if two fingers can be passed into the uterus, the ovum can usually be separated completely, especially if the other hand presses down the uterus from the abdomen. Sometimes, although separated, the ovum slips round the fingers, and cannot be caught hold of. It should then be removed by 'expression' or by ovum forceps. Expression (Fig. 240) is carried out by compressing the body of the uterus between the two hands. The internal fingers press the body from the anterior fornix and the external press it from the abdomen. *One must only compress with the internal fingers in the anterior fornix.* If an attempt is made to do it from the

posterior, there is danger of lacerating the vault of the vagina. This accident actually occurred some years ago in the hands of a practitioner of wide experience. He asked me to see the case in consultation with him, and I discovered that, although the vault of the vagina was torn, the peritoneal cavity was not opened into. The wound was plugged, and the patient made quite a satisfactory recovery.

A very convenient way of removing the ovum when it is detached is by means of the ovum forceps (Fig. 241).

If the os is not dilated, this must be done before the ovum can be removed. It may be carried out in various ways. The one generally employed is to plug the cervix and vagina with sterilized gauze. This operation should always, when possible, be carried out under an anæsthetic, for one can then perform it much more

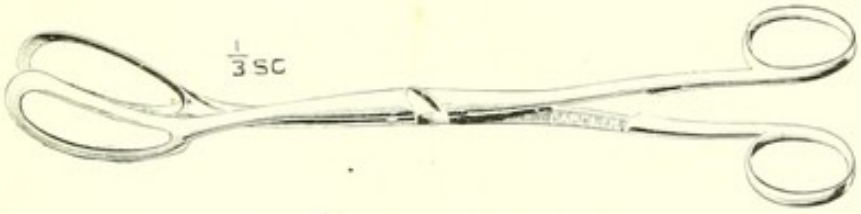


FIG. 241.—Ovum Forceps.

thoroughly and aseptically. The very greatest care must be taken in cleansing the part about the vulva and vagina. The cervix is seized with vulsellum forceps, great care being taken not to put too much traction on the instrument, as the cervix, being so soft, readily tears. A retractor is then introduced, and the posterior vaginal wall pulled back. It is always well to use retractors when packing the vagina or cervix, because if they are not used, the gauze, when being pushed in, abrades the mucous surface. The gauze is carefully pushed in through the cervix, and the vagina is firmly packed (Fig. 242). The plug is left for twenty-four hours, when, on removal, the os is often sufficiently dilated to allow of the ovum being removed; indeed, it sometimes comes away with the plug. Plugging is most efficacious when there are active uterine contractions going on. If uterine activity is feeble, one may get very little dilatation from the plug.

If, on removing the gauze, dilatation is not sufficient, the plugging may be repeated. The objection to this method is that it necessitates repeating the anæsthesia, and involves much vaginal manipulation. If plugging is not sufficient, I proceed, therefore, to more rapid dilatation with dilators or expanding tents. In using metal dilators one must take care not to drag too hard on the cervix, which is

grasped with the vulsellum forceps; and, indeed, I have often found it better to push down the uterus over the dilator with the external hand rather than try to push the dilator into the uterus. The cervix also is very liable to be torn by the dilator, so that I prefer the more gradual method of dilating with tents. This tearing

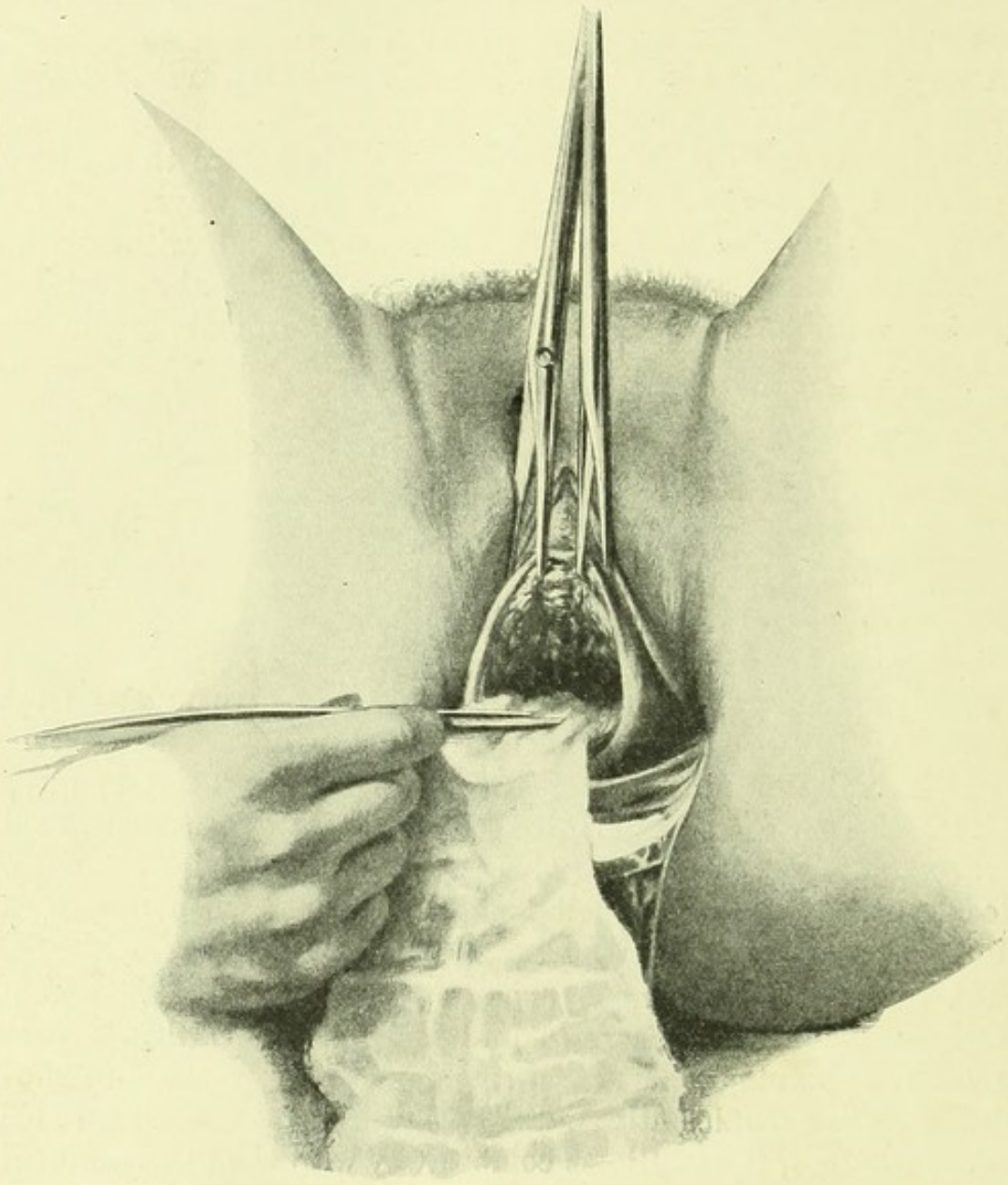


Fig. 212.—Plugging the Cervix with Gauze. (Bumm.)

always begins on the inside. These matters are especially referred to in Chapter XXVIII.

After the cervix is dilated, the uterus must be thoroughly explored, to see how much of the ovum is left behind; and let me again say, in a case of abortion, if there is the least doubt of anything having been left, the uterus should always be explored with the

fingers. I do not favour the curette, except in very early abortions. Apart altogether from the danger of the curette when the uterus is soft, as it is in pregnancy, there is the difficulty of removing the whole ovum with it, for it slips round the ovum, and merely breaks it up. There is nothing so good as the fingers for removing an in-

Fig. 243.—Reinstater's Douche Curette.

complete abortion. I frequently run over the uterine surface with a curette after I have removed the ovum. Reinstater's douche curette (Fig. 243) is very suitable. The operation is carried out as follows: Having fixed the cervix with vulsellum forceps, the curette is carefully passed into the uterus, until one feels it against the fundus.

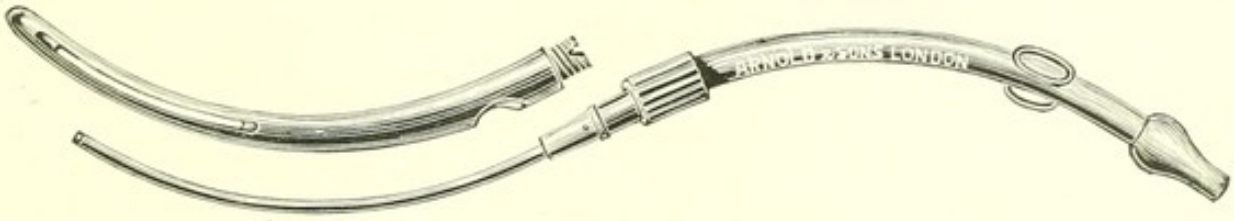


Fig. 244.—Bozemann-Fritsch Intra-uterine Nozzle.

Long sweeps, from fundus to cervix, are made, and the whole surface is carefully scraped.

After removing the remains of an abortion, it is always well to give an intra-uterine douche of sterilized water, at a temperature of 118° F., to wash away all débris and to stimulate the uterus to

Fig. 245.—Budin's Intra-uterine Nozzle.

contraction. This is best done with a Bozemann-Fritsch nozzle (Fig. 244). Budin's nozzle is also a useful form (Fig. 245). Great care must be taken that the water is not introduced at too high a pressure. I use an antiseptic douche of 1 in 3,000 biniodide of mercury only if the uterine contents are septic. I may here remark that the Rotunda siphon douche tube (Fig. 246) is much more convenient and more easily sterilized than a douche can.

A septic ovum should always be removed, if possible, without the curette. In two septic incomplete abortions recently curetted an anterior pelvic cellulitis followed—I believe as a result of the treatment employed. When the os is sufficiently dilated there is no difficulty; the ovum is removed with the fingers. When, however, the os is closed and difficult to dilate, one has to choose between plugging with gauze, the insertion of a sea-tangle tent, immediate

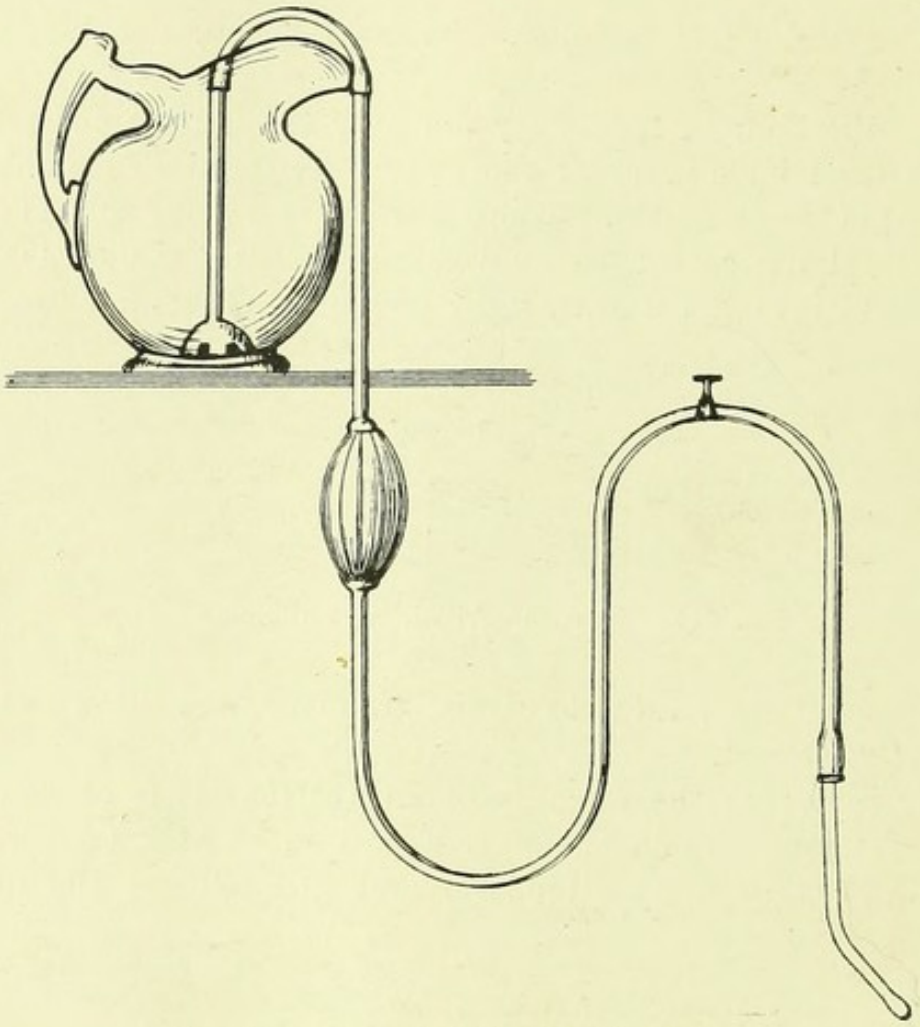


Fig. 246.—Rotunda Siphon Douche Tube.

dilatation with metal dilators, and incising the cervix, before one can clear out the uterine contents.

When a diagnosis of missed abortion has been made, the only question to settle is, Should the uterus be emptied immediately, or should one wait until the ovum is expelled? Of course, there can be no question of waiting if there are any disturbing symptoms; but even if there are not, many—and I am one of them—believe in emptying the uterus, as we consider a dead body in the uterus is a constant source of danger. Others, however, hold a different view, and would wait until uterine contractions come on spontaneously.

Hydatidiform Mole (Vesicular Mole, Dropsy of Chorion, Cystic Degeneration of Chorion, Myxoma of Chorion).

This disease of the chorion is a cystic degeneration of the terminal villi. It may occur at any time of reproductive life, although

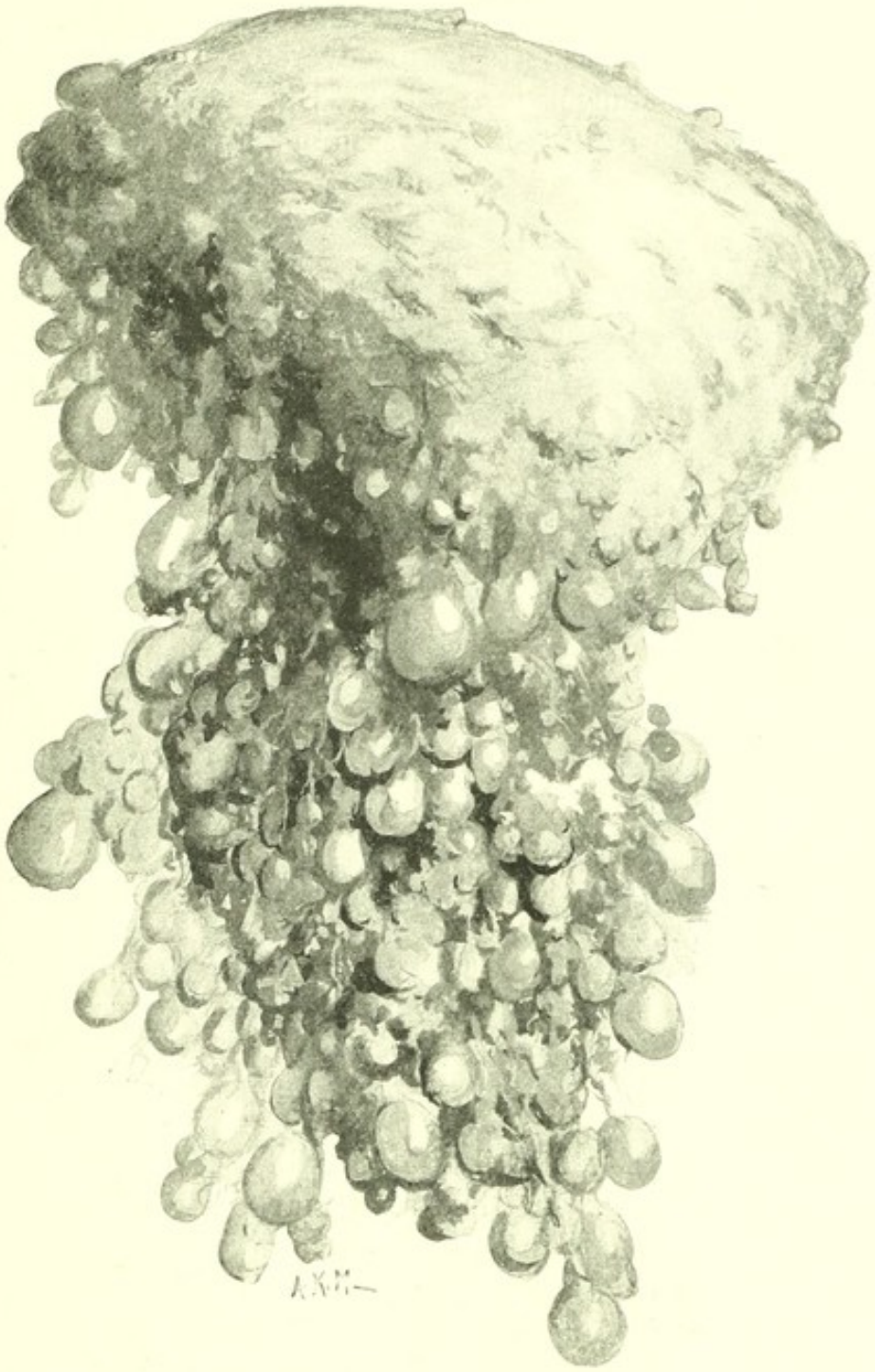


FIG. 247.—Portion of Hydatidiform Mole. (Author's Collection.)

it is a little more common between the ages of thirty and forty than before or after these years. In general appearance the mole resembles a large bunch of small grapes; consequently the Germans speak of it as a 'Traubenmole' (Fig. 247). On examining one of these affected

villi, it will be observed that the villus is not altered throughout its entire course, but that swellings occur here and there along its wall.

These cysts vary in size, but they are rarely much larger than a hazel-nut. As a rule, the disease attacks the ovum at an early period of its existence, and invades the greater part of the chorion. In the more marked cases of the disease early death of the embryo occurs, so that often no trace of it is to be discovered. In other cases only a small portion of the chorion is affected. Should this be very slight in amount, the general nutrition of the fœtus may be little interfered with, and pregnancy may continue undisturbed.

Fig. 248.—Microscopic Section of a Portion of Uterine Wall invaded by the Villus of a Hydatid Mole.

The microscopic changes consist in a destruction of the stroma of the villi, more particularly in those parts where the vesicles are present. It is generally stated that the bloodvessels are also to a large extent obliterated. In the more marked cases of the disease, however, it is probable that no vessels have ever existed; the villi are really nourished from the maternal tissues. As regards the epithelium covering the villi, it is found that both layers undergo proliferation of a very irregular character. The syncytium is very irregularly developed, and the nuclei are large and vesicular. Numerous vacuoles are present in the protoplasm. Here and there great proliferation of Langhan's layer is observed. All these features may be seen in the accompanying illustration (Fig. 248) from my third case of chorion-epithelioma. The tumour followed a hydatidiform mole. The uterus

was removed. The operation was performed two years ago, and the woman is still in perfect health.

Since the exact nature of chorion-epithelioma has come to be understood, and has been found frequently to follow a vesicular mole, attempts have been made to differentiate what might be termed malignant and benign forms of vesicular mole. Observations, however, in this direction have been very disappointing. There is no

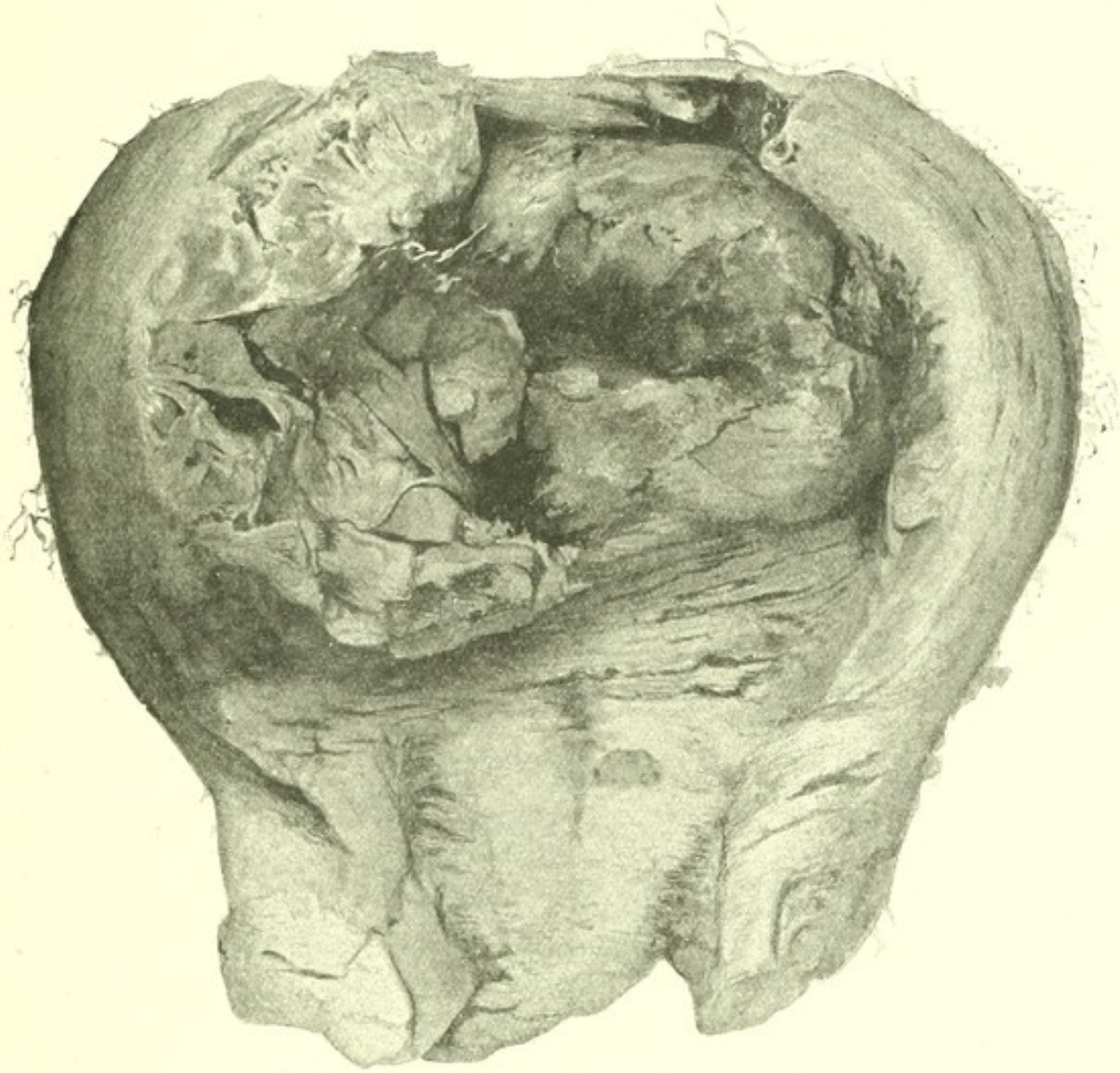


FIG. 249.—Chorion-Epithelioma. (Author's Collection.)

means of telling by microscopically examining a portion of mole removed whether the proliferation of the epithelium is of a benign or malignant character. All moles are potentially malignant. The development of a chorion-epithelioma would appear to depend chiefly upon the completeness with which the mole is expelled or removed. Some moles penetrate the uterine wall much more than others; indeed, there are a few cases on record—as, for example, one by

Martin—where rupture of the uterus occurred through the mole penetrating the wall. In these cases, where the wall is much eroded, it is more difficult to remove the diseased chorion completely; consequently chorion-epithelioma is more likely to follow.

As regards chorion-epithelioma, I need not remind my readers that a vesicular mole is not necessary for the development of this disease; it may follow any pregnancy. There are cases—as, for example, Schlagenhaufer's[1]—where metastatic deposits formed during pregnancy, although the uterine contents were apparently perfectly normal. I cannot, however, further discuss here this most interesting tumour.

Symptoms.—In cases where only a very small part of the chorion is affected there are no symptoms, and pregnancy continues undisturbed. When, however, the disease is at all extensive, well-marked and characteristic symptoms exist. There are the ordinary early subjective symptoms, such as sickness, pain in the breasts, and suppression of menstruation; in addition the woman, as a rule, feels out of sorts, and is often very anæmic. There is usually great enlargement of the uterus; indeed, *the most striking feature is that the distension is out of all proportion to the age of the pregnancy.* In a case which was recently under my care the woman thought herself three months pregnant, but when I examined her, I found the fundus two inches above the level of the umbilicus. On palpating the distended uterus, it is found to be globular in form and tensely elastic to the touch. It is commonly stated that the uterus feels soft and boggy; this sensation was only experienced in one of the four cases which have been under my care. Pain is often complained of over the uterus, and this is usually increased by pressure. Another striking and absolutely characteristic symptom is a sero-sanguineous discharge, with some of the vesicles floating in it. This, however, is not always present. Not infrequently the discharge takes the form of irregular hæmorrhages, which in no way differ from those occurring in an ordinary abortion.

When the chorion is extensively affected, abortion usually occurs about the fifth or sixth month; very rarely indeed is the ovum retained longer.

The hydatidiform mole in its typical form—that is to say, where there is rapid distension of the abdomen, and the characteristic discharge containing the vesicles—is easy of diagnosis; but where the menstrual history is vague, and the discharge is simply sanguineous, the diagnosis may be very difficult until the os is dilated, the finger inserted, and the shaggy chorionic villi felt. Even then, if the vesicles do not come away, the accoucheur may think at first that he

[1] *Wien. Klin. Woch.*, 1899, No. 2, p. 18.

has to deal with a placenta prævia. That mistake was actually made in one of my four cases.

A prognosis in this disease must be given with considerable caution, for not only is there immediate danger of rupture of the uterus, hæmorrhage, and septic infection, but there is also the later danger of chorion-epithelioma (Fig. 249). (In my four cases of hydatidiform mole one developed chorion-epithelioma, while in my three cases of chorion-epithelioma the abortion was only once a vesicular mole.)

Treatment.—Whenever the condition is recognized, the uterus must be carefully and thoroughly emptied. If the os is sufficiently dilated, no difficulty will be found in doing this; but if the cervix is not sufficiently patent, the cervical and vaginal canals should be plugged with sterilized gauze until there is sufficient dilatation. For the removal of the mole the fingers should be employed. It is of great importance that the uterine cavity should be thoroughly evacuated, as any portion of the mole left behind may form the nidus for a chorion-epithelioma. The most difficult cases are naturally those in which the degenerated villi penetrate deeply into the uterine wall. In these cases great care must be exercised in scraping with the fingers, as the uterus may be very readily perforated. While the wall is being scraped with the fingers the external hand should steady the uterus, and should always be applied over the part that is being scraped. The operator who has extensive experience of curetting the uterus may employ a blunt curette with extreme caution, but I would advise the general practitioner not to employ the curette, but to trust entirely to his fingers.

After removing the mole a hot intra-uterine douche should be given, with the object of washing away all débris and stimulating the uterus to retract. It is advisable after douching to go over the uterine surface once again with the fingers, paying special attention to any areas in which the uterine wall has been deeply eroded. A second douche should then be given.

A patient from whom a vesicular mole has been removed must be very carefully watched. Should any septic mischief arise, a weak antiseptic douche should be given night and morning till the temperature subsides. For some months, too, the woman must be seen at short intervals, in case chorion-epithelioma should develop. This will manifest itself by a recurrence of hæmorrhage. Should such a condition arise, the uterus must be extirpated immediately. In addition the general health of the patient should be attended to, and tonics, especially iron and strychnine, should be administered. It is advisable to caution the patient against becoming pregnant until a considerable time has elapsed.

CHAPTER XXXII

ECTOPIC PREGNANCY—PELVIC HÆMATOCELE—PREGNANCY IN RUDIMENTARY HORN (CORNUAL PREGNANCY)

In considering extra-uterine pregnancy I shall confine my remarks almost entirely to the clinical and operative aspects of the subject. The etiology and the minute pathology of this most interesting condition I do not intend to discuss, as they would necessarily take up a large amount of space, and are outside the province of the present work. I must, however, refer to the grosser changes which occur in the tissues as a result of extra-uterine pregnancy, so that I purpose considering the subject under the three following headings: (1) Pathological Anatomy. (2) Clinical Features. (3) Treatment.

Pathological Anatomy.

Although it is possible for the ovum to become implanted anywhere between the ovary and uterus, it is found with few exceptions that it is to the interior of the tube it becomes attached in the first instance. Until recently the old idea of 'ovarian' and 'abdominal' pregnancy was doubted by every one, and absolutely denied by not a few. In the face of recently recorded cases that extreme position has been abandoned, and every one now admits the possibility, not only of primary ovarian, but even of primary abdominal pregnancy.

With our increasing knowledge of tubal pregnancy, it has been found that the ovum may attach itself to different parts of the tube, and that these different situations vary in point of frequency.

Not only that, but the course the pregnancy runs is very considerably influenced by the site of the implantation.

I shall consider ectopic pregnancy, therefore, in the following situations, and the order in which they are mentioned is the order of their frequency: (1) Ampulla; (2) isthmus; (3) infundibulum; (4) interstitial portion of the tube; (5) ovary; (6) bowel, omentum, mesentery, etc. (primary abdominal pregnancy).

(1) **Implantation in the Ampulla.**—This is much the commonest situation—in all probability because it is the widest part of the tube, and the ovum situated there obtains the best vascular supply. Although I do not intend to discuss the microscopic pathology of ectopic pregnancy, I must refer in a word or two to what happens when the fertilized ovum becomes implanted in the tube. I shall be as brief as possible, and shall point out only the features that have a bearing upon the subject from the practical side.

There is no specimen of tubal pregnancy so early as Peters and Leopold's youngest uterine ovum, but there have been several young enough—especially Füth's—to satisfy every one that what takes place in a uterine pregnancy takes place also in an extra-uterine. The fertilized ovum buries itself in the wall of the tube. This occurs no matter whether the ovum primarily becomes attached to a crest or a trough of the wavy mucous membrane (so-called columnar and intercolumnar insertions). It does this by means of its trophoblast, and illustrations showing this may be seen in such papers as those of Berkeley and Bonney[1] and Füth.[2]

All the tissues are affected—muscular, connective tissue, bloodvessels. A decidua capsularis (reflexa) is sometimes found, but in many cases the ovum is so deeply embedded in the tube wall that there is hardly any bulging of the sac into the lumen of the tube. The connective tissue cells become altered and take on the appearance of decidual cells to a varying extent. Sometimes the tube away from the sac and even the other tube share in this change. There is, however, no well-formed decidua, as in the uterine pregnancy. From the practical standpoint the damage done to the bloodvessels is the most important. These have their walls eroded by the trophoblast, just as occurs in the uterine vessels in the formation of the intervillous space. In the uterus there is the support of a thick, dense muscle wall, but in the tube there is nothing of this: the thin sheets of circular and longitudinal fibres are, therefore, soon broken up and destroyed. Sooner or later the tendency is for the ovum to have its connexions with the tube wall disturbed, by reason of minute intramural hæmorrhages. It is only very occasionally indeed that the ectopic pregnancy continues developing to term.

With the ovum embedded in the ampulla several terminations are possible: (*a*) Tubal abortion, complete or incomplete; (*b*) tubal rupture; (*c*) formation of a mole, with subsequent changes—atrophy or disintegration of it; (*d*) continuance of the pregnancy to the later months or even term.

[1] *Journ. Obst. and Gyn. Brit. Empire*, February, 1905.

[2] *Archiv f. Gyn.*, Bd. lxiii., p. 97.

(*a*) *Abortion.*—As Werth has very rightly pointed out, this may be described as an internal rupture of the gestation sac, just as the second termination of rupture of the tube may be termed 'external rupture.' The whole ovum may be shed from the tube, or only part may be separated, when the abortion, comparing it with a uterine one, is incomplete.

With this termination there is some bleeding into the peritoneal cavity, but it is seldom great, and ceases after the ovum is completely expelled. When, however, the abortion is incomplete, a 'drip-drop' of blood continues from the end of the tube, and this blood gradually accumulating, forms a hæmatocele more marked on one side of the pelvis, and often made up of blood of different ages. (Pelvic hæmatocele is considered later, p. 570.)

The tube, after complete abortion, very soon resumes its normal appearance, just as the uterus does after expelling its contents prematurely. Everything then quietens down, and the hæmatocele that forms in time disappears. With incomplete abortion, however, there are recurrences of abdominal pain and hæmorrhage, the symptoms which we shall see are the features of ectopic pregnancy.

(*b*) *Rupture of the Tube.*—At one time this was considered the commonest termination, but it is now known to be less frequent than tubal abortion. I have explained how it is sometimes termed 'external rupture' of the gestation sac.' There is another variety of rupture, according to Berkeley and Bonney[1]—namely, 'intramural'—which these writers compare to the change occurring when a sacculated aneurysm becomes diffuse. In many cases, no doubt, this is a stage prior to the more severe rupture about to be referred to.

When rupture occurs, it takes place as a rule between the sixth and tenth weeks, although it may occur much earlier than that date.

The rupture and accompanying hæmorrhage may take place into the general peritoneal cavity (intraperitoneal), or between the layers of the broad ligament (extraperitoneal), for the tube is not completely surrounded by peritoneum, being uncovered along the lower part of its wall, where the layers of the broad ligament come together.

Rupture directly into the peritoneal cavity is much the most frequent termination, and, as might be expected, is the more serious, for there is no let or hindrance to the effusion of blood. With the extraperitoneal, the layers of the broad ligament limit the hæmorrhage, *although it must be remembered that they do not always do so.* I have, for example, seen an effusion of blood into the broad ligament so extensive that the hæmatoma extended up as high as the umbilicus, although the gestation sac was only two months old.

[1] *Journ. Obst. and Gyn. Brit. Empire*, June, 1906, p. 446.

Rupture of the gestation sac may be sudden, a large quantity of blood being poured out into the peritoneal cavity, and the patient becoming profoundly collapsed in a very few minutes. More commonly, however, the rupture is gradual (Fig. 250). The sac wall is eroded by the cells of the trophoblast, and later by the chorionic

Fig. 250.—Ruptured Tubal Pregnancy.

The body below the tube is the ovary; the body above is the ovum turned upwards from where it was attached to the tube; the point of the probe is projecting through the rupture in the tube. (Author's Collection.)

villi. In such cases there may be recurrent attacks of bleeding, abdominal pain, and syncope.

When the whole ovum is suddenly expelled into the peritoneal cavity it usually dies; it is questionable if it can re-ingraft itself on a peritoneal surface. Sometimes, however, where the pregnancy has

advanced further and the rupture is gradual, the placenta remains attached in the tube, and develops there and in the surrounding tissues, while the ovum goes on growing in the free abdominal cavity. For such an occurrence it is usually necessary that the fœtal membranes remain intact, but it is now known from one or two specimens that the fœtus may continue to grow, although its membranes have ruptured. The condition is comparable to what sometimes occurs in a uterine pregnancy.[1] Sooner or later, however, the fœtus dies in these cases.

Rupture of the tube between the layers of the broad ligament is, as I have already said, of rare occurrence. In my twenty-four cases it occurred thrice, but that is a very much higher proportion than is usually found. Here, again, death of the ovum usually results, and a hæmatoma forms of varying size. Later, a secondary rupture into the peritoneal cavity may take place. Quite recently I had an example of this, where I enucleated from the left broad ligament an ectopic sac, which, from the history, had first ruptured into the broad ligament and later into the peritoneal cavity.

In a few cases the growth of the ovum continues in the broad ligament, and the two layers become more and more separated; in fact, many of the cases of extra-uterine pregnancy which advance to the later months are of this variety. The form is spoken of by various names—'extraperitoneal,' 'subperitoneal,' 'pelvic,' or 'broad ligament gestation.' As the pregnancy advances the layers of the broad ligament become still further separated, the peritoneum becomes stripped off the bladder and rectum and pushed up by the enlarging gestation sac, which displaces all organs in its growth. This advanced variety is spoken of as 'subperitoneal abdominal pregnancy.' When it has reached the later weeks the sac seldom ruptures. If it should advance to term, a spurious labour occurs, with painful uterine contractions and the shedding of a uterine decidua. The fœtus at this time, if not extracted by abdominal section, soon dies. If retained, as it has been in not a few cases, it becomes mummified, altered into a lithopedion, or disintegrated and expelled through bowel, abdominal wall, bladder, etc.

(*c*) *Tubal Mole.*—In this variety the ovum is surrounded by layers of blood-clot (Fig. 251). Rupture may arise, or if it is retained it shrivels up, or, its tissues becoming disintegrated, a hæmatosalpinx forms. Suppurative changes may even occur and the sac become infected. In such cases the patient seldom continues absolutely free from symptoms of abdominal discomfort; there is usually a dragging pain, irregular menstruation, and a general feeling of abdominal uneasiness.

[1] Grossesse, 'Extra-Membraneuse,' p. 148.

(*d*) *Pregnancy may advance to Full Term without Rupture of the Sac.*—Such cases are extremely rare, but they do sometimes occur. The growing sac usually contracts adhesions to the surrounding structures, and displaces these to a greater or less extent. But occasionally the sac may be free, as in a most interesting case recently described by Amos,[1] where there were only adhesions in the neighbourhood of a small perforation of the sac wall. The placenta was situated at that point.

(2) **Implantation of the Ovum in the Isthmus of the Tube.**—It is only within recent years that implantation in the isthmus of the tube has been recognized to present features different from the variety previously described, where the ovum is lodged in the ampulla. While

FIG. 251.—Tubal Mole. (Author's Collection.)

theoretically the different terminations already described for the previous form may also occur in this one, it is found in practice that rupture is peculiarly frequent, and occurs generally at a very early date—often, indeed, as early as the second or third week—and often before any menstrual period is missed. The explanation of this early rupture is that the muscular fibres are peculiarly scanty and poorly developed, so that the ovum readily perforates the tube wall.

(3) **Implantation of the Ovum on the Infundibulum.**—This implantation may be directly on the infundibulum, or on the elongated ovarian fimbria. The occurrence is a very rare one. The ovum

[1] *Zeit. f. Geb. u. Gyn.*, Bd. liv., Heft 1, p. 169.

either becomes separated, or, contracting adhesions to the surrounding parts, continues to develop.

(4) **Implantation of the Ovum on the Interstitial Portion of the Tube.**—In this form of extra-uterine pregnancy the uterus is found much enlarged in one corner. As giving an idea of its rarity, I would mention that Werth[1] states that in 120 operations for ectopic pregnancy he had not met an example of this form. Personally I have had one case in my series of twenty-four. Subdivisions are sometimes made of interstitial pregnancy—the one tubo-uterine, where the sac extends into the uterine cavity, and the other utero-tubal, where it extends into the tube, and really is a variety of implantation in the isthmus. In its typical form the ovum, attached between the uterine and abdominal openings, grows in the wall of the uterus and dissects up the muscular layers. The corner of the uterus is pushed upwards, the sac enlarging especially in that direction. Sooner or later rupture takes place, occasionally into the uterine cavity, but most commonly into the peritoneal cavity. It is attended with very profuse hæmorrhage, as large vessels are usually torn. It is generally stated that rupture is a late occurrence, often not taking place until the fifteenth or sixteenth week, but from the following table given by Werth[2] it will be seen that rupture not infrequently occurs early. Here is his list:

First month ...	1	Third to fourth month	2
First to second month	3	Fourth month ...	4
Second month ...	4	Fourth to fifth month	4
Second to third month	6	Fifth month ...	3
Third month ...	4	Fifth to sixth month ...	1

The following is a brief history of my own case (Fig. 252):

Mrs. X—— was sent to me by Dr. Rennie, of Coatbridge, on account of an abdominal swelling, which he considered to be an ectopic sac. The history was as follows: The woman, a multipara, was suddenly seized, when about seventeen weeks pregnant, with severe abdominal pain. Within a very short time she was profoundly collapsed—indeed, so collapsed was she that her doctor did not think she could possibly recover. With restoratives and transfusion, however, she slowly rallied, and ultimately became quite well. When I saw her I could distinguish a swelling elongated vertically, of about the size of an ostrich egg, occupying the hypogastric and right iliac areas, and extending up to about the level of the umbilicus. On bimanual palpation this swelling was intimately connected with the uterus. The uterus could not be distinguished from the swelling, but on the left side there was a little knob, from which the left appendages seemed to run off. In writing to Dr. Rennie I pointed out to him that if the case was one of extra-uterine

[1] Winckel's 'Handbuch der Geb.,' Bd. ii., Teil ii., p. 739. [2] *Op. cit.*

pregnancy, it must be of the interstitial variety. A few days later, in the Alexandria Cottage Hospital, Coatbridge, I operated upon the patient. I must here thank Drs. Rennie, Macphail, and Wilson for their valuable assistance. On opening the abdomen I found the tumour as described, most intimately associated and adherent to the surrounding intestines. With

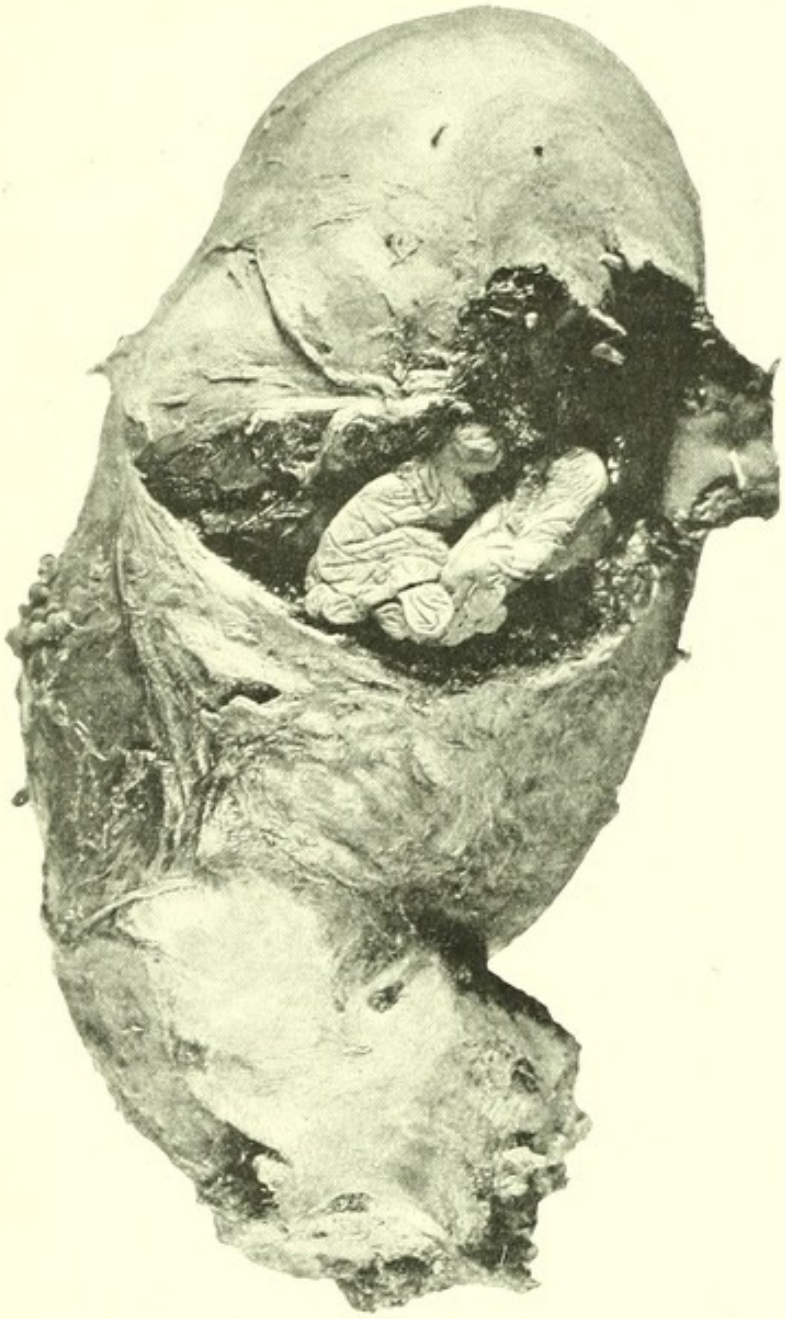


FIG. 252.—Interstitial Ectopic Pregnancy. (Author's Collection.)

great difficulty I separated these adhesions, and then found the sac, which had given way at one part, and through which a fœtal limb could be seen. So intimately was the sac connected with the uterus that I decided the easiest course to pursue would be to remove that organ along with the tumour. This I did, and the specimen is seen in the illustration. The patient, although very much collapsed after the operation, which was a prolonged one, made an uninterrupted recovery.

The diagnosis of this variety of ectopic pregnancy is often very difficult. It closely resembles angular pregnancy (p. 561), pregnancy in a rudimentary horn (p. 573), and pregnancy in a septate uterus (p. 300).

(5) **Implantation in the Ovary (Ovarian Pregnancy).**—Every one now admits the possibility of ovarian pregnancy. There are several well-authenticated cases—for example, those of Kouwer and

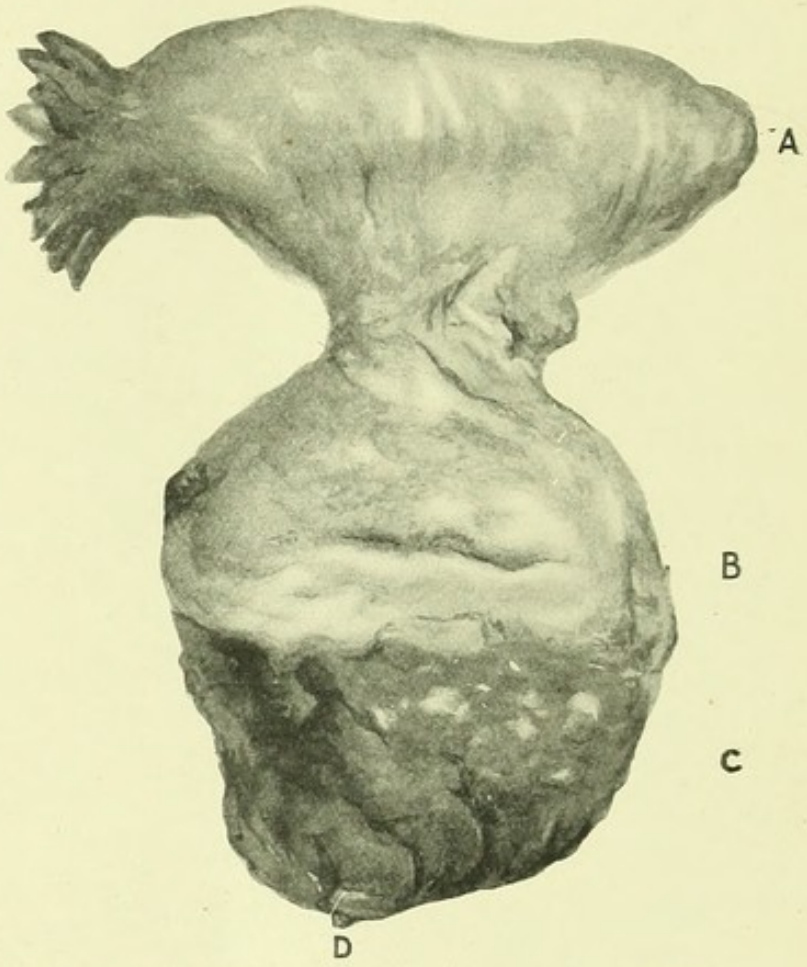


FIG. 253.—Ovarian Pregnancy. (Author's Case.)
A, Tube; *B*, ovary; *C*, ovum projecting from ovary; *D*, rupture.

Katherine van Tussenbroek,[1] Thomson,[2] Anning and Littlewood,[3] Mendes de Leon and Holleman.[4] My own case is here illustrated (Fig. 253). It is fully described, along with an extremely early ovum, in a small work entitled 'A Contribution to the Early Embedding of the Human Ovum,' which Dr. Bryce, of Queen Margaret College, Dr. Teacher, of the Pathological Institute of the University, and myself, have nearly completed.

[1] *Annal. de Gyn.*, December, 1899.
[2] *American Gynæcology*, 1902, p. 1.
[3] Lond. Obst. Trans., vol. xliii., p. 14.
[4] *Rev. de Gyn.*, June, 1902, p. 387.

Case of Ovarian Pregnancy associated with an Intra-Uterine Pregnancy.—Mrs. McD——, a patient of Dr. Wilson's, of Greenock, came to Glasgow to spend the Christmas holidays of 1902. She delayed going home, however, on account of one or two attacks of abdominal pain, which she attributed to errors in diet. She supplied me with the following details: She is twenty-seven years of age, has been married for two years, and has one child, now eleven months old. She nursed the child for a few months, but then gave it up, as the supply of milk was not sufficient. During the whole time of lactation she menstruated regularly. On November 20 she became unwell for the last time, and as she had no period in December, she considered herself pregnant. There was no sickness or vomiting, however. On New Year's Day, 1903, she felt a little backache and pain in the lower part of the abdomen; this pain was in the form of spasms, but did not quite resemble intestinal colic, although she thought that was the cause of her discomfort. She had a second severe attack of pain on the night of January 8. I saw her on January 9, 1903, when I found her in bed, with a pulse of 90 and a temperature of 100·4. She had had some sickness and vomiting during the night; there was no vaginal discharge. On examining the abdomen it was found slightly distended and rigid, more especially over the right iliac region.

On bimanual examination the uterus was freely movable, enlarged, and pushed forward to the left by a soft elastic swelling behind and to the right of the uterus. The diagnosis of extra-uterine pregnancy was made. The patient was removed to a nursing-home. On January 13 I opened the abdomen. The operation presented no great difficulties. On opening the abdomen a considerable quantity of blood welled up; in all about two pints of black blood were removed from the abdominal cavity. When I pulled up the right appendages I was expecting simply to find a ruptured tube. I was surprised to find the tube was quite free and undisturbed, and had no blood-clot attached to it; indeed, to the naked eye it appeared perfectly normal. On looking at the ovary, however, the thought of ovarian pregnancy at once occurred to me, for projecting from the inner margin of the ovary was a hæmorrhagic mass about the size of a walnut. With great care I removed the tube and ovary, and placed the specimen in a weak solution of formalin. The completion of the operation presented nothing of note; all blood-clot was carefully removed, and the abdominal wound closed in layers. The uterus was unusually large and soft; I was very suspicious that there existed also a uterine pregnancy, and I informed the husband of this. The recovery of the patient was absolutely uneventful, and she returned home in about four weeks. On the 274th day from the first day of the last menstrual period—viz., August 19—the patient gave birth to a full-time healthy child, so that my surmise that the uterus was pregnant at the time of the operation turned out to be correct, and I had, therefore, the unique example of a co-existing ovarian and uterine pregnancy, the latter being undisturbed by the removal of the sac of the former.

In the specimens of ovarian pregnancy which have been described within the last few years, rupture has occurred at a comparatively early date. In my case it occurred about the fifth week. Some of the other specimens, however, are older. A specially interesting one is that described by Menge,[1] an ovarian pregnancy of nearly full time, with a coexisting uterine pregnancy. The diagnosis of a tumour obstructing labour was made. When the tumour was opened it was found to contain a fully-developed living fœtus.

In regard to ovarian pregnancy, round which so much discussion has taken place in recent years, it has been generally admitted that the following conditions, laid down by Spiegelberg, must be fulfilled before an ectopic pregnancy can be pronounced truly ovarian:

(1) Absence of ovary of corresponding side; (2) elements of ovarian tissue in the wall of the sac; (3) attachment of the sac to the uterus by the ovarian ligament; (4) no part taken in the formation of the sac by the tube, and a topographical relationship similar to that found in large ovarian tumours. Lawson Tait,[2] always a sceptic as regards ovarian pregnancy, wrote: 'The uterus and both tubes would have to be recorded as intact, and we should have one ovary present and the other not to be accounted for, save by its existence on the cyst of the ovum; and in the cyst wall of such a case microscopic evidence of the presence of the ovarian tissues would be required.'

Primary Abdominal Pregnancy.—When one excludes all the older cases of so-called abdominal pregnancy, most of which are examples of secondary abdominal pregnancy, or primary implantation on the ovarian fimbria, there are very few cases indeed in which one can say the ovum was primarily attached to the peritoneum. Particularly difficult is this if one admits the possibility of a tube aborting or even rupturing, and the expelled ovum re-ingrafting itself upon the peritoneum and then developing.

Amongst the most interesting cases recorded is that of Galabin,[3] whose specimen was carefully examined by a committee of the Obstetrical Society of London. In that case the only thing against its being an example of primary abdominal pregnancy was the possibility of its being a tubal abortion, where the ovum had re-ingrafted itself on the peritoneum and then developed.

The committee favoured the idea that the case was a genuine one of abdominal pregnancy. Of course, the possibility of re-implantation could not be excluded; that will never be possible until it has been proved that an ovum cannot be detached and re-ingraft itself elsewhere.

[1] *Münch. Med. Woch.*, 1907, p. 2452.

[2] 'Diseases of Women,' 1889, vol. i., p. 444.

[3] Trans. Lond. Soc., vol. xxxviii., p. 88.

Vincenzo[1] recently reported a case where the sac was quite free, and felt like an ovarian cyst. Upon opening the abdomen the sac had adhesions only to the bowel and omentum. The uterus and appendages were normal in appearance and position, and the sac had no connexion with them.

Changes in the Uterus and Surrounding Tissues as the Result of Ectopic Pregnancy.—As a result of extra-uterine pregnancy the uterus becomes altered in size, shape, and consistency.

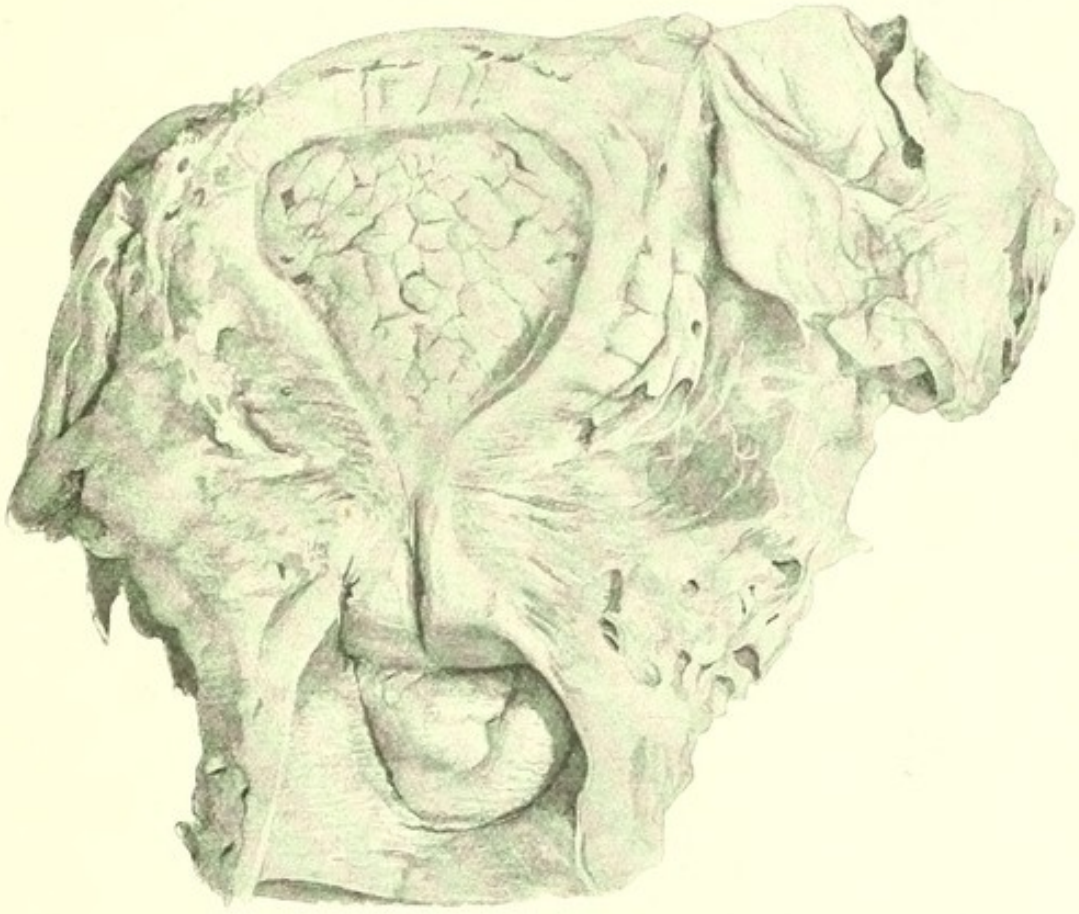


Fig. 254.—Ruptured Tubal Pregnancy, with Decidual Formation in Uterus. (Hunterian Museum, R. R. 376, Teacher's Catalogue, vol. iii., p. 757.)

At first the ectopic sac is too small to affect the position, but later the uterus may be displaced forwards, backwards, or to the side. It is also displaced upwards, but downwards hardly ever, for even with a large sac, such as a pregnancy that advances to the later weeks, the uterus is dragged up, not pushed down. In size it steadily increases, sometimes as much as one or two inches. In shape also it becomes slightly more globular, and in consistency softer. These two latter features, however, are not uniformly prominent.

[1] *Gynecologia*, 1905, Fasc. 6; Ref. *Cent. f. Gyn.*, 1906, p. 412.

Apart from the increase in size, the most striking change occurring in the uterus is the alteration of its mucous membrane into a decidua (Fig. 254). The formation of this decidua takes some little time, so

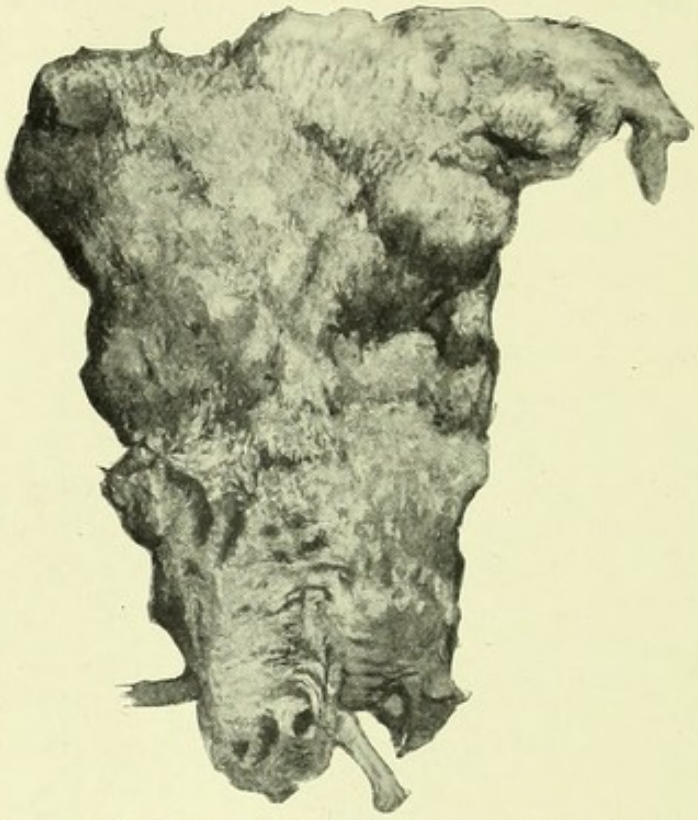


Fig. 255.—Uterine Decidual Cast from a Case of Ectopic Pregnancy. (Author's Collection.)

that in those rare cases in which rupture of the tube occurs in the early weeks, a properly-formed decidua may not exist. Both macro-

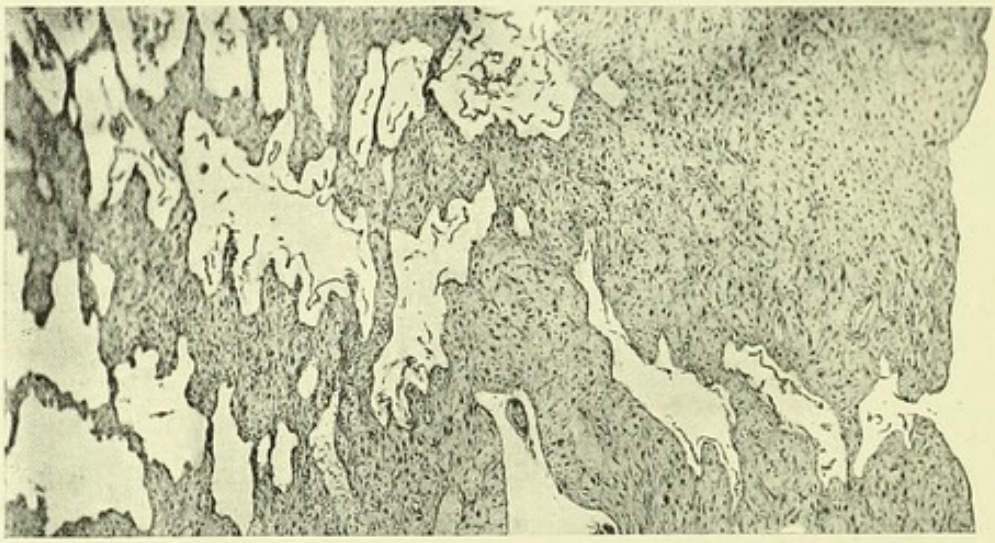


Fig. 256.—Uterine Decidua in a Case of Uterine Abortion. (Teacher.)

scopically (Fig. 255) and microscopically the decidua of extra-uterine pregnancy resembles the decidua that forms in the uterus in an ordinary pregnancy.

A stratum compactum and spongiosum can be distinguished, the glands in the deeper part may be observed compressed and oblique, and the epithelial cells flattened (Figs. 256 and 257). The whole interglandular stroma becomes œdematous, and the typical decidual cells are everywhere evident. The shedding of the decidua, which is generally stated to be so characteristic a feature of ectopic pregnancy, is not by any means constantly observed. It usually takes place at the time the tube ruptures or aborts. Very generally it comes away

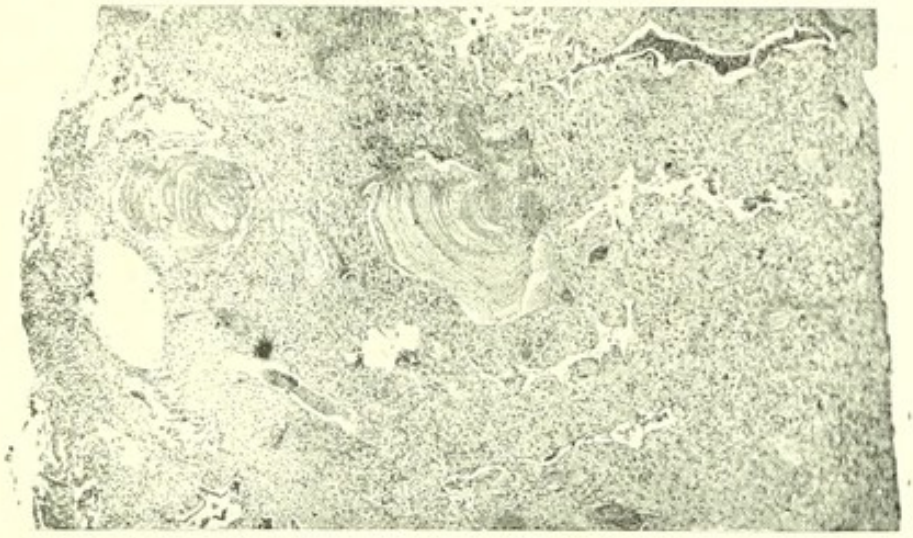


FIG. 257.—Uterine Decidua in a Case of Ectopic Pregnancy. (Teacher.)

entire, and once shed, no new one forms should by any chance the pregnancy continue.

It need hardly be mentioned that the enlarging sac disturbs the relationship of all the surrounding structures.

Clinical Features.

Having considered the macroscopic appearances of the tissues affected in ectopic pregnancy, it would be very satisfactory if, under the present heading of clinical features, I could present to my readers simple pictures of the symptomatology of each of the varieties which have been described. Many writers have attempted to do this. I have always felt, however, that while that was a thoroughly scientific method of approaching the subject of symptomatology, it led to confusion in the reader's mind, unless he was very familiar with ectopic pregnancy and had encountered examples of the complication in practice.

I will leave, therefore, what I have already written as a separate entity, and try now to present ectopic pregnancy as one sees it in practice at the bedside. It is very interesting when the operator has

removed the sac to know where the latter was situated, whether it was a tubal abortion or a tubal rupture, and whether the rupture occurred into the layers of the broad ligament, or into the general peritoneal cavity; but such questions have really no practical bearing on the treatment, and cannot be more than suspected until the abdomen is opened.

As far as my personal experience of this condition goes I would say that cases of ectopic pregnancy may be placed, at the bedside, in the four following groups:

(1) The woman is struck down suddenly with abdominal pain and profound collapse.

(2) The woman suffers for some time from abdominal uneasiness, pain, occasional faintings, and hæmorrhagic vaginal discharge.

(3) The woman advances in her pregnancy to the later weeks.

(4) The woman suffers from a pelvic hæmatocele.

The cases belonging to Group 2 are the most important, and very much the most numerous; they, however, are often overlooked until they pass into Group 1, or very occasionally into Group 3. Group 4 always passes through 1 or 2.

(1) The woman is struck down suddenly with abdominal pain and profound collapse. This type of acute tubal rupture is by no means common. It is seen in its most typical form when the ovum is in the isthmus of the tube, although it may also occur even when the situation is the ampulla. If one questions the patient regarding menstruation, there may or may not be the history of a period missed. It all depends upon the age of the pregnancy, and what might be termed the 'malignancy of the ovum.' There are no premonitory attacks of abdominal pain or sanguineous vaginal discharge; the woman is perfectly well one minute, and is suddenly seized with abdominal pain, the feeling of something giving way, and then collapses. Here is a case:

A young married lady, aged twenty-five, the mother of one child, born three years previously, was seized one afternoon, while going about her ordinary household duties, with severe abdominal pain; she fainted and fell. The housemaid, who happened to be on the same landing, heard her fall and rushed into the bedroom. With considerable difficulty she lifted her mistress on to the bed, and immediately sent for a doctor. The doctor, on his arrival, fifteen minutes later, found the patient conscious, but very pale, and with a small thready pulse of about 150 or 160. Appreciating fully the gravity of the condition, he called in a surgeon. When they questioned the patient there was no history of any previous illness, and there had been no menstrual period missed. Both, however, were convinced that some abdominal viscus had given way, and they decided that the abdomen must be opened. This

was done as soon as preparations could be made. The upper part of the abdomen was explored first, but nothing abnormal could be detected there. The operator then passed his hand down into the pelvis, and immediately blood welled up. The nature of the condition was then apparent—an early tubal pregnancy had ruptured. The tube was removed, and a rupture was discovered in the isthmus close by the uterus.

The history is so striking in this type of case that there should never be any difficulty in coming to a diagnosis. The diagnosis, however, must be based upon the history and appearance of the patient, for in these cases of early rupture nothing may be felt on bimanual examination. The tube which has ruptured is soft and collapsed, and the blood which is poured into the abdominal cavity may take some time to make itself distinctly felt as an effusion into the pouch of Douglas. Later the blood collects, and may be felt behind and around the uterus as a pelvic hæmatocele (p. 570).

The conditions which simulate this variety of what may be called 'acute tubal rupture' are: (*a*) rupture of a gastric or duodenal ulcer; (*b*) a fulminating appendicitis; (*c*) torsion of a pedunculated tumour most generally of the ovary. In none of these conditions, however, is the collapse so profound or so rapid. There may be faintings, which blanch the face and disturb the pulse, but whenever these pass off there is recovery for a time, followed, of course, by progressive abdominal symptoms. In the case of a perforating gastric ulcer there may be a history of old-standing disturbance, and in palpating over that region there is tenderness and rigidity. (Confusion arises sometimes from the fact that occasionally in cases of acute rupture of a tube the pain is referred to the upper part of the abdomen.) With a fulminating appendicitis there will always be tenderness and rigidity over the region of the appendix. I need not remind my readers that the pain following a ruptured duodenal ulcer is sometimes referred to the region of the appendix.

The third condition which may simulate a sudden rupture of the tube is torsion of the pedicle of an ovarian cyst. The resemblance becomes marked if, in addition to the severe pain complained of, there is a hæmorrhagic discharge. This is not uncommon with a twisted pedicle. Should the case be seen shortly after the attack of pain and collapse, the diagnosis will be easy if a distinct tumour is felt from the vagina. With intraperitoneal hæmorrhages no tumour (hæmatocele) is felt, for, as I have said, the effusion of blood takes some time to collect and coagulate. With an ovarian tumour, on the other hand, if the tumour projects into the pelvis it can always be felt. When, however, it does not project into the pelvis it may be difficult to define, as the abdomen is so rigid.

I do not purpose taking up any longer time with this type of case, for there is really no danger of its being overlooked; the woman is so ill that operative interference is obviously necessary.

Naturally, mistakes in exact diagnosis are most often made by the general surgeon, who not infrequently loses a little time in searching for the mischief in the region of the stomach or duodenum, because he most frequently meets with these cases. Should he approach the appendix first of all, no time will really be lost, because he will find the effusion of blood whenever he passes his fingers down towards the pelvis.

(2) **The woman suffers for some time from abdominal uneasiness, pain, and occasional faintings and hæmorrhagic vaginal discharge.** This type is much the most common. I may mention that all except two of my twenty-four cases presented at one time the clinical features of this group. Some of them had passed into the first group and one into the third before I saw them, but all of them except two had premonitory symptoms for some time before the severe collapse. It is of the greatest importance that the medical practitioner appreciates this, and remembers that the subjects of ectopic pregnancy are not, as a rule, struck down suddenly without warning, but that they have premonitory symptoms or warnings, generally of so marked a character as to cause them to call in medical assistance. I feel sure this is not fully appreciated. Most practitioners, if they think of ectopic pregnancy, picture a woman suddenly prostrated by internal hæmorrhage. Certainly such cases occur, as we have seen, but they are very much the exception. Anyone can recognize them, for the extreme collapse is apparent, but for the full appreciation of those of the group we are now to consider, a knowledge of the condition and an alert and judicial mind are necessary.

In this group of cases of the very first importance is the clinical history. In no disease that I know of is a careful consideration of the history more important than in ectopic pregnancy. To illustrate my point that there are usually abdominal disturbances and discomforts for some time before the collapse, let me give notes of a few of the cases which have been under my care in recent years.

Case I.—Case seen on December 24, 1902, in consultation with Dr. B—— and Dr. D——, of a neighbouring town. Patient blanched, pulse 140. Swelling of lower part of abdomen, extending on right side to the level of the crest of the ileum. On bimanual examination pouch of Douglas filled with hæmatocele; uterus pushed forwards and upwards. Diagnosis: Ruptured ectopic pregnancy.

The following history was obtained: Patient is thirty-seven, has had four children, last four years ago. No miscarriages. Last menstrual period ended on October 17. Remained well until November 15, when she was seized

with a violent shivering. Fortnight later (November 30) seized with severe 'cramps' in left iliac region. Seven days later (December 7) seized with similar attacks, followed by faintness. Sanguineous vaginal discharge first appeared on December 14, when there was another attack of abdominal pain. At this time a tender abdominal swelling was detected in the ovarian region by her medical attendant. Twelve days later (December 22) another severe attack of abdominal pain, followed by profound collapse. I saw patient two days later.

Abdominal section was performed in patient's house. A large quantity of blood and the ruptured right tube were removed. With stimulants and transfusion patient rallied, and ultimately made a complete recovery.

Case II.—On February 1, 1904, a young married lady, the mother of two children, was placed in a nursing-home under my care. She was sent to me by Dr. R——, of a neighbouring town, who diagnosed the condition as a ruptured ectopic pregnancy. She had been seized the previous day by a severe attack of abdominal pain and collapse. Upon bimanual examination I discovered a diffuse swelling behind and to the right of the uterus, which was pushed forward.

Upon inquiry I discovered that the patient was about three months pregnant, but that she had had several attacks of abdominal pain for some four weeks previous to the severe one which ended in collapse and caused her to be sent to Glasgow for operation. A sanguineous vaginal discharge appeared after the severe attack of abdominal pain, and a decidua was expelled the day before she came under my care.

When I opened the abdomen, I discovered a ruptured ampullary pregnancy, with a very considerable amount of free blood in the peritoneum. I removed the tube and blood-clot. The patient made an excellent recovery.

Case III.—Mrs. C——, aged forty years, 7-para, was admitted into the Western Infirmary, under my care, in August, 1905, complaining of pain in left iliac region, and hæmorrhagic vaginal discharge of six weeks' duration. A swelling, about the size of a goose's egg, could be felt in left broad ligament, displacing the uterus over to the right. From the history and bimanual examination a diagnosis of a tubal pregnancy, which had ruptured into the broad ligament, was made. The following history was obtained: Patient altered last about the end of May. Seven weeks later she was seized with irregular abdominal pains. At irregular intervals these attacks recurred, and were associated with feelings of faintness. A fortnight before admission she was seized with a specially severe attack, which was followed by collapse. A vaginal discharge appeared then for the first time.

An ectopic sac was removed from the left broad ligament. The recovery of the patient was uninterrupted.

Case IV.—Mrs. D——, aged thirty-six, 11-para, was admitted to the Maternity Hospital under my care, on November 9, 1906, complaining of abdominal pains and vaginal discharge. I had seen her earlier in the day, and from the history, and the fact that there was an indefinite swelling, about

the size of a hen's egg, behind and to the right of the uterus, I diagnosed ectopic pregnancy, and sent her into the Maternity Hospital.

The history obtained was as follows: Her last child was born eighteen months previously. Menstruation reappeared, and was perfectly regular until September 1, when she had her last period. The period lasted from September 1 to 4. On October 24 abdominal pain began, and lasted more or less for twenty-four hours. Two days later a hæmorrhagic vaginal discharge appeared. The discharge was not abundant, and consisted chiefly of dark clots. There followed a brownish-black discharge, which continued until patient's admission. From October 26 to November 6 patient had several severe attacks of pain and faintings. She was treated with poultices for inflammation of the womb. On opening the abdomen the right tube was found ruptured. There was a fair quantity of blood free in the abdomen and surrounding the tube (para-tubal hæmatocele). The gravid tube and blood were removed. Recovery was excellent.

Case V.—Mrs. D—— was seen by me one evening in May, 1906, in consultation with Dr. N——. She was in a collapsed condition.

The history of the case was as follows: She had always been delicate, and had one child seven years before. Six weeks after a missed period she began to complain of abdominal discomfort, especially marked in the left iliac region, and referred to the region of the colon. The pain was irregular, and after about ten days was associated with a slight brownish vaginal discharge. After a severe attack of pain an abdominal examination under chloroform was decided upon, but before it could be made another attack occurred, followed by profound collapse. An elastic swelling could then be felt behind and to the left of the uterus. So collapsed was the patient that the operation was delayed until a fortnight later, when a ruptured gravid tube was removed. It was encysted and closely adherent to the intestines. The decidual cast was shed a few days before operation. The patient made an excellent recovery.

It is at once apparent, from a consideration of the cases described, that each of them conforms to a certain type or period of amenorrhœa, recurrent attacks of abdominal pain and uneasiness, hæmorrhagic vaginal discharge, and feelings of faintness. But while the picture is so realistic, and can be so readily interpreted after the abdomen is opened and the sac removed, it is often a little difficult to fully appreciate the significance and gravity of the symptoms at the patient's bedside. The hæmorrhage is apt to be attributed to a threatening abortion, and the pain to intestinal colic.

Let us consider these symptoms seriatim, and first abdominal pain and uneasiness.

The pain is caused by the intramural hæmorrhages which I have described as so constantly occurring. It is also due, no doubt, to a colic in the tube and sometimes in the uterus. Naturally, if the

pregnancy advances, the muscular fibres become destroyed, and spasmodic contraction of the tube becomes almost impossible. Later, when blood has been effused into the peritoneal cavity, the pain is due in part to irritation of the peritoneum.

The importance of abdominal pain cannot be too strongly emphasized; it is always a symptom that should arrest attention. In the case of ectopic pregnancy, it is generally situated low down in the abdomen, and very often is more marked on one side, although it may extend over the whole lower quadrant of the abdomen. Very generally it is of a constant aching, with more or less severe exacerbations. Along with the pain there is also rigidity more marked on the affected side. Pressure, however, does not relieve this pain as it does an intestinal colic. Another point of difference between tubal and intestinal colic is that the abdominal uneasiness continues with tubal pregnancy, whereas with intestinal colic the woman feels perfectly well whenever the spasm passes off.

In some cases, especially if the sac is on the left side, the pain is specially referred to the bowel. When there is constipation, as is the case so often, there is considerable excuse for the medical attendant considering the pain as due to irritation and colic of the bowel. Later, if there is a large effusion of blood in Douglas' pouch, great uneasiness in the rectum, with a frequent inclination to go to stool, is often complained of. I shall refer to this again in speaking of pelvic hæmatocele.

In the cases that I have detailed it will be seen that the patients had severe attacks of pain, with intervals in which there was only a little abdominal uneasiness. It is, of course, entirely a matter of accident how frequent these attacks of pain are, or how many occur before rupture or tubal abortion.

Amenorrhœa, the next symptom of importance, is usually present in cases of this group, although occasionally the abdominal pain and uneasiness may come on before there is time for a menstrual period to be missed. Again, the symptom may not be available if tubal pregnancy occurs during lactation, or when there is some pathological condition associated with amenorrhœa, such as anæmia or chlorosis. The number of periods missed varies; but in the cases here described—and I find my own cases are very similar to those described by others—the abdominal pain and discomfort come on before the second period; —that is to say, one period is missed before symptoms present themselves. In only two of my cases was the abdominal pain delayed until after the second missed period.

Naturally, amenorrhœa is a symptom of very great importance, for it at once directs the attention of the physician to pregnancy,

and in association with abdominal pain to some complication of pregnancy.

It sometimes happens that the next symptom, hæmorrhagic vaginal discharge, may lead to confusion, and may be mistaken for a menstrual period, particularly if the discharge comes on at or about the time a menstrual period is expected or would have occurred had pregnancy not existed. If, however, this symptom is inquired into, it will usually be found that the hæmorrhagic discharge has been preceded by abdominal pain and discomfort, that it is irregular in its time of appearance, and that it is seldom very abundant. The quantity is very rarely profuse, I have only once seen it so. On the other hand, it is very generally preceded by one or more attacks of abdominal pain and discomfort. Taking the five cases I have given in illustration of this group, it will be found that in Case I. it occurred four weeks after the first attack of pain; in Case II. it occurred four weeks after the first attack of pain; in Case III. two weeks after the first attack of pain; in Case IV. two days after the first attack of pain; and in Case V. ten days after the first attack of pain.

In 80 per cent. of my cases the pain has preceded the hæmorrhage. That, however, is not the experience of all writers, for almost all mention that the hæmorrhage may precede the pain. Bell,[1] in his analysis of eighty-eight cases treated in St. Thomas's Hospital, gives a definite statement regarding this point in sixty-eight cases. From an examination of his table, it will be found that pain was the first symptom in 58 per cent. and hæmorrhage in 41 per cent.

Very often the discharge is attributed to a threatened abortion, especially if one or two periods have been missed. The differential diagnosis between these conditions is fully considered later (p. 560).

The fourth feature of cases belonging to this group is occasional feelings of faintness, nausea, and sickness, amounting sometimes even to syncope. It is due to reflex irritation of the peritoneum, to the intramural hæmorrhages which tensely distend the sac wall, and to tubal colic. It may be said that the faintness is due to hæmorrhage, and, of course, that is so if the amount of hæmorrhage is abundant; but I have operated upon two or three cases when there had been a distinct syncope, and yet the internal bleeding was very slight, and, *per se*, could not have produced the collapse. Besides, the patients get over the syncopal attacks very quickly, unless, of course, the internal hæmorrhage is profuse and the case has really passed into Group 1.

In referring to the hæmorrhagic discharge, I purposely did not mention the expulsion of a uterine decidua, because I did not wish to

[1] *Journ. Obst. and Gyn. Brit. Empire*, December, 1906.

give the impression that this was a symptom that should be waited for. Undoubtedly, when present, it is a feature of very great value; but it is very generally a late sign, frequently not appearing until there have been several attacks of pain and the tube has aborted or ruptured, and very often, indeed, never appearing at all. In my twenty-four cases it was observed six times (25 per cent.), Haultain[1] in his twenty-three cases observed it only seven times (30 per cent.), and Bell for his series of eighty-eight cases nineteen times (19 per cent.). I may mention that in a number of my cases the uterus had been curetted before I saw the patient, and in the ovarian pregnancy there was a coexisting uterine gestation. Taking series of cases reported by different operators, a decidual cast is noted in not more than 30 per cent. of cases. Without doubt the decidua is often lost in the discharge, especially at such times as the bowels and bladder are evacuated. Besides, as I have already pointed out, early in pregnancy there is practically no decidua present.

The presence or absence of the ordinary subjective and objective signs of pregnancy, such as morning sickness, pain in the breasts, and other mammary changes, cannot be relied upon in ectopic pregnancy in the early months. Naturally, if they are present, they confirm the diagnosis of pregnancy; but they are very often absent, and, indeed, appear to be less constant in extra-uterine than in intra-uterine gestation.

Irritation of the bladder, but more frequently dysuria, are common symptoms, especially if there is a large sac or collection of blood in Douglas' pouch pushing the uterus forward against the bladder. This is referred to in connexion with pelvic hæmatocele (p. 570). Constipation is very frequent, but that is so general with women, especially during pregnancy, that it is of no value from a diagnostic point of view; indeed, from recorded cases, and from those which I have seen in my practice, it has often confused the medical attendant, and led him to think that the abdominal pain and uneasiness complained of by the patient had its origin in the bowel, and was caused by constipation.

Having impressed upon my readers the extreme importance of carefully considering the history in this disease, I must now refer to the bimanual examination.

In carrying out a bimanual examination in a doubtful case of ectopic pregnancy, the greatest care must be exercised, for a gravid sac very readily gives way if carelessly handled. This has frequently happened, and, as a matter of fact, occurred in one of my cases, with a most disastrous result. My house-surgeon was examining

[1] *Journ. Obst. and Gyn. Brit. Empire*, June, 1906, p. 409.

the patient when the sac ruptured, and the contents being septic, and escaping into the general peritoneal cavity, a general septic peritonitis resulted. Especial care must be taken when the examination is made under an anæsthetic, for then, the patient being unconscious, there is nothing to warn the examiner of the danger he runs from pressing too firmly.

The sac which is felt in cases of ectopic pregnancy varies greatly as regards size, consistency, and position. Its size depends in great part upon the age of the pregnancy, but also not a little upon the amount of hæmorrhage which has occurred. Besides, sooner or later the sac contracts adhesions to the surrounding intestines, ovary, broad ligament, etc., and there is thus formed a mass of variable dimensions and of very indefinite outline. The consistency, too, is not constant. Theoretically it is soft and elastic, but, as a matter of fact, especially after any effusion of blood into the wall, it may feel just as firm and hard as any solid tumour. Pulsation over its surface is frequently referred to as being a feature of some diagnostic importance. Personally, I do not attach great importance to this feature, for in inflammatory conditions of the appendages it is also well marked. *The sac is very generally tender to the touch.*

The sac in the early weeks is commonly situated on one side, and rather behind the uterus, and as it increases it very generally extends further and further backwards. As it does so it pushes the uterus forwards and upwards. It is very much less common to find the sac in front of the uterus, although after intraperitoneal hæmorrhage some blood may collect in the utero-vesical pouch.

When the rupture occurs into the broad ligament, the tumour may be distinctly lateral, and the uterus markedly pushed over towards the opposite side.

The cases in which the sac is most difficult to define are where the uterus is backwardly displaced and is lying over the sac, and where the sac is situated far out in the ampulla, is very soft, and is closely surrounded by the intestines. *The history, the localized rigidity, and pain may then sometimes be the only symptoms, and on them alone it may be necessary to act.*

It occasionally happens, in spite of a history so typical as the one we have seen is generally associated with ectopic pregnancy, that the diagnosis is not so simple, and that other conditions may simulate or be simulated by it. Amongst the most important of these conditions may be mentioned salpingitis, appendicitis, and tumours of the ovary and uterus, especially when these are associated with intra-uterine abortion.

Let me give a few examples from my case-book:

Case 1. *Simple Ovarian Cystoma behind the Uterus associated with an Intra-Uterine Abortion of Two Months—Diagnosis: Ectopic Pregnancy—Abdominal Section—Recovery.*—A young married lady, with three of a family, about the time of a second missed period, was seized one afternoon with abdominal pain, especially marked in the right iliac fossa. There also existed a red vaginal discharge. The pain complained of was distinctly paroxysmal. Dr. D——, her family doctor, asked me to see her in consultation. Upon bimanual examination I found the uterus enlarged, and a swelling about the size of a walnut, which was fixed and tender, close to the side of the uterus. I diagnosed extra-uterine pregnancy, and advised her immediate removal to a nursing-home. Upon opening the abdomen I discovered that the tumour was a small cystic ovary. A day or two later I removed the remains of a uterine abortion.

Case 2. *Left-Sided Salpingitis associated with Abdominal Pain, removed Six Weeks after a Confinement, because of the Fear that the Condition was an Ectopic Pregnancy.*—Some years ago I was asked by Dr. McL—— to see a woman who had been delivered of a full-time child six weeks before. She complained of great abdominal pain, especially in the right iliac fossa. She was nursing her child, and had not menstruated since her confinement. There was slight hæmorrhagic vaginal discharge. Upon pressing over the right iliac region there was tenderness and pain, and upon making a bimanual examination an oval swelling, which I took to be connected with the tube, could be felt to the right side and behind the uterus. The appendages on the other side were normal. I feared it might be a gravid sac, and so advised its removal. When I opened the abdomen, I found that the swelling was an old-standing chronic salpingitis very much congested. The other ovary and tube were normal. I removed the diseased tube and ovary, and the woman made an excellent recovery.

I have upon two other occasions opened the abdomen in cases of salpingitis, suspecting that I had to deal with an ectopic pregnancy. The differential diagnosis between the two conditions must be based generally on the history; but occasionally the histories are so much alike as regards pain and irregular bleedings that one is left in uncertainty regarding which one has to deal with. In connexion with the bimanual examination, in most cases of salpingitis both tubes are affected, but very often one is more decidedly affected than the other, and masks the other.

Upon one occasion I made the diagnosis of extra-uterine pregnancy when I had really to deal with a case of appendicitis with an intra-uterine abortion. As a decidual cast came away in this case, it will be readily understood that there was sufficient excuse for the mistake.

Case 3. *Appendicitis with Intra-Uterine Abortion.*—Mrs. S——, a young married lady, a fortnight after a period missed was seized with severe abdominal pain. Dr. R——, who was summoned, found the pain very severe; it extended over the whole lower quadrant of the abdomen, but was especially marked on the right side, where there was distinct rigidity. There was also a red vaginal discharge. Upon bimanual examination a small swelling could be felt to the right of the uterus. Very naturally he made a diagnosis of extra-uterine pregnancy, and the following day, when I saw her in consultation, I had no hesitation in agreeing with him, especially as there had been expelled in the meantime a portion of decidua. The patient was immediately removed to a nursing-home. When I opened the abdomen, I found an elongated and inflamed appendix adherent to the tube and ovary, both of which showed signs of recent inflammation. As, however, I believed the inflammation was from the appendix, I only removed it and a portion of ovary. The patient made an excellent recovery, and ten days after the abdominal operation I curetted the uterus.

Another mistake which sometimes arises is the confusing of an extra-uterine pregnancy with a backward displacement of the gravid uterus. A most interesting example of this mistake has been already recorded in the chapter on Backward Displacement of the Gravid Uterus (p. 276), where the differential diagnosis of these two conditions is fully considered.

But the most common mistake is to diagnose uterine abortion when what really exists is an extra-uterine pregnancy. Here is a case of this nature, where the doctor, imagining he had to deal with an incomplete abortion, curetted the uterus, and while doing so ruptured an ectopic sac.

Extra-Uterine Pregnancy mistaken for Intra-Uterine Abortion—Curettage—Rupture of the Sac—Death.—Mrs. M——, aged thirty, 3-para, was brought into the Maternity Hospital under my care, in November, 1907, in a condition of collapse. Her doctor who accompanied her gave the following history: Three weeks before he was called to see her on account of abdominal pain and vaginal hæmorrhage. As she had missed a period the doctor thought an abortion was threatened, and prescribed the usual remedies for arresting this condition. When he saw her again three weeks later she was still having hæmorrhage. He therefore decided to curette the uterus, which he did under chloroform. After the operation he noticed the patient was collapsed, and this collapse increased in spite of strychnine, saline transfusion, and stimulants. When he brought her into the hospital, he informed me that he thought he had ruptured the uterus with his curette. On bimanual examination I could detect nothing definite, as the abdomen was so rigid and the uterus seemed displaced back-

wards. I suspected, however, that there must have been something more serious than a simple laceration with the curette, and I hazarded the diagnosis of a ruptured extra-uterine pregnancy. As she was steadily sinking, and the only possible hope of saving her seemed abdominal section, I opened the abdomen. When I did so, I found it full of blood. On passing my hand down to the pelvis, I pulled up a large ruptured tubal sac ; this I quickly removed along with the other tube, which was also distended with blood. I then flushed out the abdomen with saline, and rapidly closed it. The patient sank, and died a few hours after the operation.

Very frequently this mistake is made ; indeed, in a large proportion of the cases that have been under my care I have been asked to see the patients, because the doctor imagined he was dealing with an incomplete abortion. Consequently, my practice and teaching are in all cases of abortion to exclude the possibility of extra-uterine pregnancy, and I advise my students always to approach the case in the following way, and to answer the following questions : (1) Is the woman pregnant ? (2) Is the pregnancy uterine or extra-uterine ? (3) If uterine, is the abortion threatened, complete, or incomplete ? I make no exception, and always decide these three questions. I feel convinced that mistakes can only be avoided by doing this. Quite recently I was discussing this subject with my students when a patient came to consult me at the Western Infirmary, and gave the following history :

Mrs. X—— stated she was twenty-five years of age, and had had five children. She also said that she had not altered for six weeks ; that the day before she had some pain in the lower part of the abdomen, nausea, and vomiting. She had a slight hæmorrhagic vaginal discharge. I asked the nurse to prepare her for examination, and pointed out to the students that it was not likely that we had to deal with a case of extra-uterine pregnancy ; most probably it was a simple threatened abortion, as the latter was a far more common occurrence, but that we must exclude in this and in all cases the possibility of extra-uterine pregnancy. When I examined her, I was greatly pleased to find an elastic swelling behind and to the left of the uterus, for it was such a valuable lesson to the students. Two days later I removed the gravid tube ; it was an example of an incomplete tubal abortion. The patient made an excellent recovery.

The other mistake of considering the condition extra-uterine when it is really an intra-uterine pregnancy has also been occasionally made, and to illustrate this let me briefly detail the following case :

Angular Pregnancy resulting in Abortion mistaken for Extra-Uterine Pregnancy. —A couple of years ago I was asked by a medical friend to see his wife, as he feared she was threatened with an abortion. I had attended the lady at

her two previous confinements—one seven and the other four years previously. When I visited her, she gave me the history of a period missed. In addition, she told me that ten days after the period was expected abdominal pain and hæmorrhagic vaginal discharge appeared. The discharge was not great, but the pain was sometimes pretty severe, and was more marked towards the left iliac fossa. Upon making a vaginal examination I discovered the uterus was enlarged, and at the left corner in the neighbourhood of the tube I could detect a small localized bulging. I told her husband of my fear that there

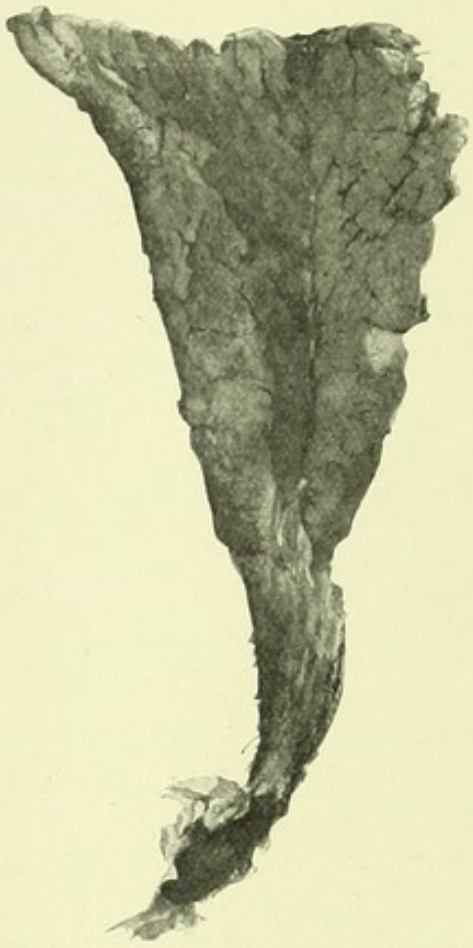


FIG. 258.—Cast of Uterine Decidua in a Case of 'Angular Pregnancy.'

At the right corner there is a small piece wanting; that piece came away a few days after the cast was expelled. The ovum was attached to it. (Author's collection.)

might be an extra-uterine pregnancy, and that I was chiefly alarmed because it was so close beside the uterus. My fear appeared to be fully justified when, two days later, the cast shown in the illustration (Fig. 258) was expelled. As may be observed, the cast is complete except at the right corner. I thought I would have to open the abdomen at this stage, but my friend requested me to delay doing so. We were, however, prepared for any possible sudden call to operate; the patient was watched very carefully, and all discharges kept. Four days later a small piece of membrane, which just completed the sac that was expelled, came away in the vaginal discharge. Attached to this little piece of decidua was the ovum, which, unfortunately, I lost.

In the case just described I had to deal with the very interesting condition of what is known as 'angular pregnancy,' which has been especially referred to by Budin, Bar, Kelly, and others. It is the implantation of the ovum in the corner of the uterus over the tubal ostium. Naturally, it very closely resembles interstitial and isthmal ectopic pregnancy.

Other errors of diagnosis which occasionally are made are mistaking interstitial fibroids, ovarian tumours, and lateral flexions of the gravid uterus for an ectopic sac. The latter condition—flexion of the gravid uterus—may simulate very closely an extra-uterine pregnancy. Some years ago I assisted a well-known gynæcologist at an abdominal section in which he had diagnosed an extra-uterine pregnancy. When the abdomen was opened, the supposed sac was found to be the body of the gravid uterus laterally displaced. In all cases of doubt an examination under anæsthesia is necessary.

Mistakes in diagnosis, such as taking an ovarian tumour or myoma for a gravid sac, or, *vice versa*, taking a gravid sac for one of these tumours, is seldom likely if one carefully considers the history. I have referred already to how closely these tumours may simulate an ectopic sac if there is a coexisting intra-uterine abortion.

In cases of great doubt, where the diagnosis is especially difficult, it used to be the custom to recommend the exploration of the uterus with the sound, and even with the curette. As regards the uterine sound, I am quite prepared to admit that sometimes it is of real practical value. I have once or twice had to employ it. If the accoucheur makes use of the instrument, he must do so with great caution, as several cases are on record where the uterus was injured. Not only must he introduce and move it about with great care, but he must make absolutely sure that the vaginal canal is thoroughly disinfected, for where there has been a vaginal discharge going on for some time there are sure to be present many organisms of greater or less virulence. Still more careful must he be with the curette, as he may very readily set up violent contractions in the sac, and injure and infect the uterine tissues. I am doubtful if the curette is often of much value. From the scrapings removed and examined microscopically one could generally give an opinion as to whether or not pregnancy existed, but one could not say whether the pregnancy was uterine or extra-uterine. Only could one say it was uterine if chorionic villi were found present. As we have seen, the deciduæ in uterine and extra-uterine pregnancy are indistinguishable either macroscopically or microscopically.

(3) **Cases in which the woman advances in her pregnancy to the later months.** Cases of this group are not very common, although

there are now a large number recorded. In this, as in the previous groups, the history is generally of the greatest importance. For example, one very generally finds on questioning the patient that she has passed through Group 2; she has at one time of her pregnancy had attacks of pain, faintness, etc. In some cases, however—they are very much the exception—there is nothing unusual, and the pregnancy advances without disturbing the patient to any extent.

The ultimate termination of cases of this group is very varied. At any time during pregnancy the peculiarity of the sensations felt by the mother or the discomforts she experiences may induce her to seek medical advice. The discomforts are chiefly those produced by the large sac displacing the structures from their normal position. Obstinate constipation is frequent, disturbances of the bladder not uncommon. Uneasiness and even pain in the abdomen may be complained of, but the symptoms are often so vague that the medical attendant, when he comes to examine the patient, attributes them to the ordinary disturbances that are frequently associated with pregnancy in the later months, when the growing uterus displaces and disturbs the surrounding organs. Even the situation of the gravid sac becomes very much like the normal. Abdominal distension is usually more marked on one side than the other, but one sees this in normal pregnancy, in which, as a rule, the uterus is displaced to the right side. The gravid uterus, however, can be pulled over to the middle line, while a large gravid sac is generally fixed.

Should the physician make a vaginal examination, there is then every likelihood that he will have his attention arrested by the condition of matters. The cervix will not be so soft, and it will often be displaced. He may be fortunate enough in feeling the uterus as a whole displaced, but very frequently the extra-uterine sac is so closely applied and fixed to the uterus that he cannot distinguish the one from the other. A rectal examination may be of service, but the accoucheur must have had his suspicions very strongly aroused before he would resort to this method of examination.

In the case of advanced extra-uterine pregnancy figured (p. 569), I at first mistook the body of the uterus, which was displaced behind and to the right, for a fibroid, although later, when the patient came into hospital, I appreciated the mistake. I found that the tumour that I thought was a fibroid was the body of the uterus, and the sac which I thought was the enlarged body was an ectopic pregnancy. In cases of doubt the passage of the uterine sound is of service, but not infrequently when this has been employed injury to the sac has resulted. This was so in my case: the sound had been forced along a false passage several times, and the sac wall and its contents had

been infected. Of course, if every possible care is taken in passing the sound, and if the hands of the operator and the vulva of the patient are thoroughly cleansed, there is little risk of doing any harm.

At any time during pregnancy the patient's attention may be arrested by the cessation of the fœtal movements, and she may seek medical advice because of this. Naturally, the further the pregnancy has advanced and the more energetic the movements, the more likely is she to have her suspicions aroused and to consult her medical attendant.

In cases of extra-uterine pregnancy which advance to term, phenomena occur which are referred to as 'spurious labour.' There is severe abdominal pain and often expulsion of the uterine decidua, with a hæmorrhagic vaginal discharge. The fœtus, if it is alive, gives evidence of very great disturbance in its circulation, its movements become extremely active, then quieten down and cease altogether. After death of the fœtus a number of changes may take place in the sac and its contents. The liquor amnii is absorbed and shrinking of the sac occurs, so that the abdominal tumour gradually diminishes in size.

The fœtus itself may become altered in different ways—most commonly it becomes mummified. In this process the fœtus, membranes, and placenta become shrivelled up by the absorption of the fluid in their tissues. Occasionally an adipocereous transformation occurs, the tissues of the fœtus becoming altered into a soapy-like yellow substance. Calcification is yet another variety of change. In most cases it does not amount to more than a deposit of lime in the membranes and placenta, and a scattered deposit in the fœtus. Occasionally, however, the fœtus is chiefly affected, and one gets the true lithopedion. In such cases the superficial tissues of the fœtus are affected, although the deeper ones may also be impregnated with the lime salts. These shrunken sacs are often retained for many years in the abdominal cavity, and are stowed away in a marvellous manner. I recently noticed a case described where the woman had had several pregnancies after a supposed ectopic one many years before. At her death the abdomen was opened, and an old shrunken ectopic sac was discovered. Quite a number of similar cases have been described. An interesting review of such cases is given by Bovée.[1] Should by any chance the sac become infected, a suppuration and breaking down of its contents may occur. In most of these cases the pus and disintegrated contents of the sac find an outlet through bowel, vagina, abdominal wall, or even bladder. This process

[1] *George Washington University Bulletin*, vol. v., No. 3; ref *Journ. Obst. and Gyn. Brit. Empire*, June, 1907, p. 504.

is often very slow if the fœtus is of some age, as the bones do not readily break up and have difficulty in passing through the sinuses formed. Fortunately, in these cases a rupture seldom occurs into the general peritoneal cavity, as by the inflammation the surrounding intestines become adherent, and completely shut off the general peritoneal cavity.

Treatment.

I purpose discussing the treatment of each of the groups of cases that I have already described in connexion with 'clinical features' of ectopic pregnancy. After doing so, I will consider those cases of marked hæmatocele, as one's attitude towards that condition is somewhat different than towards any other variety of ectopic pregnancy one encounters in practice.

1. *The Woman is struck down suddenly with Abdominal Pain and Profound Collapse.*—In such cases the all-important question for consideration is, When should one operate? Should one, no matter how collapsed the patient is, open the abdomen, remove the sac, and arrest bleeding, or should one give the patient time to recover from her profound condition of shock? There are advocates of both courses. Personally, I believe the safer procedure is immediate operation in all cases. After all, if the patient is extremely collapsed, the immediate operation adds very little to the shock already present, for the operation can be performed quickly and with light anæsthesia. It is most important to appreciate that fact. When immediate operation is undertaken for sudden collapse, the abdominal route is the only one to be considered.

The operation is performed as follows: The abdominal wall is thoroughly cleansed with soap and water, alcohol, and perchloride solution (1 : 1,000). The patient is then placed in the Trendelenburg position. An incision is made in the middle line, the hand passed down into the pelvis, and the affected tube and corresponding ovary brought up to view. If desired, a pair of pressure forceps is applied to the infundibulo-pelvic ligament beyond the ruptured tube, and another pair is applied to the uterine end of the tube. The tubal sac is removed, the ovary being, if possible, left behind, provided it is quite healthy. Ligatures are then applied to the two cut ends of the broad ligament, and the raw edge covered with peritoneum. The pelvic and abdominal cavities are then irrigated with normal saline solution, or simply swabbed out with dry gauze. Before closing the abdomen the other tube and ovary should be examined. I have thrice in my twenty-four cases found the other tube the seat of a hæmatosalpinx, in one case the result of a previous extra-uterine pregnancy.

I would remove the other tube and ovary only if they were grossly diseased and could not possibly be conserved.

During the operation, but not before it, an assistant introduces one or two pints of normal saline solution underneath the breast or into a vein. The patient is then put back to bed and the foot of the bed raised. If deemed advisable, she is given some brandy by the rectum. I would strongly caution, however, against the danger of over-stimulation. I have often found my house-surgeons make this mistake.

2. *The Woman suffers for Some Time from Abdominal Uneasiness and Hæmorrhagic Vaginal Discharge.*—In this group immediate operation is always advisable, for one can never tell when all danger is past. Some years ago I saw a case, along with a well-known gynæcologist, which illustrated very well the danger of leaving such cases unoperated upon. The gynæcologist referred to had quite recognized that the condition was one of extra-uterine pregnancy, but he considered that all danger was past, as the sac was small and hard. He advised against operation. A few weeks later I heard that the patient had been seized with severe abdominal pain, and had collapsed and died.

The operation in cases of this group is a very simple one. Usually there are slight adhesions between the tube and surrounding parts, but these are readily broken down, and the sac—be it an aborting tube or be it a ruptured tube—is removed as I have already described in Group 1. Should the rupture have occurred into the broad ligament and a hæmatoma exist, the general recommendation is to split open the broad ligament, clear out all blood-clot, and pack the cavity with gauze. The broad ligament is then stitched over, and the end of the gauze brought out through the vagina. It is undesirable, if it can be avoided, to bring out the gauze through the abdominal wound, for drainage in that direction is unsatisfactory, as it weakens the lower part of the wound. In these cases it is quite sound to proceed as Kelly and others have recommended, and deal with the sac entirely from the vagina, and then close the abdomen.

In cases where the ovum is situated in the interstitial portion of the tube, it may sometimes be found impossible to satisfactorily close the ragged cavity of the uterine wall, and so it is often necessary to remove the entire uterus supravaginally. This was found necessary in my case already described and figured (p. 543). If possible, however, the uterus should always be saved, and that will usually be possible if the pregnancy is still early, and the sac has projected out from the uterus rather than developed in the uterine wall.

In recent years several operators have suggested a conservative

treatment of the tubes in cases of tubal pregnancy. Some, for example, have dilated the abdominal end of the tube and pressed out the ovum; others have split open the tube and shelled out the ovum from its wall. In the latter case the wound in the tubal wall is carefully sutured. How far such procedures are advisable I am not prepared to say, as I have never adopted them, and there is not yet a sufficient number of recorded cases to judge by.

3. *Ectopic Pregnancy in the Later Months.*—Before considering details regarding the operative treatment of such cases, one must consider the question as to whether or not it is ever advisable to delay operating for the sake of the child. Personally, I would decidedly answer in the negative. I am fully aware that a number of children have been saved, but I think the dangers of delaying are greater than the chances of obtaining a healthy child. If delay is decided upon, it is only permissible if the patient is placed under such conditions that immediate operation can be performed should that become necessary.

The chief difficulty in operating upon cases of advanced extra-uterine pregnancy is the treatment of the placenta. There is never any difficulty in opening into the sac or in removing the fœtus, but there may be considerable difficulty in dealing with the sac, and especially with the placenta. The ideal treatment is to remove the sac entire—fœtus, placenta, and membranes—as was done in the case figured in the illustration (Fig. 259), where I had simply to separate some adhesions and tie off the lower part of the sac. This is generally possible when the child has been dead for some time, for a 'dead' placenta is easily stripped off, and any little bleeding that occurs is readily controlled with gauze packing. But the placental site of a 'living' placenta bleeds very freely when the latter is separated; and besides, in the process of separation, especially if the placenta has been attached to the mesentery, serious injury may be done to the blood-supply of a portion of the intestines. In such cases, with a view to obtaining a 'dead' placenta, and one that may be safely detached, it has been recommended that the operation should be delayed until some time after the death of the child. In many cases this is perfectly safe, and the dead placenta can be easily and safely separated. But by such treatment the child is sacrificed, and there is no guarantee that in the interval the sac, with its dead contents, may not become infected. It is a treatment, therefore, quite out of harmony with modern obstetric surgery.

In recent years the successes attending immediate removal of the 'living' placenta have been increasing in number. There are two most

interesting papers on the subject by Sittner,[1] who has carefully collected a large number of recorded cases from the obstetric literature of different countries. From his figures it is evident how much better the results are from immediate removal than from any other method, for where the placenta was left behind the mortality was 57 per cent., and where it was removed it was 18 per cent.

In dealing with some of these cases, it has been found that occasionally the arterial blood-supply may be cut off by ligaturing the

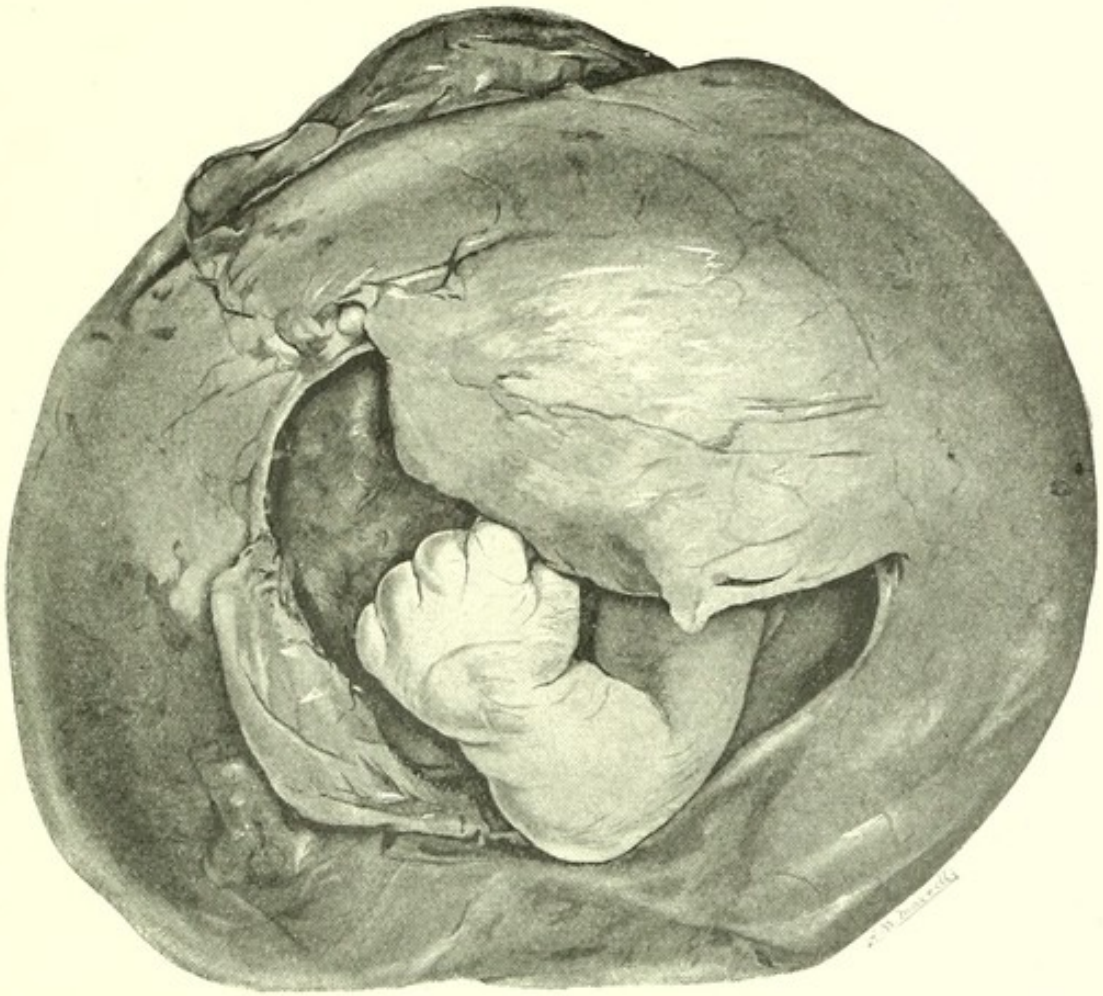


FIG. 259.—Ectopic Pregnancy which had advanced to Term. (Author's collection.)

ovarian and uterine vessels before proceeding to separation. In others, separation of the sac by degrees and careful 'understitching' of the wall have proved successful. Sometimes the hæmorrhage from the raw placental site has been so great as to necessitate compressing the aorta until the bleeding was controlled. The worst cases to deal with are those where the placenta is attached to some very vascular and freely movable viscus, such as the bowel. When the attachment is in the pelvis, bleeding can usually be controlled by simply packing.

[1] *Cent. f. Gyn.*, 1903, No. 2, p. 33, and *Deut. Med. Woch.*, 1906, Nr. 30, p. 1200.

Occasionally the operator has deemed it advisable to remove the uterus, but that is unfortunate in a young woman, and should be rarely necessary.

When it is deemed inadvisable to separate the living placenta, the best course to pursue is to cut the umbilical cord short, stitch the sac wall to the abdominal parietes, and pack the cavity with gauze. If the sac is well down in the pelvis, the end of the gauze may be brought out through the vagina, and the sac wall closed above. The gauze should be removed in a few days and the sac repacked. After ten or twelve days the placenta should be removed. If that is not done, the 'dead' placenta disintegrates, and a discharge continues, which sooner or later becomes secondarily infected by pyogenic organisms, and is a constant source of danger to the patient. One has only to read the records of such cases to see how extremely unsatisfactory this termination is.

Closing the abdomen and neglecting the placenta, leaving the latter to take care of itself in the abdominal cavity, has proved absolutely unsatisfactory, and has now no advocates.

It is occasionally possible to remove the child and deal with the placenta entirely from the vagina. It is generally stated that the cases suitable for this treatment are where the lower pole of the fœtal sac is situated low down in the pelvic cavity, and can be easily reached through the vaginal vault. I would add another condition—that the child must either be premature or the presenting head must be impacted in the pelvis, as the difficulties and dangers of dragging a full-time child through an opening in the vaginal vault would be extreme.

A most grave condition to deal with is infection of the gravid sac. If the sac cannot be removed, but has to be incised and drained, the ideal route is through the vagina. There are, however, occasionally cases in which it cannot be satisfactorily reached from the vagina. In such an incision should be made at a point where there is the least chance of the contents escaping and infecting the general peritoneal cavity, and where there is the best drainage. This is usually possible, for the sac has already contracted adhesions of such a nature that at some point externally a fresh incision can be made into it without opening into the general abdominal cavity.

Pelvic Hæmatocele.

In considering the clinical features of ectopic pregnancy, I have only incidentally referred to the collection of blood in Douglas' pouch, known as a pelvic hæmatocele, and which every one admits is so generally the result of a gravid tube which has ruptured or aborted.

I have done so purposely, because I do not wish a hæmatocele to be looked upon as a symptom of tubal pregnancy. My endeavour has been to try and help my readers to be able to appreciate the condition of ectopic pregnancy before the hæmatocele is pronounced. It must be remembered that only occasionally does the medical attendant see the patient for the first time when there is a well-defined hæmatocele, even although the hæmorrhage is sudden and profuse, as in Group 1, or more gradual, as in Group 2, for in the former it takes some time for the blood to collect, and in the latter, as we have seen, there are the premonitory symptoms already indicated.

When recovery occurs from the free peritoneal hæmorrhage, a pelvic hæmatocele forms. The blood collects in Douglas' pouch, and, if of large amount, not only fills up the pouch, but extends up above the pelvic brim. When this swelling is palpable above the pelvic brim, it is usually more marked on one side. Fluctuation cannot be made out, but areas of dullness, which alter very slowly when the patient is changed from one position to another, may be noted shortly after rupture if there is a large quantity of free blood in the abdomen. It need hardly be stated that it is generally undesirable to move the patient about to permit of this sign being elicited.

On examining by the vagina shortly after rupture probably nothing is felt ; later an elastic effusion can be made out, and still later, when the blood coagulates, a semi-solid tumour. The effusion is felt to run out against the pelvic wall, and, consequently, most frequently simulates, as far as the physical examination goes, a pelvic cellulitis and peritonitis. The histories, however, of these two conditions are so absolutely different that seldom any confusion arises between them, unless, as occasionally happens, the hæmatocele becomes infected. Later the hæmatocele is firmer : it gives a peculiar sensation to the examining fingers, for in some parts it feels hard and in others soft.

The effusion displaces the uterus always a little to the side, and most commonly forwards and upwards against the bladder. Occasionally the effusion occurs also into the utero-vesical pouch when the uterus is found embedded in the effusion.

With a pelvic hæmatocele a general feeling of abdominal and pelvic discomfort is complained of. After the collapse is recovered from, the pulse improves, but the temperature, which was subnormal, rises first to the normal, and often to slightly above the normal. This slight febrile disturbance is the result of absorption of disintegrating blood. As the effusion very generally presses the uterus forward against the bladder, slight difficulty in micturition is often complained of, and this occasionally throws the physician off his guard, and leads him to suspect that he has to deal with an incarcerated retroflexed

gravid uterus. The differential diagnosis of this condition is referred to on p. 276. Owing to the pressure on the rectum behind, the patient complains not infrequently also of rectal tenesmus: she has a constant desire to go to stool. Here is the brief history of a case in point:

Case of Ruptured Tubal Pregnancy—Hæmatocele—Chief Symptom, Rectal Tenesmus.—Late one evening recently I was called to see the wife of a practitioner in a neighbouring town. When I arrived, I found the patient very anæmic, with a pulse of 90, and complaining of great abdominal pain. There was no discomfort on micturition. Nothing could be felt from the abdomen except great rigidity of the whole abdominal wall. Bimanually I could make out the uterus pushed forward and an effusion in Douglas' pouch extending to the pelvic walls, and more marked on the right side. The history of the case was as follows: The patient was about seven weeks past her period. Four weeks before abdominal pain was complained of; recurrent attacks of this pain followed. A few days after the first attack of pain there was a vaginal discharge. A fortnight before she was seized with very severe pain and fainted. From that time great rectal tenesmus and a constant desire to go to stool were complained of. The week before I saw her she had been curetted, the idea being that the case was one of incomplete abortion, and that the effusion behind the uterus was of an inflammatory nature. Colour was lent to this idea by a slight rise of temperature in the evening, never, however, amounting to more than 100°. I was quite satisfied that the condition was ruptured extra-uterine pregnancy, and that the swelling in Douglas' pouch was a hæmatocele. I therefore opened the abdomen. I found the right tube ruptured in the ampulla, and a large quantity of blood-clot filling Douglas' pouch and extending up to the right side. I removed the tube and the blood-clot and closed the abdomen. The patient made an excellent recovery.

As I have indicated already, this irritation and tenesmus in the bowel is very apt to deceive the physician unless he considers most carefully the history of the case.

Should the pelvic hæmatocele be seen later, when a considerable portion of blood is absorbed, the tumour remaining may simulate any of the tumours connected with the uterus or appendages, but the history of the case will usually clear matters up. The tumour is peculiarly fixed, and it seldom has the definite outline that one finds in a myoma or an ovarian growth. It most nearly resembles a chronic salpingitis. In distinguishing between these two conditions one must rely entirely on the history. In salpingitis there is the story of old-standing pelvic and abdominal pain; in hæmatocele there is the history of the condition dating back to some comparatively recent acute abdominal illness.

Treatment.—In dealing with a pelvic hæmatocele most gynæcolo-

gists are in favour of operation, but there are still a few who recommend the expectant treatment. This expectant treatment consists of absolute rest in bed, fomentations, etc., and, later, douching and the administration of syrup of the iodide of iron, all with the object of favouring absorption. The treatment is a very prolonged one and the recovery most protracted, two or three months sometimes passing before the blood is completely absorbed. In a number of cases it has proved quite successful, but in others adhesions between uterus, intestines, tubes, and ovaries have followed, and the ultimate health of the patient has been far from satisfactory. In a few cases the hæmatocele has been infected, and an abscess has formed, with all its dangers. In this connexion Bell[1] has given a very interesting comparison between the results from the expectant and the active treatment. He takes the results of Champneys, a strong advocate of expectancy, and compares them with those of Cullingworth, Tait, and Fairbairn, in St. Thomas's Hospital. He comes to the following conclusion: 'Hence a comparison of the two lines of treatment shows that the desire to avoid operation leads to a higher mortality, not only in cases operated upon, but also in the whole series of cases.'

If it is decided to operate upon the hæmatocele, either the vaginal or abdominal route may be chosen; there is much to be said for both. By the abdominal route all blood-clot can be cleared away, and any other unsatisfactory state of tubes, ovaries, and uterus may be corrected. The disadvantage of the method is that the hæmatocele, shut off by adhesions between the intestines, is opened into through the general abdominal cavity.

By opening through the vaginal vault, blood-clot may be removed without opening into the general peritoneal cavity. Whichever route is chosen, the cavity should be drained with iodoform gauze brought out through the vagina.

Personally, I prefer the abdominal route, unless suppuration has occurred in the sac, and I do so because I think it advisable in all cases to examine the tubes and ovaries, and to suspend the uterus to the abdominal wall, so as to prevent it becoming fixed in a position of retroflexion.

Pregnancy in a Rudimentary Horn.

Pregnancy in a rudimentary horn, often referred to as cornual pregnancy, although the latter term is a little misleading, is a condition which I have already briefly referred to in Chapter XX.

[1] *Op. cit.*

('Dystocia the Result of Abnormalities affecting the Parturient Canal'). I must here, however, consider the complication a little more fully, for clinically it resembles extra-uterine pregnancy in many of its details. The illustration (Fig. 260) indicates at a glance the relationship of the rudimentary to the normal uterine horn. The connexion between the two horns is by a fibro-muscular band of from 2 to 6 centimetres. This band is usually attached to the normal horn about the level of the internal os, although its lower margin may be as low as the os externum. In the great majority of cases no canal is found, and in many when it exists it is incomplete. Werth[1] found in his hundred

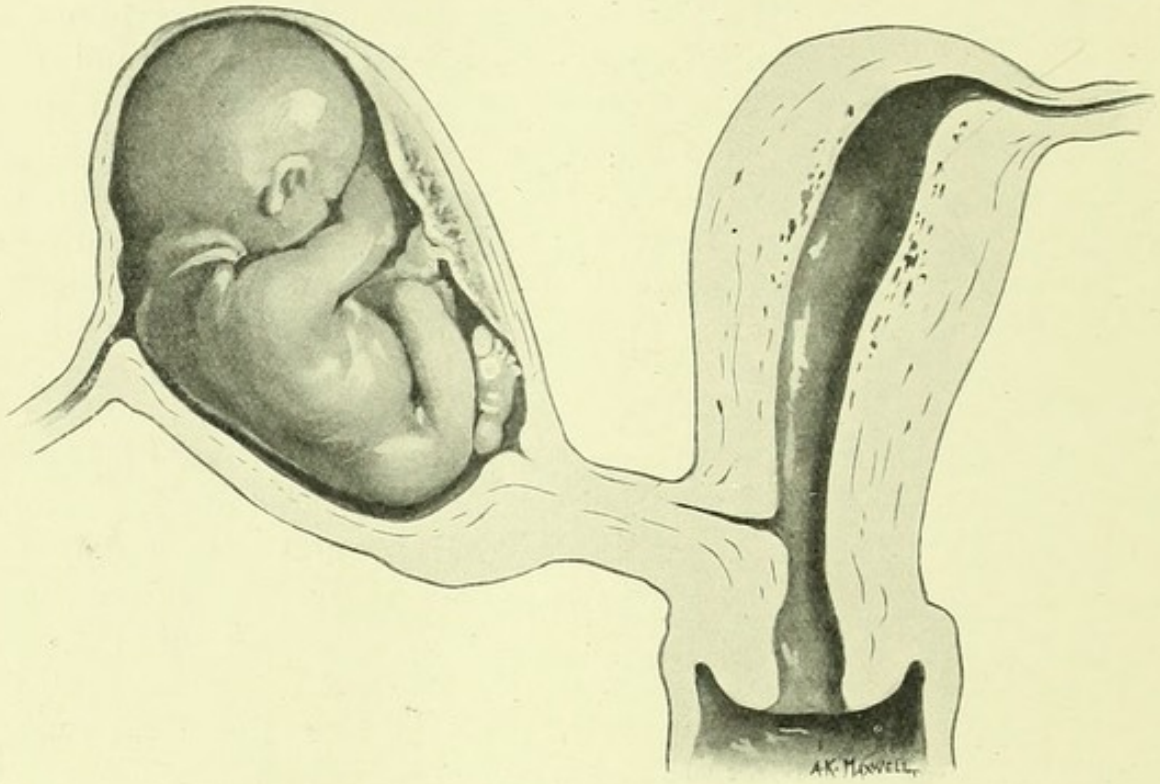


Fig. 260.—Pregnancy in a Rudimentary Horn. (Diagrammatic.)

collected cases a canal in nineteen, but only in two was there an opening into both parts of the uterus. It is possible that occasionally the canal becomes closed during pregnancy. As there is so seldom a canal, impregnation occurs usually by the spermatozoa passing through the healthy half of the uterus and tube, and impregnating an ovum which has been shed from the ovary connected with the rudimentary horn. In some few cases, however, an ovum from the other ovary has been impregnated, as the corpus luteum was discovered in the ovary connected with the normal horn.

The course of pregnancy in a rudimentary horn is variable. In a

[1] Winckel's 'Handbuch der Geburtshülfe,' 1904, Bd. ii., Teil ii., p. 998.

large proportion of cases rupture occurs because of the poorly-developed muscular and mucous coats. The trophoblast, meeting with little resistance, burrows into the wall and erodes it. This will be seen in the figures accompanying a recent paper by Hoff.[1] According to Werth, rupture occurred in forty-five of his hundred collected cases. The fourth and fifth months are the most usual time for this occurrence, but quite a number occurred earlier, and a few even later than that time. In the cases in which rupture occurs it will be found that the clinical features usually resemble those found in extra-uterine pregnancy, described under Group 2—recurrent attacks of abdominal pain, tenderness, faintings, often vaginal discharge, and expulsion of the decidual from the normal uterine horn. In some cases the rupture and collapse occur suddenly without any premonitory symptoms, such cases being comparable to those belonging to Group 1.

In quite a number of cases, however, the pregnancy continues to term. In this country Galabin,[2] Targett,[3] Murdoch Cameron,[4] Bland-Sutton,[5] and Roberts[6] have recorded such cases, and there are a considerable number recorded by different foreign writers. In these cases the striking clinical fact is that there were so generally attacks of abdominal pain and vaginal hæmorrhage, etc., during pregnancy. Late in pregnancy, often about the time labour was expected, a 'spurious labour' occurred in many of the cases.

A fœtus retained after its death may undergo all the changes that have been described already in connexion with extra-uterine pregnancy.

Of the rare complications which are associated with a gravid rudimentary horn may be mentioned torsion of the pedicle, prolapse of the tumour behind the uterus, and infection of the sac.

The condition is theoretically not difficult of diagnosis, but in practice it is comparatively seldom that it is fully appreciated before the abdomen is opened. Extra-uterine pregnancy is the usual diagnosis. Targett, Bland-Sutton, and a few others, recognized the condition exactly before operation. The position of the round ligament and the separation of the tumour from the uterus are important features, especially in the early months, but later the sac is so large that these landmarks are often difficult to distinguish.

[1] *Archiv f. Gyn.*, Bd. lxxx., Heft ii., p. 352.
[2] Trans. Lond. Obst. Soc., vol. xxxvii., p. 225.
[3] *Ibid.*, vol. xlii., p. 276.
[4] *Journ. Obst. and Gyn. Brit. Empire*, vol. i., p. 67.
[5] Trans. Lond. Obst. Soc., vol. xliv., p. 316.
[6] *Journ. Obst. and Gyn. Brit. Empire*, December, 1906.

In the early months an interstitial ectopic pregnancy is somewhat similar, only in that condition the tumour and uterus form one body. Later in pregnancy, when the gravid horn is of large size, the latter may be mistaken for the pregnant uterus, and the non-gravid normal horn mistaken for a myoma or an ovarian tumour. In such cases of difficulty the uterine sound, employed with great caution, may be of assistance in coming to a conclusion regarding the exact nature of the condition.

The treatment of this condition is to remove the gravid horn. In two cases recorded by Doran[1] normal pregnancy has occurred in the horn left. In most cases the removal of the gravid horn is not difficult. The ovarian vessels are ligatured in the infundibulo-pelvic ligament, and then the band connecting the horn with the other half of the uterus is secured. Special care must be taken in ligating the latter, for there may be very free bleeding if it is not carefully tied.

But not infrequently adhesions to the surrounding parts exist, so that, as in Targett's and Bland-Sutton's cases, considerable difficulty may be experienced in separating them and in securing all the bleeding points.

It may occasionally happen that the association of the sac and the other horn of the uterus is so intimate that total extirpation is deemed advisable.

Should it be suspected that the contents of the sac are septic, and should it be found, when the abdomen is opened, that the sac wall has very intimate connexions with the surrounding structures, it is well not to try and extirpate the sac, but to open it from the vagina and empty and drain it for some time. The sac may be removed later.

If it is quite impossible to remove the sac—a very rare contingency to judge by recorded cases—the sac may be emptied from the abdomen, and the Fallopian tube belonging to the rudimentary horn removed, or divided and ligatured, so as to prevent the horn again becoming gravid. Cameron pursued this course in his case. He took the further precaution of packing the cavity, and bringing out the gauze through the vaginal vault.[2]

[1] *Journ. Obst. and Gyn. Brit. Empire*, June, 1906, vol. ix., p. 448.

[2] As it would serve no practical purpose, I have purposely desisted from considering cases of repeated ectopic pregnancy, pregnancy in both tubes, plural pregnancy in one tube, and of coexisting tubal and uterine pregnancy. I have, however, detailed in connexion with my case of ovarian pregnancy the unique condition existing in this case—viz., a coexisting ovarian and uterine pregnancy.

CHAPTER XXXIII

PLACENTA PRÆVIA—ACCIDENTAL HÆMORRHAGE

By placenta prævia is meant an implantation of part of the placenta over the lower uterine segment. The complication is very serious, as, owing to the situation, separation of it must take place before the child is born. This fact led Rigby to term the bleeding that occurs 'unavoidable hæmorrhage.'

Until Portal in 1685, but more especially Schacher in 1709, clearly described the anatomical relationship of placenta to uterus, it was believed that the condition was produced by separation and prolapse of the placenta. Schacher demonstrated, on the dead body of a woman with placenta prævia, the exact relationship of the placenta to the uterus. Since then the teaching has been that the condition arises from the ovum becoming attached low down, and, as it grows, coming to cover the os or project down towards it. The illustration (Fig. 261), from a specimen of William Hunter's in the Hunterian Museum, shows this low implantation very well. It is generally supposed that this low implantation is the result of the uterine cavity being enlarged, and the endometrium being the seat of an old-standing inflammation which does not permit of the ovum implanting itself so readily on the surface. In support of such a view there is the fact that the complication is found to occur more frequently in multiparæ than in primiparæ, and that in many cases of the complication a history of old-standing uterine trouble may be elicited.

In the Glasgow Maternity Hospital the proportion of primiparæ and multiparæ was 1 to 26; in Strassman's[1] recent figures it was 1 to 5. The tendency to placenta prævia increases with each pregnancy, and especially is it liable to occur when the pregnancies occur in rapid succession. It has also been suggested that the low implantation may sometimes be the result of low implantation of the tubes, or of impregnation occurring when the ovum is just about to escape from the uterus. As, however, we do not yet know where the

[1] *Archiv f. Gyn.*, Bd. lxvii., p. 112.

meeting-place of the ovum and spermatozoa normally is, these suggestions are pure speculations. So also is the view that the covering of the ovum is altered, and that it does not ingraft itself until it reaches the lower part of the uterus.

Occasionally the placenta becomes prævia purely by reason of its size. Thus, placenta prævia occurs oftener with plural than with

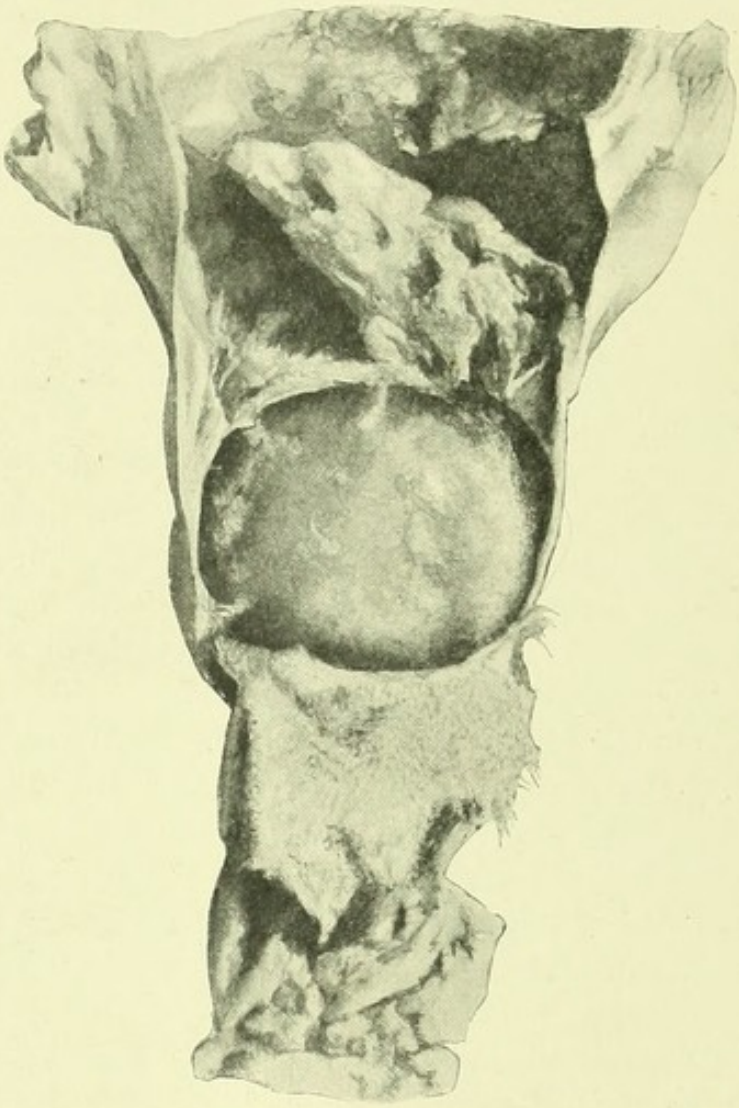


Fig. 261.—Implantation of the Ovum over Os Internum. (Hunterian Museum, Glasgow University.)

single pregnancies. In my forty cases it occurred twice. Strassman in 231 cases found it fifteen times.

But one not infrequently finds an unusually large placenta apart altogether from plural pregnancy. Strassman explains this by saying that there is a defective blood-supply, and in consequence the placenta must become large to cope with the demands of the fœtus; but does this explanation not beg the question?

In recent times the theory advanced by Hofmeier[1] and confirmed

[1] 'Die Menchliche Placenta,' Wiesbaden, 1890.

by Kaltenbach, that the condition arises from a development of placenta from the decidua reflexa, which, as pregnancy advances, comes to cover the os internum, has met with considerable support. There are now a sufficient number of specimens confirming this view, and compelling one to admit that sometimes that is the manner in which the placenta prævia occurs. In most cases, however, the low implantation is present from the first. This is apparent in Webster's[1] specimens, which were shown in support of Hofmeier's and Kaltenbach's views.

The frequency of placenta prævia in the Glasgow Maternity Hospital has been 1 in 300 cases; but naturally the percentage is higher in hospital practice, for the complicated cases tend to

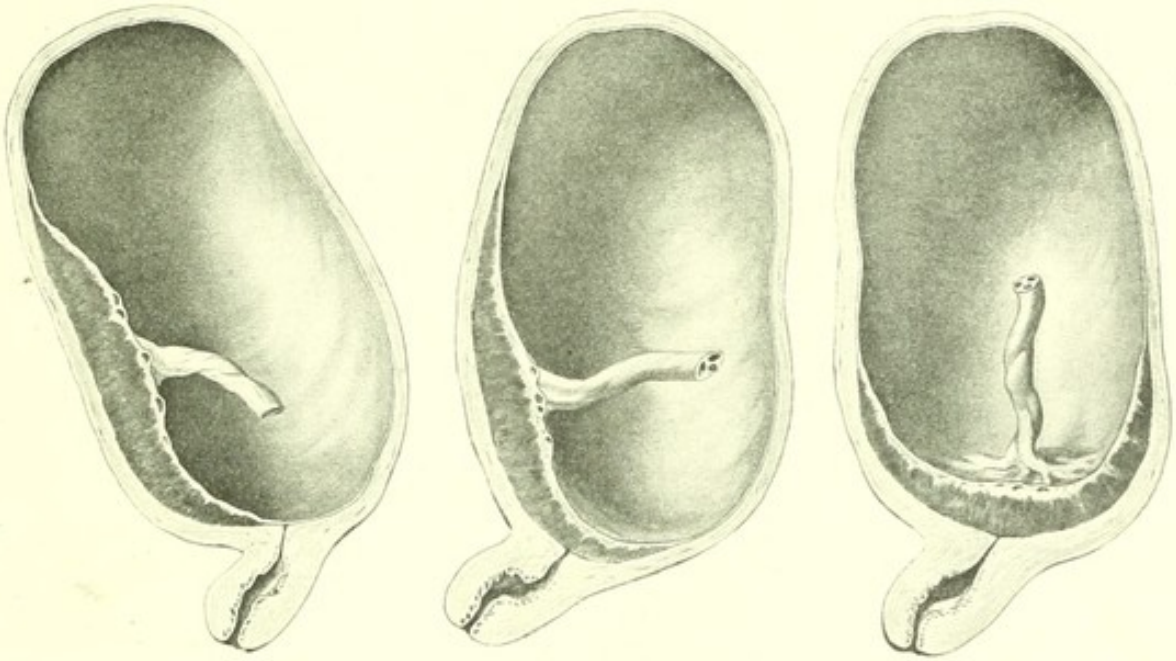


Fig. 262.—Showing the Different Varieties of Placenta Prævia.

gravitate there. Hofmeier puts it at 1 in 500 to 600; Strassman,[2] for the Berlin Charité, found it 1 in 220 for the Klinik and 1 in 300 for the Poliklinik.

The extent of the implantation varies greatly, so that it is customary to divide examples of this complication into a central or complete, a marginal, and a lateral variety, according as the placenta completely covers the os internum, reaches up to its margin, or dips into the lower uterine segment. This will be clearly understood from the illustration (Fig. 262). In almost all cases of central implantation the placenta is attached more to one side of the uterus than the other; very rarely does the middle of the placenta correspond

[1] Webster, 'Text-book of Obstetrics,' 1903, p. 543.

[2] Winckel's 'Handbuch,' Bd. ii., Teil ii., p. 1202.

FIG. 263.—Complete or Central Placenta Prævia.
(Photographed from Van Rymsdyk's drawing in the Hunterian Museum, Glasgow University.)

exactly to the os internum (Fig. 263). Again, as dilatation occurs in a case where only a small portion of the placenta covers the os, this

small part becomes separated, and feels to the examining finger like a tongue hanging over, or projecting into, the cervix. It was originally, nevertheless, an example of the central or complete variety. There are objections to all classifications, but, as it is almost necessary to have a classification, I think the one given is as good as any other.

Clinical Features and Diagnosis.

The condition first makes itself known by hæmorrhage. The bleeding may occur without warning when the woman is at rest, although it often follows straining efforts, such as straining at stool, lifting weights, or after severe fits of coughing, sneezing, etc. As a rule, the first hæmorrhage occurs during the last ten weeks of pregnancy, but sometimes not until term. Occasionally it manifests itself very early, as can be judged from the accompanying table.

Table to show Time of Onset of Hæmorrhage in Placenta Prævia.

Month.	Pinard.	Doranth (Klinik Chrobak).
	Cases.	Cases.
First	25	4
Second	11	4
Third	18	5
Fourth	7	4
Fifth	10	5
Sixth	27	14
Seventh	23	17
Eighth	20	40
Ninth	—	40
Tenth	—	21
Term	11	43
Commencement of labour	17	—
Total	169	197

Not a few abortions are the result of the condition. As regards this, Strassman gives the following figures: Abortion, 18 per cent.; premature birth, 42 per cent.; full-time birth, 39 per cent.

The blood comes, of course, from the portion of the uterine surface from which the placenta is detached, and, to a very slight extent, from the separated portion of placenta. In addition, on one or two occasions very profuse bleeding has occurred from rupture of the circular sinus of the placenta (Fig. 264). Matthews Duncan[1]

[1] 'Mechanism of Natural and Morbid Parturition,' 1875, p. 387.

refers to this specially. Budin[1] has reported several cases of this nature.

Hæmorrhage occurring during labour is easily understood; the os as it dilates, and the lower uterine segment as it develops, bring about the separation of the placenta. When hæmorrhage occurs during pregnancy, the explanation is that the bleeding is produced

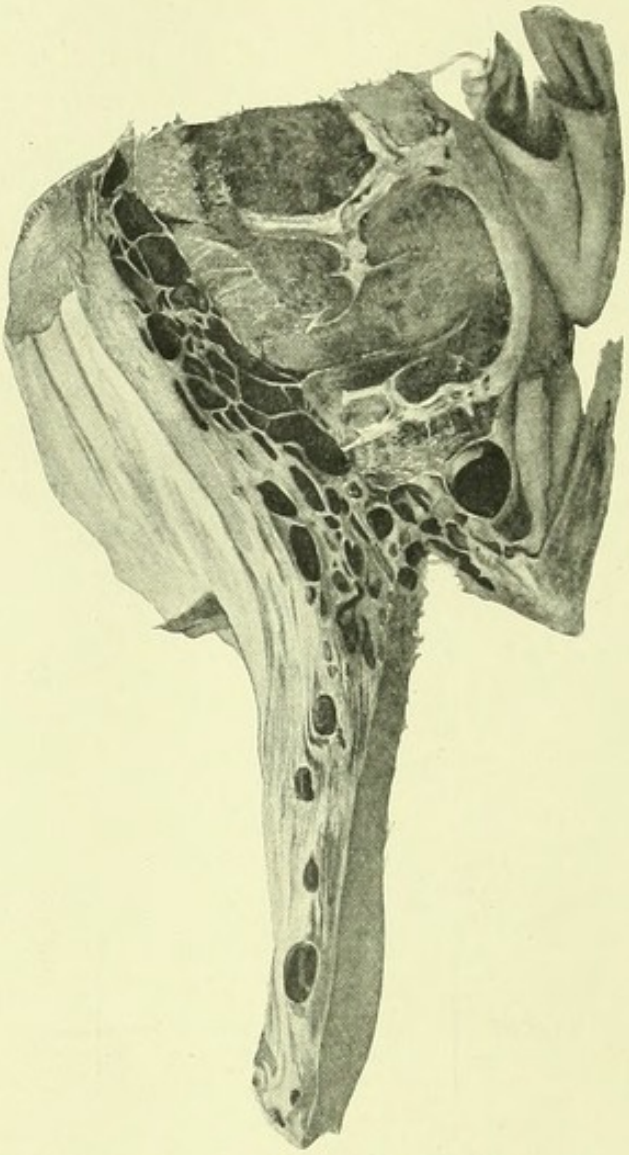


Fig. 264.—Showing Portion of Uterine Wall and Attached Placenta.
The circular sinus is very distinctly seen. (Drawing from a specimen in the Hunterian Museum, Glasgow University.)

by the same conditions that bring about 'accidental hæmorrhage.' That this is probably the correct explanation is supported by the fact that both varieties of hæmorrhage result from similar diseased conditions of the uterus. In this connexion one must not forget that, besides the active and rapid development of the lower uterine segment which occurs during labour, there is a slow increase of the

[1] *Société d'Obstét. et Gyn.*, June, 1893.

segment in the later weeks of pregnancy. Von Franqué found the upper limit of the lower segment from the second to the fourth months 2·5 centimetres, from the fifth to the sixth months 4 centimetres, and from the seventh to the tenth months 6 centimetres, above the os internum.

At the first attack the bleeding is often slight, so that assistance is unfortunately not requested until several attacks have occurred. Recurrent attacks of hæmorrhage, becoming gradually more severe, is the usual history.

Although one would expect the central variety to be associated with earlier and more severe hæmorrhages than the lateral, this is not always so. On several occasions I have observed cases of central attachment where term was reached, and no bleeding occurred until labour actually commenced. This has been frequently remarked. Naturally, in cases of the lateral variety there is often no bleeding until labour occurs.

In some few cases of central attachment the placenta has been expelled before the child, and in one or two the child has been born through the placenta. These are extremely rare occurrences, for usually uterine action is not very strong, and the profuse bleeding leads to collapse of the woman and inhibition of the uterine contractions.

Placenta prævia is not, as a rule, difficult of diagnosis; indeed, the only other condition which really resembles it is accidental hæmorrhage. It should always be suspected with any hæmorrhage during pregnancy, especially during the later weeks. On two occasions I have been able, by abdominal palpation, to recognize a placenta situated in the antero-lateral wall. The head in the lower pole of the uterus could be made out on one side, but on the other was obscurely felt as if through a doughy swelling. Palpation of the placenta, however, is seldom possible, and it is questionable in these two cases if I would have recognized the abnormal position of the placenta had my attention not been arrested by the hæmorrhage.

In coming to a diagnosis one must depend on the vaginal examination, and actually feel the placenta with the examining fingers. If one feels the placenta one calls the condition placenta prævia, if one does not feel it one diagnoses it accidental hæmorrhage. If the os is sufficiently dilated to allow of the finger being passed through—and that is usually the case—the placenta is easily recognized, for almost the only thing that can be mistaken for it is blood-clot. The latter is soft, smooth, and breaks up under the pressure of the finger, while the placenta feels firm and rough. I once saw a case of hydatidiform mole, in which the ragged mass, which was felt through

the cervix with the tip of the examining finger, exactly resembled a placenta. I could also conceive of a submucous myoma such as the one figured on page 134 resembling the placenta. The cases in which difficulty is found are the lateral forms, for sometimes, with them, only a very small portion of the placenta dips into the lower uterine segment, and cannot be reached by the examining finger unless the hand is introduced into the vagina and the finger is pushed well into the uterus. Not a few of these cases are never recognized; bleeding occurs, but with the separation of the small portion of the placenta attached to the lower segment it soon ceases, and the child is born. If the membranes are examined after birth, it will be found that the rent is close to the margin of the placenta.

It is generally stated that the vault of the vagina feels boggy, that there is difficulty in making out the presenting part through the placenta, and that ballottement is more difficult to appreciate. In cases of central implantation all that is quite true; but in many cases of lateral and marginal implantation these features are not apparent; it is only by getting a finger in through the os internum and feeling a portion of placenta that one can make sure of the condition.

According to the extent of the bleeding will be the degree of collapse. The symptoms of such a condition are small, rapid pulse, clammy sweats, with, in extreme cases, dimness of vision, air hunger, faintings, convulsions, etc.

I have already said the first attack of bleeding is usually not excessive; indeed, so slight is it sometimes that the woman does not give any information regarding it. But there are many exceptions to this rule, and Edgar[1] has reported a case where death followed the first attack of hæmorrhage at the fourth month of pregnancy.

Prognosis for Mother and Child.

The prognosis for both mother and child is serious, and is most serious with the central variety. As regards the mother, in the Maternity Hospital our mortality has been about 10 per cent. for some years. If all care is taken against septic infection, and the delivery of the child is not unreasonably hurried, the mortality should not rise above 8 per cent. Amongst the very poor, however, where the surroundings are unfavourable for operating, and where the women are ignorant and delay sending for assistance, and are first of all attended by dirty 'handy-women,' the mortality will always be greater. But apart from the actual mortality, the morbidity is

[1] 'Practice of Obstetrics,' 1903, p. 230.

naturally high; tears of the cervix, cellulitis, and later phlegmasia alba dolens, are not infrequent, while profound anæmia and general debility are occasional late complications.

As regards the children, the results are very much more unfavourable. In great part this is due to the fact that the children are born prematurely. Taking my list of 40 cases, this was so in fully 60 per cent. The method of treatment employed is another most important factor in the prognosis. Next to the age of the fœtus the fœtal mortality is most affected by the treatment employed. In this connexion we shall see that the lives of mother and child are often antagonistic. Take, for example, accouchement forcé and version. The former gives the best fœtal results, but the worst maternal; while the latter gives better maternal results, but worse fœtal. With this complication, therefore, we must not be too concerned about the child. The child must always be given its proper place if it is mature, but we must never risk the mother's life unduly, especially if the child is premature.

The outlook is infinitely more serious for the child with a central than with a marginal or lateral variety, for with the former so much of the placenta becomes separated in the progress of the delivery.

Treatment.

It is interesting to remember that it was in this complication Guillemeau recommended podalic version, and that by such a treatment he saved the daughter of Ambrose Paré, the master who had taught him the new method of turning. This was the first really scientific treatment of the condition, and it was followed and amplified by Mauriceau and others. But accouchement forcé fell into disfavour, for the results were not satisfactory, and there was a return to the old treatment of removing the placenta.

Gradually it came to be appreciated that rupture of the membranes or version without forcible extraction was sufficient to arrest the bleeding. As regards the treatment by simply rupturing the membranes, this was recommended by Siegemundin,[1] who was born about 100 years before Puzos, so that the latter's claim to priority cannot be admitted.

Of modern advances in the treatment of this condition the most important resulted from bipolar version, described by Braxton Hicks some fifty years ago. By this method forcible dilatation of the cervix prior to turning, with all its dangers, became unnecessary.

[1] Siebold, 'Versuch einer Geschichte der Geburtshülfe,' Bd. ii., p. 203, Berlin, 1845.

Somewhat later hydrostatic dilators began to be employed, and amongst the first to advocate and employ them was Pinard. In recent years they have been steadily gaining in favour.

But in considering the history of the treatment of placenta prævia, we must never forget the great service rendered by Barnes, who recommended partial separation of the placenta, separation from what he termed the 'dangerous zone,' which later investigations have proved to be the lower uterine segment. Neither should we forget the extraordinary mistake made by Sir James Y. Simpson, of believing that the blood came from the separated placenta, and that, consequently, the treatment for the condition was to remove the placenta.[1]

Before Onset of Labour.—In considering the modern treatment of placenta prævia, the first question that naturally arises is that of expectant treatment. Is one justified in temporizing when one knows one is dealing with a case of placenta prævia? Personally, I have no sympathy with such a treatment in private practice, for I have repeatedly seen how unsatisfactory, dangerous, and even fatal it may be. Only if a skilled medical attendant is living under the same roof, and in constant attendance—as, for example, in a large maternity hospital—should such treatment be considered, and even then I am not in favour of it, because I believe it to be a wrong attitude to assume towards the complication. When a placenta prævia has been diagnosed, the uterus should be emptied. I am quite aware others, including Pinard and many distinguished obstetricians, take up a different position, and prescribe rest, sedatives, and hot douches until the child is viable.

Having considered the question of temporizing, and believing that the only safety to the mother is in emptying the uterus, let us consider the means at our disposal for bringing about the delivery of the child. Now, it is at once apparent that the ease or difficulty with which this can be accomplished will depend largely upon the condition of the cervix, and whether or not labour is in progress. At present, and, indeed, for a quarter of a century, the routine treatment in this, as in many other countries, has been the vaginal tampon (Fig. 265), when the cervix did not permit of bipolar version after the manner of Braxton Hicks, and whenever the cervix did permit of bipolar version, the carrying out of that manœuvre. For many years I have employed these methods of treatment in private and hospital practice, and been, upon the whole, well satisfied with the results.

At the present time many obstetricians in England, Germany, France, Italy, etc., are opposed to the tampon, as they believe it

[1] 'Obstetric Works,' vol. i., p. 68.

possesses many disadvantages. In the first place, they say it does not always arrest the bleeding, although they admit that it does so usually if the membranes are still unruptured. They object to it, in the second place, because it does not always bring on labour, and so has to be repeated; and, in the third place, because there is a

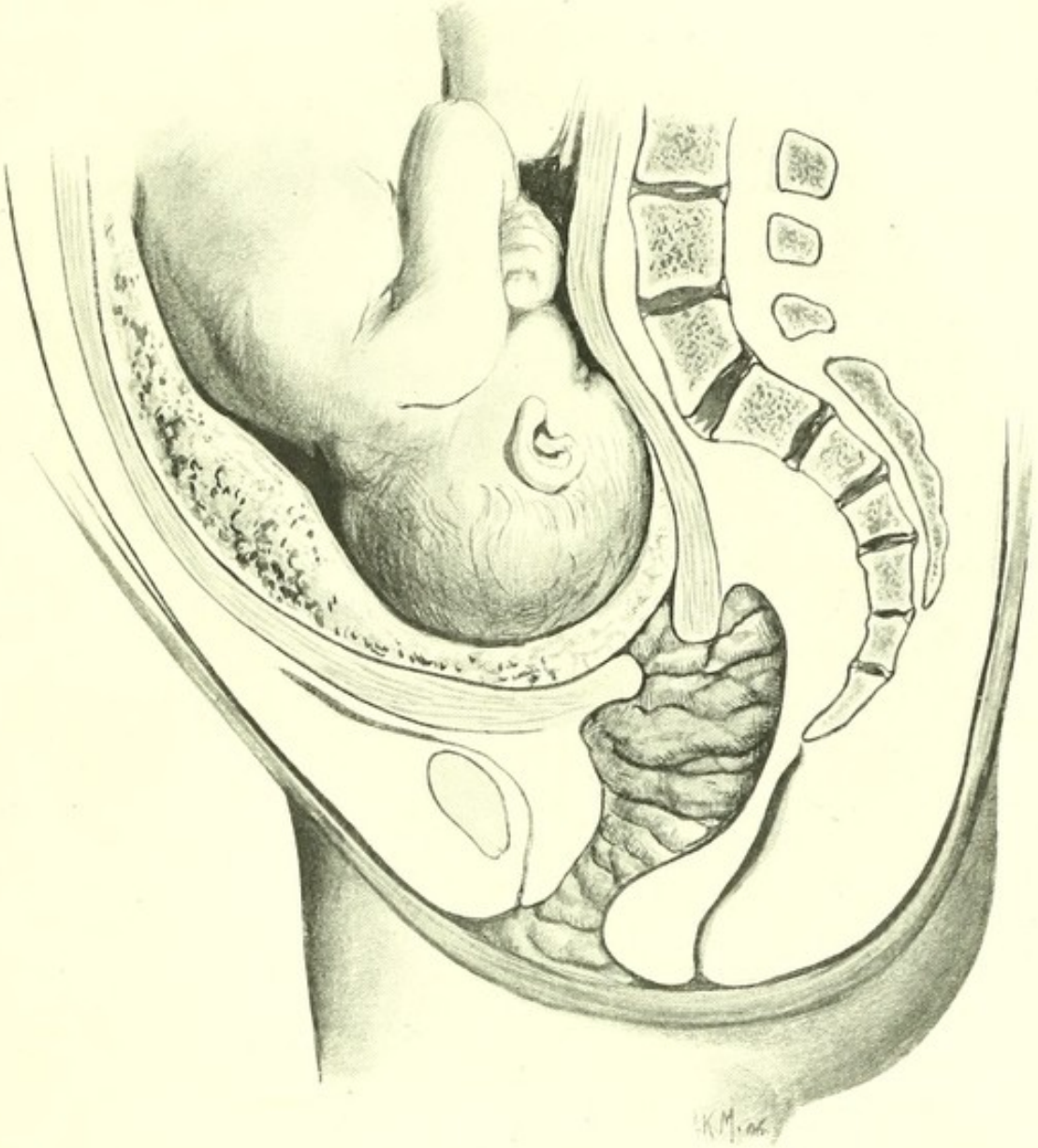


Fig. 265.—Cervical and Vaginal Tampon in Placenta Prævia.

considerable risk of infection, no matter how carefully it is employed. They would make use of the tampon only in cases of emergency, as, for example, when preparations are not complete for delivery, or the patient has to be removed to a hospital or nursing-home. Taking a few writers, one finds Pinard disapproves of it, and gave up employ-

ing it as far back as 1885. The late Varnier was also opposed to it; Nagel and Strassman condemn it. But Herman, Eden, Hofmeier, Edgar, and Williams, recommend it employed properly. *In theory I am in entire agreement with those who are opposed to the tampon, but for ordinary domestic practice I believe it is the best treatment when bleeding has to be arrested before labour has begun, and when the cervix is not taken up; but both cervix and vagina must be plugged.*

What is the alternative treatment to the tampon when the cervix is undilated? There are two courses one may pursue: (*a*) Rupture of the membranes; (*b*) partial dilatation, followed by bipolar version, or the introduction of a Champetier de Ribes or some other metreurynter.

As we have seen already, simple rupture of the membranes is an old method of treatment. Puzos advocated it towards the end of the eighteenth century, and Siegemundin suggested it, if she did not practice it, nearly a century earlier. The objection usually raised to the treatment is that not infrequently it does not completely arrest the hæmorrhage; and that if it is insufficient and the bleeding continues, one is very awkwardly placed, for plugging is valueless after rupturing the membranes, and version is difficult or impossible, as the waters have drained away. Within recent years, however, the introduction of the various rubber bags has greatly altered matters, for supposing hæmorrhage does continue after rupture of the membranes, a Champetier de Ribes bag or some other metreurynter may be introduced.[1]

Naturally it will be asked, Is the cervix ever so rigid that it is impossible to introduce two fingers, perform version, or insert a metreurynter? In my experience it is sometimes most difficult to get the cervix dilated sufficiently. I admit such cases are not numerous, for the hæmorrhage always brings about a degree of softening and dilatation; still, they may be encountered. My advice, therefore, is in all cases, Try if the cervix will dilate before rupturing the membranes. If it is dilatable, they may with safety be ruptured, for one has the metreurynter in reserve; but if the cervix is not dilatable, the safest course is to plug the cervix and vagina.

When the Cervix is Dilated or Dilatable.—When the cervix is dilated or dilatable to the extent of permitting two fingers being passed through it, I feel convinced that the general practitioner will

[1] If labour has advanced considerably by the time the patient comes under treatment, rupture of the membranes is quite sufficient if the placenta is lateral, or even marginal. In such cases the pressure of the head arrests the bleeding. Besides, by this treatment one will save most children, for when the os is fully dilated one can, if necessary, deliver with forceps.

be well advised to continue the treatment which has been most favoured during the last thirty years—viz., version according to the manner of Braxton Hicks (Fig. 266).

When the cervix is dilated to any extent, version is an easy matter.

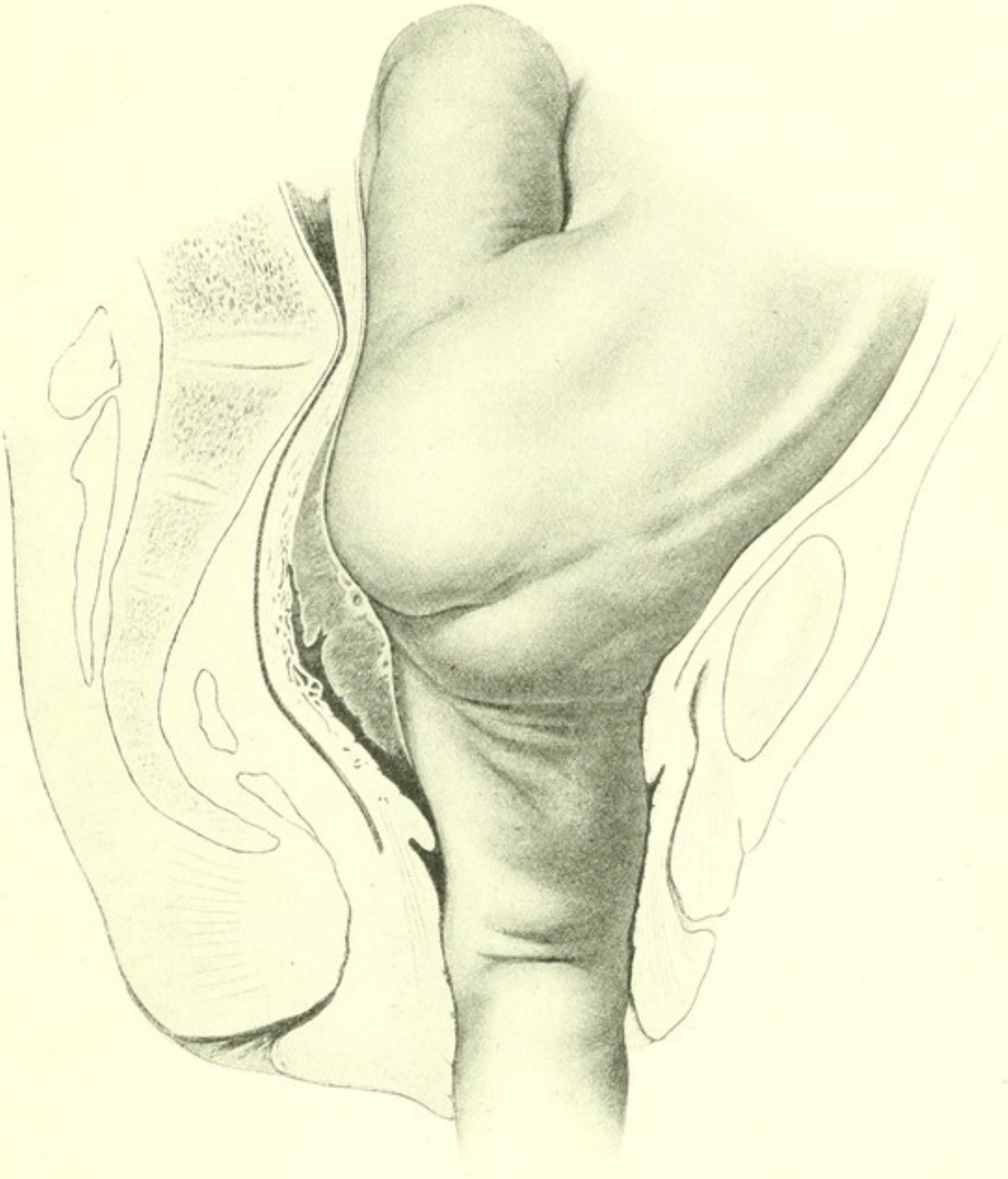


Fig. 266.—Bipolar Version in Placenta Prævia. (Bumm.)

Personally, I have found it an advantage to perform external version, and then seize hold of a foot when the child has been turned. I find Strassman and several other writers recommend this. In most cases I have found external version easy, but if after one or two

attempts it is impossible, then the ordinary method of bipolar version must be employed. When rupturing the membranes, this should be done to the side of the placenta; but in some cases of central or complete placenta prævia this is not possible, for the edge cannot be reached. In such cases the fingers should be pushed through the placental tissues. The foot having been seized and brought down in the manner described (p. 330), a loop of gauze should be attached to it, so that slight traction may occasionally be applied to it should it be deemed necessary. It is of the greatest importance that no attempts at hurried extraction of the child be made. The child's thigh and breech must be pushed through the cervix by the uterine contractions, not dragged through, otherwise serious laceration of the cervix and great difficulty with the arms and after-coming head may result. Should the uterine contractions be feeble and infrequent, occasional traction on the limb may be indulged in, but only with the object of stimulating uterine action.

By this method the bleeding, in my experience, has always been arrested. It is not surprising, therefore, that so many operators favour this treatment, and that the results obtained from it should be so satisfactory. In my hospital and private practice during the years 1901 to 1906 I have had forty cases with a maternal mortality of 7·5 per cent. Nagel[1] had forty-two consecutive cases without a death, Hofmeier thirty-seven cases with one death, and there are many others showing a mortality of only 4·5 per cent. or 6 per cent. Whenever attempts at dilatation and rapid extraction are made with the object of improving the fœtal mortality, the maternal is at once raised, and that is the reason why my results show a higher death-rate. This also explains Klien's figures for the Chrobak Klinik in Vienna, where there was a maternal mortality of 9·4 per cent. Olshausen, Leopold, and Noble, all emphasize this point, and Strassman, in his most excellent monograph, shows by his figures that extraction improves the prognosis for the child by 28·5 per cent., but makes it worse for the mother by 11·4 per cent. As regards the mother, then, I am convinced that, taking everything into consideration, bipolar version is the safest and best treatment for the general practitioner. Strassman says it continues to be the simplest and safest, and Bumm,[2] Zweifel,[3] and most English obstetricians are of the same opinion.

The disappointing feature about version is that the fœtal mortality is so high.

[1] 'Operative Geburtshülfe,' 1902.

[2] 'Grundriss Studium der Geburtshülfe,' 1902, p. 603.

[3] *Münch. Med. Woch.*, 1907, Nr. 48.

TOTAL CASES OF PLACENTA PRÆVIA IN MY HOSPITAL AND PRIVATE PRACTICE, 1901-1906—FORTY CASES IN ALL.

	Relative Percentages.	Maternal Deaths.	Total Fœtal Deaths.	Fœtus macerated.
Central ...	42 per cent.	1) 7·5 per cent.	66 per cent.	—
Marginal ...	21 ,,	1)	50 ,,	3·75 per cent.
Lateral ...	36 ,,	1)	41 ,,	—

There were two cases of twins; in one case both children were born alive, in the other both were born dead. In 75 per cent. of cases bipolar version was the treatment; in four Champetier de Ribes bags were inserted, and in four accouchement forcé was employed. I have not given the fœtal mortality from the point of view of the particular treatment employed, because there are too few cases to go on, but I would say this, that the worst results followed accouchement forcé. To all intents and purposes, therefore, the figures here given represent the results from bipolar version. My results in forty cases show a fœtal mortality of 52 per cent. Of recent writers who favour version may be mentioned Sonnenfeld,[1] who gives his fœtal mortality as 62 per cent., and Berger and Graf,[2] who give a fœtal mortality for Schauta's Klinik in Vienna of 54·9 per cent.

It is owing to the fact that the fœtal mortality is so very high—not because of the maternal mortality, which can hardly be improved upon—that other modes of treatment than version have been advocated. The first we will consider is the comparatively recent treatment with the metreurynter (Fig. 267). It is not of much importance which of the various forms of this instrument is employed, but in speaking of it and describing how it is introduced (p. 460) I have indicated a preference for the one devised by Champetier de Ribes. Used in cases of placenta prævia, this instrument compresses the placenta against the uterine wall and so arrests the hæmorrhage, and, at the same time, dilates the cervix and allows of the easy expulsion of the child afterwards. It must, of course, be introduced after the membranes are ruptured; for if, as has sometimes been done, the bag is pushed in against the unruptured membranes, the result must be that more of the placenta is stripped off. Zimmermann[3] recommends maintaining the membranes intact; I feel sure this is unwise.

At the present moment it is impossible to give a decided opinion

[1] *Monat. f. Geb. u. Gyn.*, 1904, Bd. xx., p. 1096.
[2] *Ibid.*, January, 1907, Bd. xxv., p. 49.
[3] *Ibid.*, 1902, Bd. xvi., p. 37.

regarding the metreurynter. Hofmeier, Strassman, and Nagel are satisfied it has not reduced the fœtal mortality to any very great extent, but other equally distinguished writers hold the opposite view. Without doubt Pinard's results are very good, for with rupture of

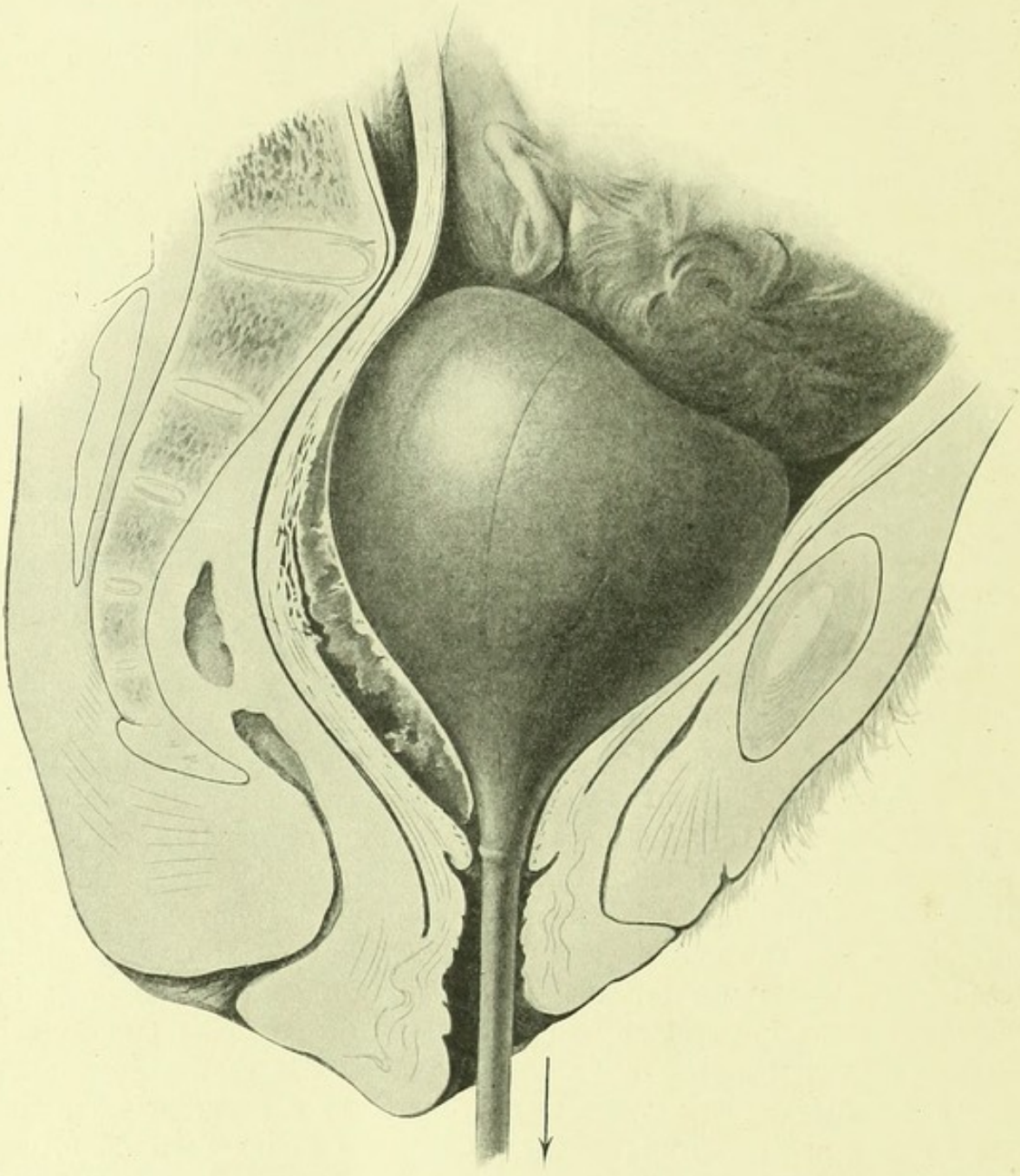


Fig. 267.—Metreurynter in Placenta Prævia. (Bumm.)

the membranes and the metreurynter the fœtal mortality was 31 per cent. Zimmermann gives for 116 cases a maternal mortality of 5 per cent. and a fœtal of 37 per cent. Reetmann,[1] for Greiswald Klinik, in nineteen cases gives a fœtal mortality of 37 per cent., but in

[1] *Cent. f. Gyn.*, 1904, p. 1369.

the six cases treated by bipolar version there were no fœtal or maternal deaths. I am fully satisfied that for hospital practice, or where the conditions are favourable in private practice, the metreurynter is most suitable, and gives the best results as regards the child, and I feel certain it will increase in favour in succeeding years.

As regards the dangers of this method of treatment I need say little. There are all the ordinary dangers attendant upon all forms of treatment in placenta prævia—infection, laceration of cervix, etc. Lea, Braun von Fernwald, and others, have recorded cases of rupture of the uterus, and Strassman has pointed out that after the expulsion of the metreurynter there may be a very profuse discharge of blood. On several occasions the metreurynter has burst, but that accident should not happen if the bag is tested beforehand (p. 460).

With the object of lowering the fœtal mortality still further, much more active and heroic methods of treatment have been suggested in recent years. Thus, forcible dilatation of the cervix, either by the fingers or by metal dilators, vaginal Cæsarean section, and even the classical Cæsarean section have been recommended.

Regarding accouchement forcé, however much I am inclined to question the wisdom of employing it in such a condition as placenta prævia, I must admit that some very striking results have been obtained by this treatment, both by those who have employed manual and metal dilatation. I know of no better results for placenta prævia than those given by Meuleman[1] for Treub's clinique. Forty-five cases were treated after Bonnaire's method of manual dilatation and extraction. In these forty-five cases the fœtal mortality was only 15·5 per cent., and the maternal 4·5 per cent. This treatment of manual dilatation is specially advocated by the Amsterdam school, of which Treub is the head. No doubt, practised with great care in hospital and by obstetric specialists, the dangers would be reduced to the minimum; but it is equally certain that the general practitioner, if he followed this line of treatment, would have a higher maternal mortality and morbidity because of the great danger of infection and laceration of the cervix during the extraction of the child. Still less can be said in favour of dilatation with expansile metal dilators.

But not only are there advocates at the present day for artificial dilatation, but there are even those who recommend vaginal and abdominal Cæsarean section for this condition.

Under no circumstance whatever is it conceivable that vaginal Cæsarean section is a suitable operation for placenta prævia in the later months of pregnancy. I dismiss, therefore, this treatment without

[1] Amsterdam, 1903; ref. *Cent. f. Gyn.*, 1904, p. 1054.

doing more than absolutely condemning it, and in writing so strongly I feel sure I have the support of all unprejudiced obstetricians.

Abdominal Cæsarean section, however, I place in quite another position. Suggested many years ago by Lawson Tait, it was received with derision. In recent years, however, there has been growing up a slowly increasing body of obstetricians who, while not inclined to advocate the treatment, are disposed *in certain exceptional cases* to adopt a less antagonistic attitude towards it than formerly. I admit I am one of this number. I have never performed the operation for placenta prævia, but in thinking over a large number of cases of this condition which have been under my care, I can remember two in which I now think it would have been the soundest treatment.

It is needless to say that the cases of placenta prævia in which such a radical operation as Cæsarean section is contemplated must be chosen with the very greatest care and judgment, and with a mind absolutely unbiased. Let us consider the cases that possibly might be suitable for this operation.

As we have seen, placenta prævia has a maternal mortality of 8 per cent., and a fœtal mortality of 50 to 60 per cent. The best figures give 4 per cent. and 35 per cent. respectively, and they are as low as one can ever expect to reach with the present recognized methods of treatment. Looking at the fœtal mortality, it must, I think, be admitted that, provided the pregnancy is at or near full time, Cæsarean section would undoubtedly be better for the child, for by means of it one could make sure of reducing the mortality to 5 per cent. or 7 per cent. at worst. We will dismiss the consideration of the child for the moment, and consider the mother.

Taking the cases of placenta prævia as a whole, better than 4 per cent. to 8 per cent. maternal mortality cannot possibly be attained by Cæsarean section ; but are there not certain cases where that mortality of 4 per cent. to 8 per cent., which is the best average, cannot be attained by the ordinary recognized methods of treatment, when, in other words, these treatments—version, etc.—would come to have much the same mortality as Cæsarean section? The cases which I refer to are old primiparæ, where the hæmorrhage occurs at full time and before labour has started, and where, to judge by the condition of the parturient canal and the size of the child, delivery would be tedious and difficult. I put the question in connexion with such cases—Is it not possible to get as low a mortality from Cæsarean section as from the recognized treatments in such cases, provided the women have not been interfered with and infected? It will be observed I do not say a 'lower,' but 'as low' a mortality. If the answer is in the affirmative, then in such cases Cæsarean section is the right treatment,

for there will be an enormously larger number of children saved. I leave the matter at this point. I trust I am not misunderstood. As I have said, I have never performed Cæsarean section for placenta prævia, and it may be that I never shall; but I am less antagonistic to it than I was, and I would not now condemn, as I once was inclined to do, those who would have recourse to the operation under the circumstances indicated.

Before leaving the subject of the treatment of placenta prævia, I must warn my readers to be always prepared for post-partum hæmorrhage. This hæmorrhage is said to occur because the placental site does not retract satisfactorily, situated as it is in a less actively contractile portion of the uterus. In my experience severe post-partum hæmorrhage rarely follows this variety of ante-partum hæmorrhage. Without doubt, if the more rapid methods of emptying the uterus come to be generally employed, post-partum hæmorrhage will be much more common.

ACCIDENTAL HÆMORRHAGE—ABLATIO PLACENTÆ.

By accidental hæmorrhage is meant hæmorrhage that results from the partial or complete detachment of a normally-situated placenta in the later weeks of pregnancy—say after the child is viable. The similar condition, prior to that time, is abortion.

The name 'accidental hæmorrhage' was given to the condition by Rigby, to distinguish it from 'unavoidable hæmorrhage,' the hæmorrhage from placenta prævia, which we have just considered. These two terms have been very generally employed since Rigby's time. There are, doubtless, certain objections, particularly to 'accidental hæmorrhage,' for it might be, and often is, understood as meaning hæmorrhage of any kind the result of an accident, whereas, as the definition says, it is hæmorrhage resulting from the detachment of a normally-situated placenta. But the terms, as far as one can judge, are likely to continue to be employed; at least, the recent attempt of Holmes[1] to call the condition of accidental hæmorrhage 'ablatio placentæ' has not met with much support.

The etiology of this complication may, with a few reservations, be said to be that of abortion. Frights, falls, injuries, and diseases of the various systems—nervous, digestive, etc.—furnish doubtless occasionally causes for the placental separation; but, without a diseased condition of the endometrium, it is surprising how harmless such disturbances are.

Without the least doubt, the great cause of 'accidental hæmorrhage,'

[1] *Amer. Journ. of Obst.*, 1901, xliv., p. 753.

as it is the great cause of abortion, is a chronic inflammatory condition of the uterine mucosa. Thus we meet with the complication most commonly in the poorer classes, in multiparæ, and in those who have suffered from uterine troubles.

In the severe cases of the disease which I have seen the general condition of the women has been most unsatisfactory; very often they have been ailing for some time, and many of them have been very decidedly anæmic. I have not often found them the subjects of chronic renal disease, although, of course, one often finds albumen present in the urine. Winter and many others have laid great stress upon this. Personally, I am inclined to think that the albuminuria often present is, in many cases, the result of the patient's general ill-health, and is not the cause of the condition.

How far actual disease of the placenta plays a part as an etiological factor in this complication it is impossible to state, seeing that the placental pathology is in such a confused state at present.

Clinical Features and Diagnosis.

This all-important complication presents itself in two distinct forms, according as the hæmorrhage escapes externally and is evident, or becomes pent up inside the uterus between the placenta or membranes and uterine wall, when it is spoken of as 'concealed,' a term given to the condition by Baudelocque.

The bleeding is at times so slight as to be almost negligible, at other times so profuse as to place the woman's life in the greatest jeopardy. The blood may come away quite bright red, but if retained for any length of time it is dark and coagulated, and sometimes is expelled in the form of large, flat clots. If at all profuse, labour comes on spontaneously, or the means employed to arrest the bleeding result in its onset. In slighter degrees one meets with recurrent attacks of bleeding, as in placenta prævia. Once or twice I have seen cases where, after a moderate degree of active bleeding, a dark brownish discharge continued until labour came on spontaneously or was induced.

I have said there are two distinct varieties; I should have added a third or a 'mixed' variety, which includes a large number of cases, where the bleeding is partly external and partly internal.

Both the apparent and concealed varieties are serious, but the concealed is especially so, as it is generally associated with a more diseased condition of the uterine wall, and is apt, from the absence of hæmorrhage, to be overlooked. Indeed, it is no exaggeration to say that it is one of the most serious complications of parturition. As

the different forms present features quite distinct, we shall consider them separately.

Apparent Accidental Hæmorrhage. — The bleeding, although often following some strain, stress, or injury, not infrequently comes

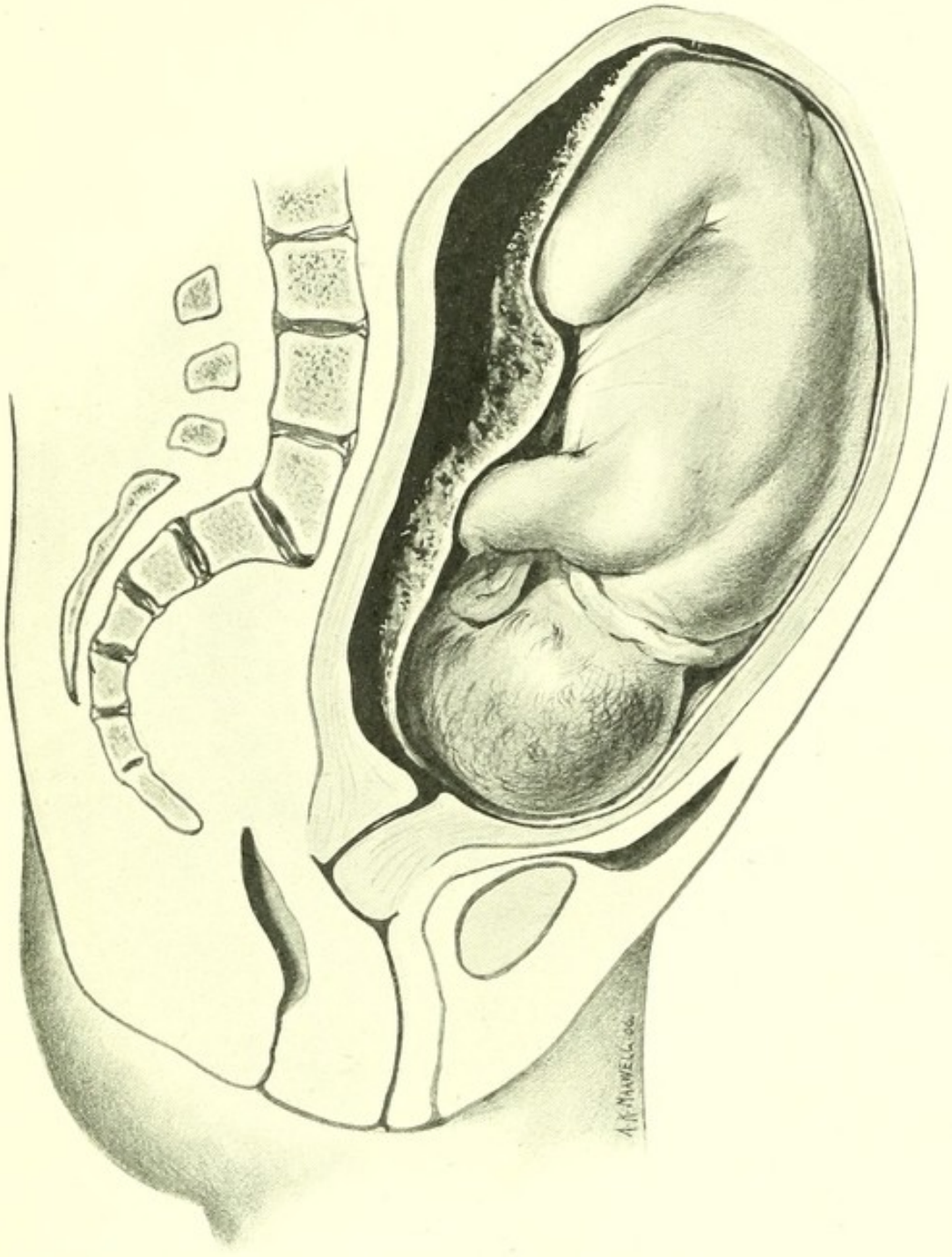


FIG. 268.—Accidental Hæmorrhage in which the Bleeding is partly Concealed and partly Apparent. Mixed Variety.

on without any exciting cause. The quantity of the hæmorrhage varies. Sometimes a feeling of weight and tension in the abdomen is complained of, but until labour comes on such discomforts are usually slight. Sensations such as feelings of faintness and sickness,

and evidences of anæmia, such as pallor, rapid pulse, etc., soon supervene if the hæmorrhage is at all profuse.

A diagnosis of the condition is not difficult, although it is by no means always easy to say whether or not in a particular case an internal as well as an external bleeding is going on (Fig. 268). I always conclude that there is a decided internal hæmorrhage if the anæmia and general symptoms are out of proportion to the amount of blood lost, and if there is decided uterine tenseness. It is of the greatest importance that these mixed forms should be recognized. In my experience they are very apt to be disregarded, for the medical attendant is apt to gauge the seriousness of the case by the amount of evident bleeding, whereas he must always gauge it by the general condition of the patient and the state of the uterus. Let me give a case in illustration :

Case of Accidental Hæmorrhage of the 'Mixed' Type not fully appreciated until the Parturient was extremely collapsed.—Some little time ago a patient, a 4-para, was admitted into my wards in the Maternity Hospital in a condition of extreme collapse. Early in the day she had sent for her medical attendant on account of some vaginal hæmorrhage which alarmed her. He, seeing that the hæmorrhage was only slight, advised absolute rest in bed, and prescribed some sedative to relieve the uterine pain. Later in the day he was again summoned to her because of her collapsed condition. There had been very little external bleeding in the interval. The doctor, of course, now diagnosed the nature of the condition—concealed accidental hæmorrhage—and immediately sent her into hospital.

So ill was the patient when she came under my care that I deemed it advisable to perform abdominal hysterectomy. She survived only a few hours. Behind the placenta and membranes there was a large quantity of coagulated blood, and even the uterine wall contained in its substance numerous and extensive hæmorrhages.

There is only one other condition that is likely to be mistaken for apparent accidental hæmorrhage, and that is the hæmorrhage that occurs from placenta prævia. Profuse bleeding from polypi, malignant tumours of the cervix, and from torn vaginal vessels, is extremely rare, and may be disregarded, although quite recently my house surgeon mistook a case of concealed accidental hæmorrhage, where there was a little external bleeding and the cervix was a little thickened, for a carcinoma of the cervix complicating pregnancy. As regards placenta prævia, the placenta can be felt, as a rule, by carefully sweeping the fingers round the lower uterine segment inside the os internum. Undoubtedly blood-clots may simulate the placenta very closely, but they are smoother on the surface and more friable. As we have seen when considering placenta prævia, a small portion of placenta attached to the lower segment may be overlooked very

easily, and there is not the least doubt that many cases of hæmorrhage are of this nature. Fortunately, treatment differs but little in the two conditions, and in carrying it out, as in performing version, one has an opportunity of making a more exact diagnosis. After delivery also, an examination of the placenta and membranes may give important information, for in placenta prævia the rupture in the membranes will be near the margin of the placenta, while in accidental hæmorrhage it will be some distance from it.

Concealed Accidental Hæmorrhage.—Turning now to the more serious form, the 'concealed,' one may find external bleeding entirely absent (Fig. 269). That, however, is very uncommon. In fifty cases in the Maternity Hospital, in the years 1901 to 1906, it was only noted four times. Colclough,[1] in his analysis of eighty-two cases in the Rotunda Hospital, found it in six cases, while Holmes in 200 collected cases found it forty-one times. Not infrequently, although there is no external bleeding, there is a serous discharge from the vagina.

It sometimes happens that one gets a history of the woman having had a sensation of something having given way, and this, especially when external bleeding is absent, may give rise to considerable uncertainty as to what exactly is the condition one has to deal with. Rupture of the uterus is the other complication that most naturally comes to one's mind, but rupture of the uterus during pregnancy or early in labour is very rare, although it does occur occasionally. Theoretically the rapidity and extent of the collapse, the sudden onset of pain, and the alteration in the outline of the abdominal swelling, would lead one to suspect rupture; but, as I shall show in Chapter XXXV., rupture may occur and yet these symptoms may not be present. In practice it may occasionally happen that the differential diagnosis of the two conditions is not easy. A subperitoneal hæmatoma referred to in Chapter XIII. (p. 208) may very closely resemble concealed accidental hæmorrhage. If the hæmatoma is of any size, it may be distinguished as a distinct tumour, although in some cases that has not been possible. *The all-important feature of concealed accidental hæmorrhage is tenseness and tenderness of the uterus.* In addition, there is collapse out of all proportion to the amount of blood lost.

The blood that becomes pent up in the uterus collects between the placenta and membranes and uterine wall. Occasionally one finds the whole placenta separated except at its margin, but at other times, and more commonly, some blood accumulates also behind the membranes. Very rarely indeed the effusion of blood ruptures into the amnionic cavity, and still more rarely does the uterine wall give way.

[1] *Journ. Obst. and Gyn. Brit. Empire*, 1902, vol. ii., p. 153.

As a result of the bleeding, there are all the symptoms characteristic of hæmorrhage and shock—pallor, faintness, cold, clammy sweats, and small, rapid pulse. The amount of collapse, however, is out of proportion to the quantity of blood effused, and is due, therefore, not

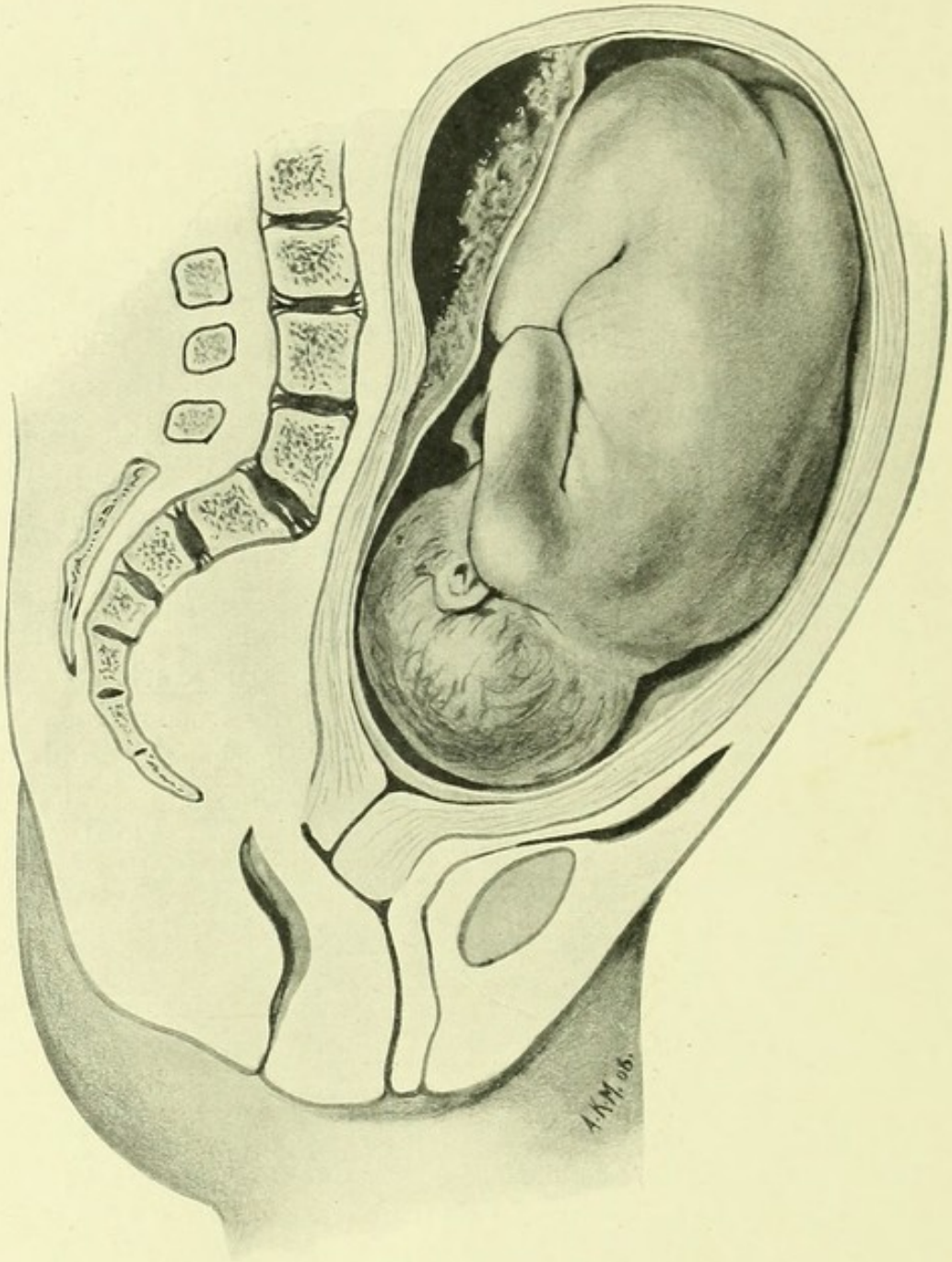


Fig. 269.—Concealed Accidental Hæmorrhage.

altogether to the anæmia, but also to the shock produced by the uterus being so tensely distended. In bad cases one always finds, in addition, extreme restlessness, great pain, distension, and tenderness of the abdomen. Sometimes the tenderness and distension are confined more especially to one part, where presumably the separated placenta is. On

palpating the uterus it is always found very hard and globular; personally I can never remember having found it boggy. It is, as a rule, impossible to make out the fœtal parts. By vaginal examination the membranes can be felt through the os more than usually tense.

Prognosis for Mother and Child.

In most of the cases where the hæmorrhage is slight the outlook is not serious. Whenever the bleeding is at all pronounced, however, and especially if it is concealed, the dangers to mother and child are very great. As regards the mother there is probably no complication, with the exception of rupture of the uterus, in which her life is placed in greater danger. Statistics are unreliable, for if the slight cases are included in a series, then the mortality will appear comparatively small. In the grave cases there is a mortality of 40 to 60 per cent.

As regards the children, unless the placental separation is very slight indeed, they always perish.

Treatment.

Before discussing such a contentious subject as the treatment of accidental hæmorrhage, let me remark that this complication is on quite a different footing as regards treatment to the other form of hæmorrhage which we have just considered—namely, placenta prævia. Accidental hæmorrhage almost invariably results in the death of the child, so that its life, except where the hæmorrhage is very slight, need not be considered. The treatment is entirely directed, therefore, to the saving of the mother.

As the clinical features and severity in the different varieties of accidental hæmorrhage differ, so also should the treatment. Let us first of all consider the cases where the hæmorrhage is apparent, and where, as far as can be judged from the clinical features, there is little concealed. All, I think, will agree that in the slight cases of this variety, which occur during labour in a uterus contracting satisfactorily, the simple procedure of rupturing the membranes is all that is required. It is not even necessary in most cases to perform version, which has the objection of complicating the delivery, and diminishing the chances of obtaining a living child, for in this variety one occasionally is fortunate enough in saving the child.

When the hæmorrhage occurs before labour has started, or only just at its commencement, the procedure to be followed is quite different. In such cases there are three distinct methods of treat-

ment: (*a*) Plugging the cervix and vagina; (*b*) rupturing the membranes; (*c*) dilating the cervix and extracting the child (accouchement forcé).

Treatment by Plugging.—In recent years in this country the treatment first initiated by Leroux, in 1776, of plugging the vagina has been revived, and has been very strongly recommended, more especially by the past and present masters of the Rotunda Hospital. In the discussion on this subject at the British Medical Association in 1904, Macan and Irish obstetricians, without a dissentient voice, supported this treatment, inaugurated some years previously in the Rotunda Hospital by Smyly. Certainly the results obtained by this method in the practice of the Rotunda Hospital have been of a highly satisfactory nature, as can be judged from the valuable paper on the subject by Calclough, in which he showed a mortality by the treatment of slightly under 5 per cent. At the same meeting Champneys supported the treatment in certain cases. Galabin also half-heartedly favoured it, but pointed out that in the old statistics of Sinclair and Johnston, of about fifty years ago, where the treatment was rupture of the membranes and acceleration of delivery, the mortality was only slightly greater.

In Germany, with the exception of Veit,[1] Hofmeir,[2] and Nagel,[3] there are few who favour the treatment by plugging; the same also applies to France and America. Amongst those who condemn the treatment may be mentioned Herman,[4] who writes: 'The only way in which it does good is by irritating the cervix, and so stimulating the uterus to contract; it is a clumsy and painful way of doing this.' Webster:[5] 'The tampon treatment is most pernicious; it has no scientific basis whatever, although it may have in a certain class of cases of placenta prævia.' Holmes:[6] 'The tampon should have no place in the treatment of ablatio placentæ.'

We have here, then, as in so many other conditions, two absolutely opposite opinions by equally distinguished obstetricians on the treatment by plugging. It is, consequently, not a little difficult to decide who is in the right, or, what is more important, whether or not plugging is of value in the treatment of accidental hæmorrhage.

There are two conditions in which it is agreed by every one that plugging is unsuitable—viz., when the membranes are ruptured, and when the hæmorrhage is concealed, and it is self-evident why that

[1] 'Handbuch für Geburtshülfe,' ii., p. 86.
[2] 'Handbuch der Geburtshülfe,' Bd. ii., Teil ii., p. 1195.
[3] 'Operative Geburtshülfe,' 1902, p. 299.
[4] 'Difficult Labour,' revised edition, 1900, p. 301.
[5] *American Journal of Obstetrics*, 1901, vol. iv., p. 861. [6] *Op. cit.*

should be so. These cases, therefore, may be dismissed from consideration at present.

Personally, I favour the treatment by plugging in certain cases, and for the simple reason that it is the only method of imitating Nature's cure. On several occasions I have watched the progress of a case of accidental hæmorrhage which has been left entirely to Nature, and I have found that by the formation of clots the further progress of the hæmorrhage becomes arrested. But during such a time the woman loses a considerable amount of blood, and sometimes Nature cannot control the condition, and so, with the object of favouring clotting, the tampon is sound treatment. It also, of course, has the effect of damming back the blood, stimulating the uterus to contract, and dilating the os. There is another action claimed for the plug by Tweedy—that it compresses the uterine arteries when there is a tight abdominal bandage pressing down the uterus from above. If the contention is correct, a very large supply of blood must be cut off from the uterus. In other words, as Tweedy says, arrestment of bleeding results in the same way as occurs in post-partum hæmorrhage if the abdominal aorta is compressed. It is incorrect to say that the plugging of an external hæmorrhage simply converts it into a concealed or internal one, for this will only happen if the uterine wall is unable to withstand the pressure from within.

We have had in the Maternity Hospital, and I have had in private practice, some highly satisfactory results in cases of apparent accidental hæmorrhage by plugging. But when I have said this in support of the plug, used as I shall describe it immediately, I feel that I have said all I can in support of it; for there are certain cases—those in which, although the hæmorrhage is apparent, it is also to a large extent concealed—in which the treatment by plugging must be used with great care. The patient must be watched constantly as regards her general condition, more especially as regards her pulse and the effect that the distension of the uterus is having upon her. In these cases the experience and judgment of the operator will be tested to the utmost, and he must be prepared, if symptoms of the more serious form of concealed hæmorrhage develop, to adopt the more energetic treatment we shall consider later.

In plugging for accidental hæmorrhage the operation should be carried out as follows: The woman is placed in the lithotomy position. The external genitals are then thoroughly cleansed and the pubis shaved, as there is great danger of sepsis, seeing that there is so much vaginal interference. The vagina also should be carefully washed out with a weak solution of lysol, so as to remove any loose blood-clot which may be present in its upper part. The material used

for plugging is not of any great moment, although, without doubt, plugs of absorbent cotton-wool, about the size of a walnut, fit into the fornices better than larger tampons. Sterilized gauze does very well if tampons are not available, and, of course, at a pinch, any linen or cotton boiled will do. If the material used for plugging is soaked in an antiseptic, it must be a very weak solution, as otherwise considerable damage will be done the vaginal mucous membrane. As such a weak solution can have no germicidal value, it is quite unnecessary to employ it.

If retractors are at hand, they should be employed; although it is easy to use one hand as a vaginal retractor, while pushing in the plug with the other, the vaginal wall is much more likely to be damaged. Having packed the gauze firmly round the cervix and filled up the vagina completely, a firm abdominal binder is applied over the uterus. The binder is fastened from above downwards. Last of all, a perineal pad and bandage are applied, the latter being pinned to the abdominal binder.

Rupture of the Membranes.—It is perfectly true, as has been already stated, that in a certain number of cases rupture of the membranes, and so taking off the strain on the uterus, and allowing its walls to retract over the child, is sufficient. As Barnes[1] says, 'Nature will do the rest.' In a very large number of cases, however, and these the most serious, rupture of the membranes is not sufficient, and even the strongest supporters of this treatment admit this in their writings, for they all, as witness Barnes and Herman, refer to what should be done should hæmorrhage continue.

Rupturing the membranes is usually quite sufficient in cases where labour has been in progress for some time and the uterus is contracting well. But should one adopt this simple procedure where the cervix is still undilated and the uterine contractions are not active, one is very awkwardly placed indeed if the hæmorrhage continues; a foot cannot be brought down, and there will be difficulty even in introducing the metreurynter. Both the older results, such as those of Goodell and Hicks, and the more recent results of Smyly—an opponent to the treatment by rupture of the membranes—are far from satisfactory, and were it not for the *dernier ressort* of the metreurynter no present-day obstetrician would favour the treatment. Hofmeir,[2] writing on this subject, says: 'Rupture of the membranes should only be employed when the bleeding is not very strong, when the pains are good, and when labour has advanced so far that rapid delivery is possible should it become necessary.' Practically all other modern writers express themselves in similar terms.

[1] 'Obstetric Operations,' p. 426. [2] *Op. cit.*

Dilatation of the Cervix—Extraction of the Child—Accouchement Forcé.—At the present moment on the Continent of Europe and America the treatment by the metreurynter is probably the one most favoured; in Holmes' paper this is the treatment recommended for severe cases not in labour. Others in America, such as Jewett,[1] Hirst,[2] and Williams,[3] all favour this method. In this country Herman, Eden, and most recent writers, with the exception of the Rotunda school, favour the treatment and trust to it rather than the plug.

Without doubt this treatment has its place, and the cases in which personally I believe it is suitable are where there is a moderately severe internal hæmorrhage, in which one is not quite prepared to adopt the very radical treatment that is now recommended for the very grave forms of concealed accidental hæmorrhage. To my mind, therefore, it is the most suitable treatment in cases unsuitable for plugging, but not severe enough for hysterectomy.

As regards treatment by more active dilatation, such as that carried out by means of Bossi's dilators, obstetricians one and all are opposed to such a procedure. Our results in the Maternity Hospital by this treatment have been most unsatisfactory. The shock produced to the patient—and it must be remembered she is already very much shocked—is very great, the danger of laceration of the cervix is not inconsiderable, and the probability of post-partum hæmorrhage by no means remote.

Abdominal and Vaginal Cæsarean Section.—I have dealt sufficiently exhaustively, and above all, clearly, I hope, with the treatment of accidental hæmorrhage as one meets with it generally. I have pointed out how in slight bleeding during labour simple rupture of the membranes is sufficient; how in the apparent hæmorrhage during pregnancy or early in labour, the best results are obtained by plugging; how in the mixed, especially those in which a large quantity of blood is concealed, the metreurynter should be employed.

There now only remain to be considered those severe cases of concealed accidental hæmorrhage, which are fortunately not common.

It is a very striking fact that, as regards this, the most serious group of cases, there is gradually coming to be a greater uniformity of opinion. Year by year one finds the active treatment, which I shall refer to, more and more advocated. At the British Medical Association at Oxford, in 1904, when this subject of accidental hæmorrhage was discussed, all the speakers,

[1] 'Practice of Obstetrics,' 2nd edition, 1902, p. 528.

[2] 'Text-Book of Obstetrics,' 1899, p. 536.

[3] 'Obstetrics,' 2nd edition, 1907, p. 808.

without exception, held more or less the same opinion regarding the treatment of these most serious and fatal cases now under consideration.

The results obtained from all the ordinary forms of treatment in cases of severe accidental hæmorrhage have been so unsatisfactory that modern obstetricians have been forced to adopt most radical procedure in the hope of lessening the maternal mortality. The treatment consists in emptying the uterus, and in most cases removing that organ. This may be done either by the abdomen or by the vagina. The reason why the uterus is removed is that it has been found that, after emptying it, hæmorrhage often continues, and that there is great difficulty in controlling this post-partum hæmorrhage even by plugging. I entirely agree with this attitude towards this condition. In the grave cases of concealed accidental hæmorrhage the uterus is in a state of atony, and cannot possibly be aroused from that state by massage, douche, etc.

One finds advocates both of the abdominal and vaginal route, and there is much to be said for each of these methods. The advantages of the abdominal route are that the operation is easier, that there is less risk of injuring the bladder, and that the subsequent removal of the uterus is not difficult. The advantages of the vaginal route, on the other hand, are that the risks of infection are less.

Quite a number of successful cases have been recorded by both methods. In the two cases in which I have adopted hysterectomy I chose the abdominal route. In neither of the cases did the treatment prove successful. One died almost immediately after the operation, while the other succumbed to sepsis on the fifth day. In the latter case it was specially disappointing that this happened, as her progress after hysterectomy for the first two days was extremely satisfactory. Both these patients were admitted into the Maternity Hospital profoundly collapsed, and I am perfectly certain no other treatment would have been more successful. Targett[1] recently reported a successful case, and scattered through the literature of the various countries are to be found not a few successes. The form of abdominal hysterectomy to be performed in these cases is supravaginal amputation of the uterus, with a retroperitoneal treatment of the stump, an operation described on p. 420. The vaginal Cæsarean section, so strongly recommended by Duhrrsen, Bumm, and others is fully detailed on p. 469. In Germany several successful cases have been recorded by this method, and it may be that it will be more extensively employed in the future. The objection to the vaginal Cæsarean section, with the subsequent extraction of the uterus by the vagina,

[1] Trans. Lond. Obst. Soc., vol. xlvii., p. 147.

that there would be a difficulty in removing the large uterus, has not been found to be the case. The latter objection is purely theoretical. Several operators, including Wilson of Birmingham and myself, have described cases where the full-time uterus has been removed without difficulty through the vaginal canal. The uterus becomes so relaxed and stretched out that by steady traction it is readily dragged down.

As I have already stated, 'If vaginal Cæsarean section is to have a permanent place amongst the recognized obstetric operations of the *later months of pregnancy*, there is no condition more suited for this method of treatment than severe concealed accidental hæmorrhage.' And I say this for two reasons—(1) The child, as we have seen, is negligible; it is always dead, and so the after-coming head may be perforated always and easily extracted. (2) The uterus is negligible; it should be removed, and, consequently, it does not matter how it is incised or torn. When speaking of vaginal Cæsarean section in Chapter XXVIII., where the operation is described, I pointed out that my objection to the operation in the later months of pregnancy was the danger of injuring the lower uterine segment. Naturally that objection cannot be raised if the uterus is removed.

The accoucheur who is accustomed to vaginal operations will have no difficulty in removing the full-time uterus by the vagina. The bladder has been already separated before the incision in the uterus was made. The quickest way of dealing with the vessels is by securing the broad ligaments with clamps, and in cases where this route is chosen I would advise this method of treatment, for the operation can be performed in a few minutes. It is all-important that the clamps should have the ridges on the blades running longitudinally, otherwise they are apt to slip. They should be removed at the end of forty-eight hours. I am not, however, prepared to advocate the vaginal route; in fact, in the two cases of this complication in which I removed the uterus I chose the abdominal one.

CHAPTER XXXIV

POST-PARTUM HÆMORRHAGE

Post-partum hæmorrhage is commonly divided into primary and secondary; 'primary' is the hæmorrhage that occurs during the first twenty-four hours after delivery, and 'secondary,' or puerperal hæmorrhage, that which occurs later.

Primary Post-Partum Hæmorrhage.

Post-partum hæmorrhage of a severe type is a complication which one now sees comparatively seldom in hospital and private practice. The explanation of this satisfactory state of affairs is that the second and third stages of labour are managed much more carefully than in former years. It is no exaggeration to state that the all-important preventive against post-partum hæmorrhage is a proper management of these stages of labour.

It does happen occasionally, however, in spite of the utmost care, that severe hæmorrhage follows the expulsion of the child, so that in a very short time the woman may be so exsanguinated that death results; but that is not the most common type of post-partum hæmorrhage. More generally the hæmorrhage is less severe, and there is some slight attempt at uterine retraction and contraction.

Post-partum bleeding may occur from the placental site, or from tears and lacerations in cervix, vagina, and vulva. Hæmorrhage from the placental site is the most important, but it is well not to forget that occasionally severe hæmorrhage occurs from tears in the situations I have mentioned. I quite agree with Herman[1] that lacerations of the cervix are very rarely associated with severe hæmorrhage. Herman writes: 'One cannot say it is impossible for a torn cervix to cause dangerous post-partum hæmorrhage, but I doubt if it ever does.' Personally, I have only seen it in two cases, where the laceration extended into the broad ligament. These cases are considered in Chapter XXXV. Tears of the vaginal wall and lacerations of the

[1] *Practitioner*, April, 1907.

perineum may also be associated with a considerable amount of bleeding, but I have seen the worst bleeding of all occur from tears of the vestibule in the neighbourhood of the clitoris.

Hæmorrhage from lacerations of the parturient canal is to be distinguished from hæmorrhage from the placental site by the fact that with the former the uterus is firmly retracted, although bleeding still goes on.

The repairing of lacerations of the cervix and the perineum is described in Chapter XXXV. Tears of the vestibule are only to be dealt with by deeply understitching the part. A needle is passed down to the bone wide of the bleeding-point, and a ligature carried round the bleeding centre (purse-string suture).

We must now turn to the ordinary post-partum hæmorrhage—that is, the hæmorrhage which occurs from the placental site. The immediate causes of post-partum hæmorrhage of this variety are primary and secondary uterine inertia or exhaustion. The former is favoured by over-distension of the uterus, from hydramnios or plural pregnancy, tumours of the uterine wall, etc., but most of all by a diseased condition of the uterus, seen so commonly in multiparæ the subjects of chronic metritis. The latter, secondary inertia or exhaustion of the uterus, also results from the conditions already mentioned, but it is seen in its most typical form in cases of prolonged parturition where there is a disproportion between the parturient canal and fœtus or some malposition of the fœtus.

It will be observed that I have not mentioned precipitate labour, for I have seldom seen grave post-partum hæmorrhage in that condition. In cases of Cæsarean section, for example, where the child is rapidly extracted, it seldom occurs, and when it has occurred the uterus was invariably exhausted. Neither have I mentioned pathological conditions of the blood, as found in hæmophilia, anæmia, and general debility, for I believe that these conditions are of comparatively little account. But there is one thing which I feel convinced favours post-partum hæmorrhage, and that is the long-continued administration of chloroform. In private practice amongst the wealthier classes a light anæsthesia is often kept up for many hours. In such cases I have often found the retractility of the uterus greatly impaired.

The diagnosis of post-partum hæmorrhage is simple when the uterus remains absolutely flaccid and blood is gushing from it. The condition may not, however, be fully appreciated when there is a slow oozing of blood and the uterus contracts slightly from time to time. In these cases the blood often becomes pent up in the uterus, and only a small quantity escapes, so that the uterus slowly distends, and the condition is only recognized when the accoucheur, on pressing

it, forces out a large quantity of blood-clot, and finds the patient unexpectedly becoming collapsed. The latter type is the more common, but the least serious. Cases belonging to it can always be saved, for there is a certain degree of activity left in the muscle-fibres of the uterus. Cases of the former type are naturally much more grave, and must be dealt with promptly and energetically if the patients are to be rescued.

Treatment.

Prophylactic.—Before discussing the treatment of post-partum hæmorrhage, I must say a word or two about the prevention of this condition.

Although the patient who has had experience of post-partum hæmorrhage need not at a subsequent labour be again afflicted with this complication, there is no doubt that it is to her advantage to have any pathological condition of the uterus corrected, and to have her general health kept at as high a level as possible during her pregnancy, in case of the complication recurring. The particular pathological condition of the uterus that should be suspected, and if possible remedied, is a chronic metritis. Unfortunately, however, it does not yield very readily to treatment. The administration of small doses of ergot and strychnine during the later weeks of pregnancy is generally recommended in such cases, with the object of improving the muscular contractility and innervation of the uterus. I am in the habit of giving these drugs, but I cannot say if they have done good. One thing is certain—they cannot do any harm. In recent years the exhibition of chloride of calcium has been recommended because of its property of favouring coagulation of the blood. As I have already indicated, however, post-partum hæmorrhage is only to be prevented by securing uterine retractility and contractility.

The greatest factor in preventing post-partum hæmorrhage is the proper management of the second and third stages of labour. It is quite impossible to discuss here the whole management of the second stage of labour, so I will only refer to the one all-important point—namely, *the danger of extracting the child while the uterus is in a condition of secondary inertia*. The uterus in that condition is tired and worn out; it requires rest: opium is the drug to give. When the uterine contractions recur and do not complete the delivery, then extraction may be performed with absolute safety. The management of the third stage has been considered in Chapter XXX., so that I need not refer to the subject here.

Active.—Post-partum hæmorrhage can only be controlled by establishing retraction and contraction of the uterus. It is never

encountered when the uterus is firmly retracted, nor will it ever fail to occur when the uterus is flabby and in a condition of atony.

There has been a great deal of discussion about the meaning of these two terms 'retraction' and 'contraction.' For a simple explanation of them I cannot do better than refer my readers to Herman's recent remarks on the subject.[1] Herman says: 'I will not discuss definitions, but I will describe. Anyone who puts his hand on the abdomen of a women who has just been naturally delivered will feel the uterus. It is firm; its shape is definite; its inner wall is applied to the placenta; its muscular fibres are grasping and constricting the vessels, and in this condition it remains. This is retraction. Every few minutes the uterus becomes smaller and harder; it grasps the vessels more tightly, and it squeezes the placenta; and if the placenta is loose, it squeezes it out. This is contraction. The patient is not safe in the third stage of labour until this condition of retraction with intermittent contraction has come to stay.'

The first thing to do in order to try and secure this condition of retractility and contractility is to massage the uterus. The uterus is seized between the fingers and thumb and rubbed firmly. If the placenta has not been delivered, it should be expressed. In the slighter degrees of post-partum hæmorrhage the expression of the placenta and of blood-clot ends one's anxiety about the condition; but in the graver cases, where the uterus does not respond to massage, the hand must be immediately introduced into the uterus, and the placenta, if it is still there, and all blood-clot removed. Before doing this it is well to pull on a sterilized glove, for one seldom has time to resterilize the hand, which has become contaminated to a slight extent. I have discussed the advantages and disadvantages of gloves elsewhere. If the accoucheur has not gloves, he should cleanse his hands once again, provided there is time for doing so. If there is not time, then he must run the risk of introducing his hand soiled as it is. Provided he has previously thoroughly disinfected his hands before delivering the child, the risk is not great.

Very generally the removal of all blood-clot and the manipulations of the hand in the uterus bring about uterine contractions. Whether or not that occurs, an intra-uterine douche of sterilized water at a temperature of about 118° (water at this temperature is uncomfortably hot, but not more than that, to the skin of the forearm) should be given. In addition to the douche ergotin should be injected into the buttock: 10 to 20 minims of the aseptic ergotin supplied in little

[1] *Op. cit.*, p. 447.

glass capsules is the best preparation; liquid extract given by the mouth (2 drachms) is much slower in its action. If these means are ineffective in producing satisfactory retraction of the uterus, the hand should be again introduced, the uterus stimulated, and the surface again gone over with the fingers, in case there may still be some membrane or placenta left behind, and another douche given.

I have only twice seen this treatment fail to arrest the bleeding, and in both of these cases I packed the uterus with gauze, which I believe is the best course to follow. One should always carry a quantity of broad iodoform gauze, sufficient to pack the uterus and vagina. Supplied in the tins of Dührssen, it can be carried about

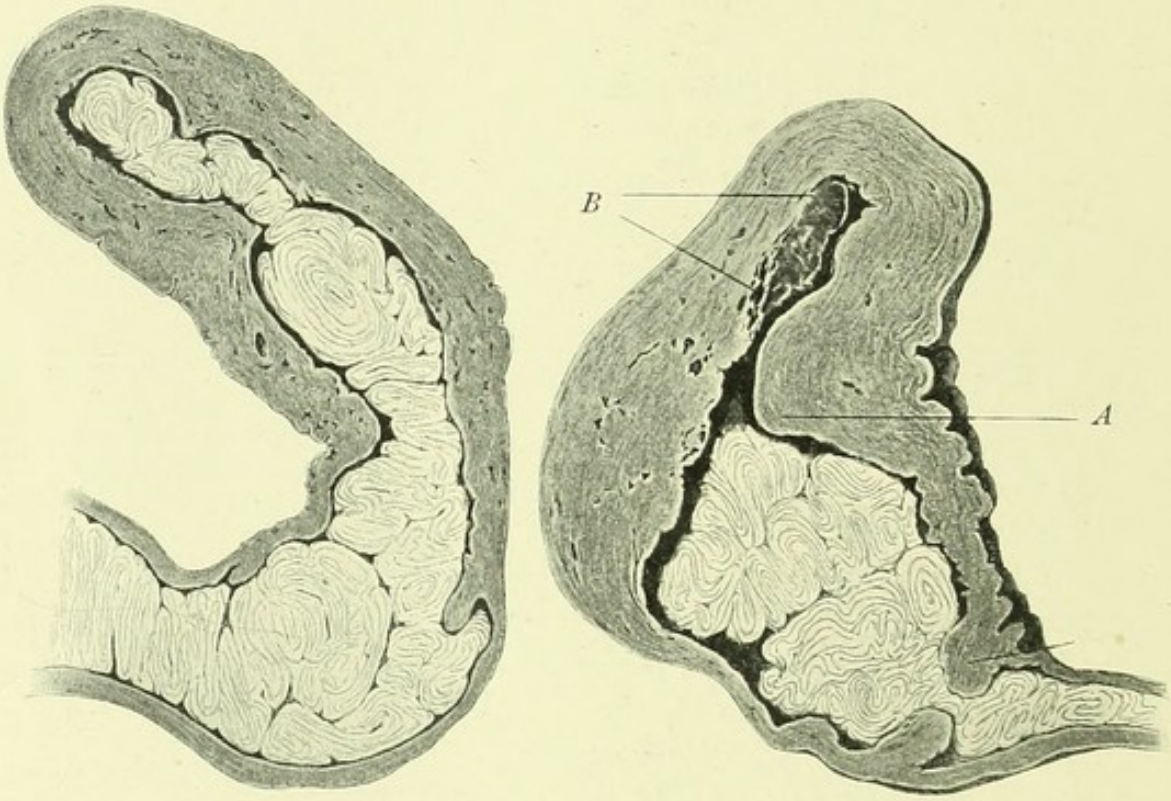


FIG. 270.—The left-hand figure shows a Uterus carefully plugged with Gauze; the right-hand one a Uterus in which only the Lower Uterine Segment is packed.
A, Retraction ring; *B*, cavity of uterus unpacked. (Bumm.)

very conveniently. In order to arrest the bleeding the packing must be thorough. It is best performed by pulling down and steadying the cervix with vulsellum forceps, and stuffing in the gauze with the hand. Gauze forceps are not nearly so good. After the uterus is thoroughly packed, the vagina should be plugged, a pad should be placed round the fundus, and a firm abdominal binder applied. *By this means the bleeding can be absolutely controlled.*

The illustration (Fig. 270) shows a mistake often made of packing only the lower uterine segment. Such plugging is naturally quite ineffectual in arresting hæmorrhage.

I am quite aware that many operators, especially in this country, are opposed to plugging the uterus. Herman, for instance, is opposed to it, and Eden[1] gives it a very half-hearted support. Tweedy,[2] however, approves of it, and many American and German accoucheurs recommend it.

The alternative to plugging is bimanual compression of the uterus ;

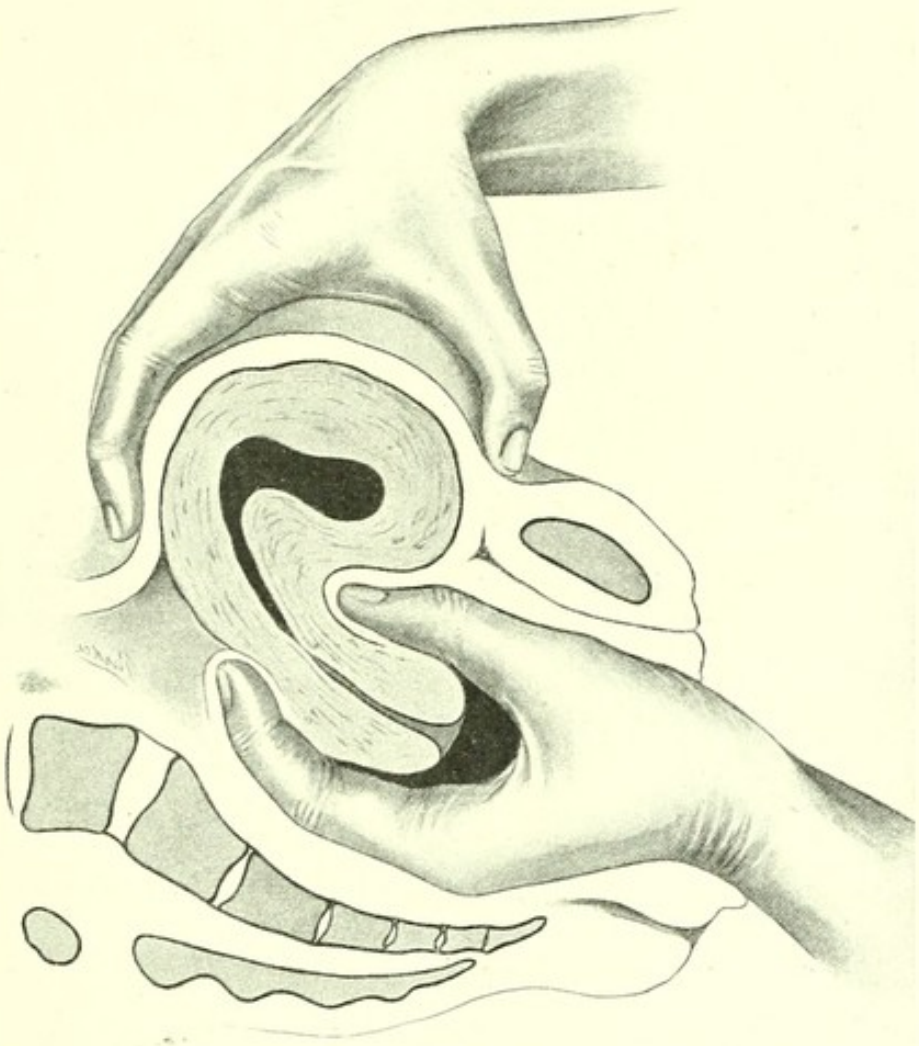


Fig. 271.—Bimanual Compression of Uterus for the Purpose of arresting Post-partum Hæmorrhage. (Bumm.)

that is to say, the whole fist is introduced into the uterine cavity, and the uterine wall is squeezed between the fist and the external hand. It is claimed that this is a better method of compressing the uterus than the one illustrated (Fig. 271). I very much question if this manual compression is better than plugging, and in any case one cannot keep it up for any length of time. In desperate cases, as a

[1] 'Manual of Midwifery,' 1906.

[2] 'Rotunda Practical Midwifery,' 1908, p. 291.

temporary measure, manual compression of the abdominal aorta by the fist may be employed.

In carrying out this treatment the accoucheur or his assistant should stand above the patient, place his fist over the aorta, and lean the whole weight of his body on his straightened-out arm. By that means he can keep up pressure for an indefinite period, but if he tries to do the same by pressure with the arm bent, he will soon become exhausted.

More radical suggestions have been made for dealing with desperate cases of post-partum hæmorrhage. It has been recommended that the uterine vessels should be clamped, and that the uterus should be removed. It has even been suggested that the uterus should be artificially inverted. I will not discuss such methods, however, for I do not believe that they are ever necessary.

In the text-books of twenty or thirty years ago the swabbing of the uterine cavity with a styptic solution was recommended, the idea being that the bleeding could be controlled by producing thrombosis of the vessels. For this purpose such substances as perchloride of iron and vinegar were employed. I could hardly have believed that such measures were still in use, yet a case came under my notice some two years ago where a practitioner packed the vagina and uterus with gauze soaked in vinegar; the consequences were very serious, for the entire mucous membrane sloughed. In recent years swabbing with a weak solution of adrenalin, 1 in 1,000 to 1 in 2,000, or soaking a portion of the gauze in such a solution, has been recommended. I feel sure it is unsound treatment for this kind of hæmorrhage, and if employed is bound to result in destruction of tissue, which naturally favours the invasion of saprophytic organisms.

Treatment of Collapse from Hæmorrhage.

So far in discussing the different varieties of hæmorrhage I have only incidentally referred to the manner in which the collapse should be overcome. Certainly it is all-important to arrest the bleeding, but it has also been abundantly proved in recent years that, unless fluid is added to the circulation to take the place of the blood lost, the patient may die even although the bleeding has been stopped.

After arresting the hæmorrhage, of first importance is maintaining the vital organs of the body, such as the brain and abdominal viscera, well supplied with blood. This is done by raising the foot of the patient's bed, and, if thought desirable, although it is of less importance, applying bandages round the limbs (auto-transfusion). Secondly, an amount of fluid should be added to the circulation to

take the place of the blood lost. This may be done in a variety of ways. Fluid may be introduced into the rectum, the subcutaneous connective tissue, or directly into a vein.

Rectal injections of warm saline solution (temperature 102°) is the simplest method of introducing the fluid, but, owing to the enfeebled circulation, absorption is often too slow. Should, however, it be the only possible and convenient method of giving the fluid, it is best given with a syphon-douche.

Intracellular transfusion is more rapid in its action. The fluid may be injected into the loose connective tissue over the abdominal wall or back, but it is even better to inject it into the loose tissue underneath the breasts. All that is required for this operation is a filler, a piece of rubber tubing, and a large trocar and cannula. This simple apparatus should always be carried by the obstetrician. The solution employed consists of boiled water at a temperature of 99° to 100°, to which is added common salt (sterilized common salt or, better, salt tabloids) in the proportion of a drachm to the pint. One or two pints of fluid are injected. If the breast is chosen, a very convenient method is to introduce simultaneously by means of a double tube a pint into each breast. The tissue underneath the breasts cannot usually contain comfortably more than about a pint. During the operation the tissues should be gently massaged to hasten the absorption of the fluid. After the trocar is withdrawn, a collodion dressing is applied, and two pieces of adherent plaster placed over it.

The most rapid method of introducing fluid into the circulation is through a vein. The median basilic is the one generally chosen. This simple operation is carried out without an anæsthetic, seeing that the patient is so extremely collapsed. The steps are as follows: A bandage is applied round the lower part of the upper arm; this makes the veins of the forearm stand out. An incision is made over the vein for about 1 inch. The vein is separated from the tissues, and a loop of fine silk applied underneath it. An opening is made into the vein and a blunt needle introduced. Care must be taken that no air is allowed to enter. The ligature is tied over the needle. One or two pints of fluid is allowed to enter slowly from a filler held not more than about 1 foot above the patient's arm. The needle is removed and the vein tied in two places and divided. Lastly, the skin wound is sutured and a collodion dressing applied.

In addition to the means described, judicious cardiac stimulation is of value. Brandy or whisky (2 or 3 ounces) should be given by the bowel, and strychnine ($\frac{1}{30}$ gr.) should be injected hypodermically. Care must be taken not to overstimulate the heart at this stage. The

recovery of the patient is often surprisingly rapid, but in some cases it is very protracted. It should not be unduly hastened, for there are late dangers, such as crural and pulmonary thrombosis. Last of all, there is the danger of a pernicious anæmia being established.

Secondary Post-Partum Hæmorrhage.

By secondary post-partum hæmorrhage we understand hæmorrhage which occurs any time in the puerperium after the first ten hours. The most common cause of this complication is the retention in the uterus of blood-clot, pieces of membrane, but especially pieces of placenta. Sometimes it is purely the result of subinvolution, but in such cases the amount of hæmorrhage is usually slight. In two cases I have seen a very profuse hæmorrhage occurring in the third and fourth weeks of the puerperium, when the patients were going about, and where apparently the only cause was a backward displacement of the uterus. Submucous myoma calls also for mention as a cause of post-partum hæmorrhage, and lastly, chorion epithelioma must not be forgotten. With this latter tumour the bleeding usually does not come on until three or four weeks after parturition.

The treatment of secondary post-partum hæmorrhage is simple. If the hæmorrhage is only slight, ergot (liquid extract, a teaspoonful morning and evening) should be given for a week, the patient kept at rest in bed, and hot intra-uterine douches given. If this does not control the bleeding, the uterus should be explored. If at all possible, this exploration should be done by the finger, and it is often possible, as the cervix is still dilatable. Any displacement of the uterus should be corrected, while a submucous myoma should be removed. In the cases of chorion epithelioma the uterus should be removed entire.

CHAPTER XXXV

ACCIDENTS TO MOTHERS—LACERATIONS OF UTERUS, VAGINA, PERINEUM, SYMPHYSIS PUBIS

Rupture of the Uterus.

To anyone acquainted, however slightly, with obstetrics the mention of rupture of the uterus at once suggests a labour badly managed. Such a view is in the main correct, for without doubt, in the majority of instances, the accident must be considered a disgrace to the obstetric art, and to the individual who has had charge of the parturient. There are, however, exceptional cases in which the accident is quite unavoidable, even cases when it occurs during pregnancy.

Although well aware that the manner in which I am going to consider rupture of the uterus is not the most scientific that could have been adopted, it appears the most practical, and has certainly helped me, personally, to a better understanding of the accident. I purpose considering rupture at three distinct periods: (*a*) During pregnancy; (*b*) early in labour; (*c*) after labour has been protracted.

Rupture of the Uterus during Pregnancy.

Of cases belonging to this group the most numerous are those in which the uterus has been previously injured. Naturally, the injury which first occurs to one's mind is a previous Cæsarean section wound. There are quite a number of cases in which such a wound has given way. I have myself described one[1] in which the cicatrix of a fundal incision gave way; similar cases have been reported by Eckstein[2] and Meyer,[3] while cases of rupture through the scar of the ordinary longitudinal incision have been reported by Targett, Galabin, Guillaume Woyer, Koblanck, Everke, Backhaus, etc., and quite recently by Couvelaire,[4] who gives a review of several of the recorded cases.

[1] *Journ. Obstet. and Gyn. Brit. Empire*, 1904, vol. vi., p. 378.
[2] *Cent. f. Gyn.*, 1904, p. 1302. [3] *Ibid.*, 1903, p. 1416.
[4] *Ann. de Gyn.*, 1906, p. 148.

But other injuries, such as perforation of the uterus with the curette or uterine sound, etc., have been followed by rupture at a subsequent pregnancy, as in the cases of Herzfeld[1] and Staude.[2]

In this connexion the observations of Jellinghaus,[3] that previous removal of an adherent placenta predisposes to rupture, are of particular interest. The probability is, that in such cases the operator actually tears the uterus with his fingers in removing the after-birth, and blood being effused, the wound heals by granulation.

Very similar to the above are those in which a previous rupture gives way. Several cases of this nature are referred to in Peham's monograph,[4] and recently by Lahhardt.[5]

Lastly, there is a group in which injuries, falls, blows, etc., during pregnancy have been the cause. Reusing[6] describes a case of his own and several others previously recorded. In most of them the women were multiparæ, but in Reusing's and Plenio's cases they were young primiparæ. The injury to the uterus was in some cases direct, but in others it was indirect, the women having fallen upon their sides or buttocks. In such cases the laceration is generally in the upper part of the uterus, and is very extensive.

As is well known, it occasionally happens that the interstitial portion of the tube becomes gravid, and ruptures, as a rule, about the sixteenth week. Such cases, literally speaking, are examples of uterine ruptures, but they are considered in Chapter XXXII. in connexion with ectopic pregnancy. The same applies also to pregnancy in a rudimentary horn of a double uterus.

The cases of rupture of an infantile uterus in which pregnancy occurs are somewhat different, however. Such an occurrence is very rare, for the women are almost invariably sterile; there have been, however, in recent years one or two cases described. The two most interesting are those of Freund[7] (Fig. 272) and Schickele,[8] referred to very specially by Wertheim.[9] Freund considered his case one of pregnancy in an infantile uterus, but Schickele looked upon his as possibly a pregnancy in a diverticulum. Similar are the cases, such as Donald's,[10] already figured (p. 301), where a double uterus gave way.

But putting aside all such cases, which are, after all, easily

[1] *Cent. f. Gyn.*, 1901, p. 1219. [2] *Ibid.*, 1903, p. 706.
[3] *Archiv f. Gyn.*, 1897, Bd. liv., p. 103.
[4] *Cent. f. Gyn.*, 1902, p. 87.
[5] *Zeit. f. Geb. u. Gyn.*, Bd. liii., p. 478.
[6] *Cent. f. Gyn.*, 1895, p. 41
[7] Hegar's 'Beitrage,' iv., p. 1. [8] *Ibid.*, 1904, viii., Heft ii.
[9] Winckel's 'Handbuch,' Bd. ii., Teil i., p. 408.
[10] *Practitioner*, June, 1903.

explained, and also those such as Martin's,[1] where a hydatidiform mole perforated the uterine wall, there yet remains a number in which the cause of rupture is still unknown. Round such cases there is much interesting speculation. As, however, the subject belongs still to the region of speculation, I do not intend to do more than mention some of the views which have been expressed.

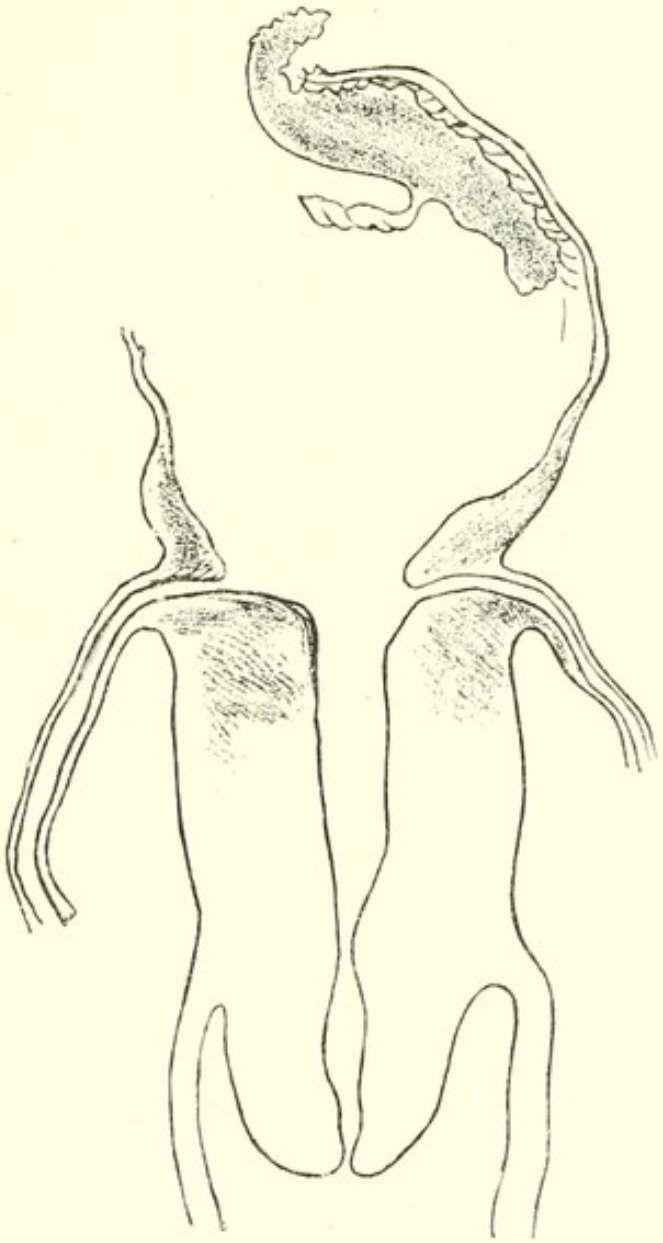


Fig. 272.—Fundal Rupture of Infantile Uterus. (After Freund.)

Fatty degeneration has been freely spoken of in the past, but in recent years grave doubts have been expressed regarding the frequency of its occurrence: Herman,[2] Gebhard,[3] and other modern writers, are very sceptical regarding it. Further investigations are necessary

[1] Trans. Edin. Obst. Soc., vol. xxi., p. 63.

[2] Trans. Lond. Obst. Soc., 1901, vol. xliii., p. 220.

[3] 'Pathologische Anatomie Weiblichen Sexualorganen,' 1899, p. 239.

before this matter is decided. The same also applies to hyaline degeneration, although in this connexion a case recently recorded by Meyer [1] is of great importance and interest. He found in the neighbourhood of the tear, which had occurred during pregnancy, that the uterine tissue and muscle showed signs of hyaline degeneration. The exact effect of pregnancy on a uterus affected by chronic metritis is also unknown, although this disease has been mentioned repeatedly by writers as favouring rupture, nor is it to be wondered at that it should. Personally, I feel convinced that degeneration of the wall is frequently present and predisposes to the accident, for a slight fall or cough, or a more than usually violent movement by the child, have been the only apparent exciting causes in some cases.

The recent investigations of Pick,[2] Ivanoff,[3] Schaper,[4] and many others, have not confirmed the theory of Dawidoff and Poroschin,[5] that the rupture is due to a deficiency of elastic fibres in the tissue of the uterus in the neighbourhood of the rupture. Several, including Martin and Dührssen, have, however, found the elastic fibres diminish as age advances, and it is quite probable that they, in common with other tissues, become altered with each succeeding pregnancy.

The situation of the placenta has an influence in different ways. There are not a few recorded cases of rupture of the uterus associated with placenta prævia. Again, the tubal orifice being a weak spot, as Gebhard points out, implantation there is unfavourable. Lastly, in a considerable number of cases of rupture during pregnancy the placenta has been situated over the tear, and it is just possible that under certain conditions the chorionic villi have a specially destructive effect, and burrow unusually deeply into the wall. Be that as it may, not a few authors have referred to the fact, as, for example, Alexandroff,[6] Meyer, Couvelaire, and Eckstein. I also refer to it in recording my own case (p. 632).

Rupture of the Uterus after a Protracted Labour.

It might appear a natural sequence that, having discussed rupture during pregnancy, one should turn to those cases where the accident happens early in labour. Personally, I think otherwise, however, for I am disposed to look upon the latter group from the etiological point

[1] Hegar's 'Beitrage,' Bd. ix., p. 45.
[2] *Berlin. Klinik Wochenschrift*, 1900, xxiii.
[3] *Annal. de Gyn.*, August, September, October, 1904.
[4] 'Diss. Wurtzburg,' 1901.
[5] *Cent. f. Gyn.*, 1898, p. 183.
[6] *Monat. f. Geb. u. Gyn.*, Bd. xii., 1900, p. 447.

of view, as standing midway between the group where rupture occurs during pregnancy and the one in which it follows a prolonged parturition; consequently, it will be best understood after these groups have been considered.

Rupture of the uterus following a complex and protracted labour is a subject which has come to be understood only in recent years. Although Guillemeau, Baudelocque, and, later, Michaelis, appreciated in great part the nature of the accident, it is only since Bandl's writings on the 'Lower Uterine Segment' that any clear conception of the pathological anatomy of the subject has arisen.

For a correct comprehension of rupture of the uterus in labour one must appreciate the different anatomical features of the uterus, and especially of the lower segment, during parturition. That being so, I must consider them for a moment.

Since Bandl's paper appeared in 1875 the number of contributions to the subject of the lower uterine segment have been legion, but although many matters regarding it have from time to time been settled, there are still many details upon which differences of opinion exist, and these differences have not been lessened by the latest frozen section of Bumm and Blumreich. This is not the place to discuss these in detail, and so I have thought it best to give the principal conclusions of one of the most recent writers. Von Rosthorn, writing in Winckel's 'Handbook of Midwifery,'[1] comes to the following conclusions regarding the lower uterine segment:

1. There already exists during pregnancy a lower uterine segment.
2. This segment is covered by decidual altered mucous membrane.
3. The arrangement of the muscle in the wall of the segment is lamellar, and it is to a moderate extent distinct from the wall of the corpus uteri, and very different from that of the part below.
4. The upper part of the lower segment is marked by the firm attachment of the peritoneum, and in the inside, when uterine contractions have already been in existence by the so-called contraction ring.
5. The lower limit is the essentially different cervical tissue.
6. The mucous membrane appears to vary. In the majority of cases there is sharp differentiation—on the one side distinct cervical mucous membrane.

The illustration represents (Fig. 273) the relationship of the different parts of the uterus during parturition. This is a very old diagrammatic figure of Schroeder, but for practical purposes it is still useful. I do not suppose it is correct, but who can say what exactly is the

[1] Bd. i., Heft i., p. 553.

lower uterine segment? The upper part or body, the active contractile portion, the middle or lower uterine segment, and the lower part, the dilated cervix, are represented. During labour the upper part, the body, is the only really active part of the uterus—it alone forces the child down through the parturient canal; the lower uterine segment

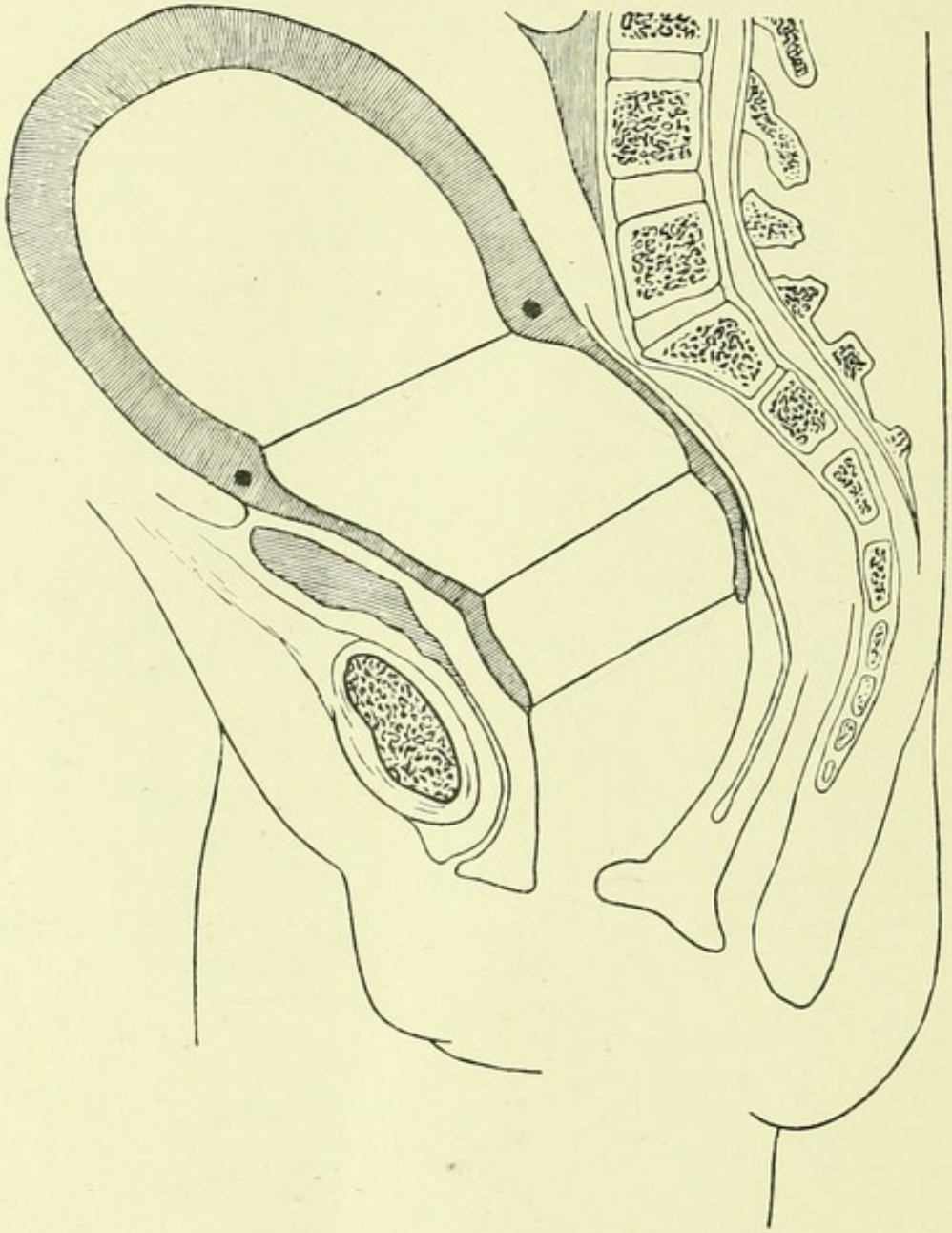


Fig. 273.—Diagrammatic Representation of Parturient Canal at End of First Stage. (Schroeder.)

and cervix play an entirely passive rôle. As labour progresses the body becomes diminished in a vertical direction because the retraction, or Bandl's, ring, which marks the lower limit of the body and the upper limit of the lower segment, becomes further and further drawn up; it can be appreciated sometimes by abdominal palpation as high as, or even above, the umbilicus. But the active contractions of the

uterus would do more than pull up Bandl's ring; they would also pull up the cervix, were it not that the latter is more or less fixed by its attachments. As a result, therefore, of the upper part being increasingly retracted and the lower fixed, one finds, in a protracted labour, that the area between—viz., the lower uterine segment—becomes more and more stretched and thinned out. It is not surprising, therefore, that there is a stage at which, not being able to stretch any farther, and with its tissues bruised by pressure between the head and the pelvis, it gives way, either spontaneously or as a result of operative interference.

For many years after Bandl's papers great importance was attached to this fixation of the lower part of the uterus, more particularly by the presenting head, as in cases of contracted pelvis and hydrocephalus. Freund, at the present time, is the strongest supporter of this view, and gives emphatic expression to it in his chapter in Winckel's 'Handbuch.'[1] But few go as far as Freund. Olshausen and Veit (in the last edition of their text-book) and Ivanoff do not attach the same importance to this factor. Personally, my experience leads me, in common with most others, to side with the authorities last mentioned.

Without doubt a good deal of misunderstanding has arisen from the erroneous idea that the cervix is drawn up or retracted over the head during labour. From clinical observation I have not found that to be the case to any great extent, and the records of frozen sections support that view. Barbour[2] points this out when he says: 'The dilatation of the cervix can only, to a very slight degree, result from stretching through traction on its ring by the contracting uterine walls, but must be almost entirely due to dilatation through expansion of the ring by the bag of membranes or presenting part.'

When I mentioned before that the cervix was fixed, I meant that it was fixed by its attachments, not by the presenting part.

What happens is that the cervix and lower part of the lower uterine segment become unduly pressed upon, bruised, and lacerated. It is not so much that the cervix is held down and cannot retract over the head.

But let us now consider the conditions which chiefly favour the occurrence of rupture of the uterus—pelvic deformity, malpresentations and malpositions of the child, and hydrocephalus, and let us see how they act and the nature of the injuries they produce.

The importance of pelvic deformity as a cause of rupture of the uterus is well illustrated by the large percentage of cases in which bony deformity of the canal exists. In fourteen cases which have

[1] Bd. ii., Teil iii., p. 2116. [2] 'Anatomy of Labour,' p. 47.

been under my care in recent years pelvic deformity was present in 40 per cent.; others have had a similar experience. Merz[1] found it in 30 per cent., and Ivanoff in 40 per cent. of their collected cases.

The pelvic deformity is not, as a rule, of the extreme type, for when the deformity is great the danger of the condition is early appreciated, and labour is not allowed to be indefinitely protracted. Almost without exception the women have borne children, and many of them have had several. Naturally, the danger increases with each succeeding pregnancy. This is often attributed to degeneration of the uterus, and rightly so in many cases; but in recent years it has come to be recognised that in some cases cicatrices from previous labours have given way, cicatrices of wounds often only slight and never appreciated. The nature of the lesion in the different forms of contracted pelvis has been most carefully investigated by Ivanoff; no one has gone into this subject so particularly. Personally, however, I am not in a position to express any opinion regarding his conclusions, for although, in common with others, I have found the lesions in cases of contracted pelvis are in general as he has described, I cannot give exact statements. He is the first who has so exactly distinguished the lesions which are found in flat pelvis from those which arise in generally contracted pelvis. He believes that the tears are produced by injury of the soft parts. The extension of the rupture may occur spontaneously, or be produced by violence.

With these lacerations, which occur in the progress of labour transverse commonly in front or behind in the case of flat pelvis, and lateral in the case of generally contracted pelvis, extension of the tear readily occurs, especially if the child is forcibly extracted. In such cases, as with violent rupture in general, the extension of the laceration is often longitudinal, and very usually passes into the broad ligament. In the Glasgow Maternity Hospital during the last ten years, amongst the cases of flat pelvis where rupture occurred there were three in which the child was delivered with forceps, and the tear presented the appearance shown in the illustration (Fig. 274). In these cases the rupture was complete.

Next in order of frequency as a cause of rupture are malpresentations of the child, and especially transverse presentation. Amongst my cases such a condition existed in 17 per cent., and taking the authorities already referred to, one finds that Koblanck found it in 25 per cent., Merz in 11 per cent., and Ivanoff in 32 per cent. As might be expected, the rupture in most cases results when version is attempted after the waters have drained away and the shoulders have become impacted. But in a certain number of cases this has not

[1] *Arch. f. Gyn.*, 1894, Bd., xlv., Heft ii., p. 181.

been so: the rupture has occurred spontaneously. Spontaneous rupture in transverse presentations, however, is rare.

In most cases the laceration is longitudinal and to one or other

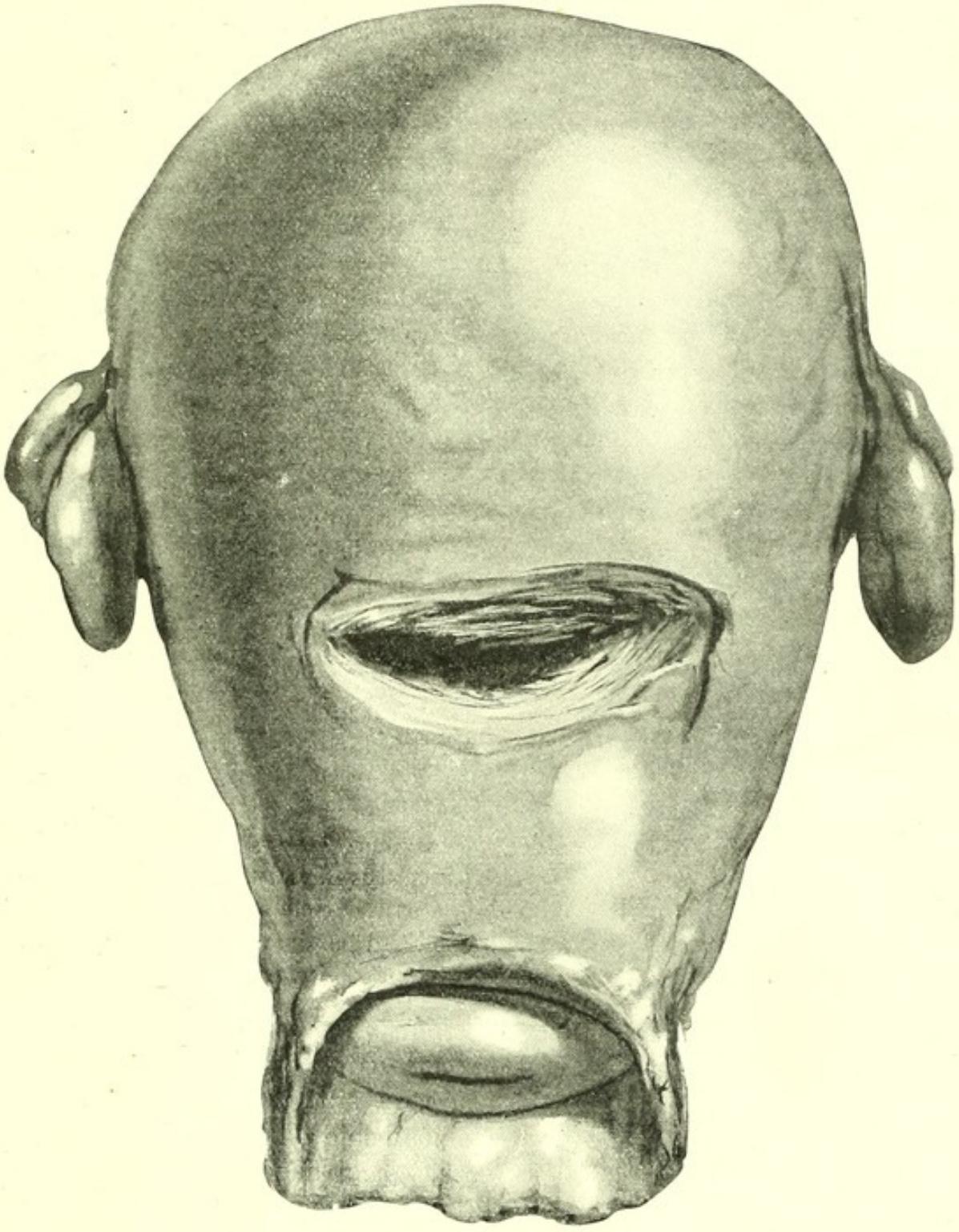


Fig. 274.—Laceration of the Posterior Uterine Wall in a Case of Flat Pelvis.

side (Fig. 275). It tends to be extensive, as one would expect, and to run up into the body. The cervix is invariably torn, and the vaginal vault in many cases also suffers. In this condition there is no

difficulty in understanding how the accident occurs; indeed, it is surprising that it does not occur oftener.

Other malpresentations, such as face and brow presentations, are occasionally found associated with rupture. A brow presentation is

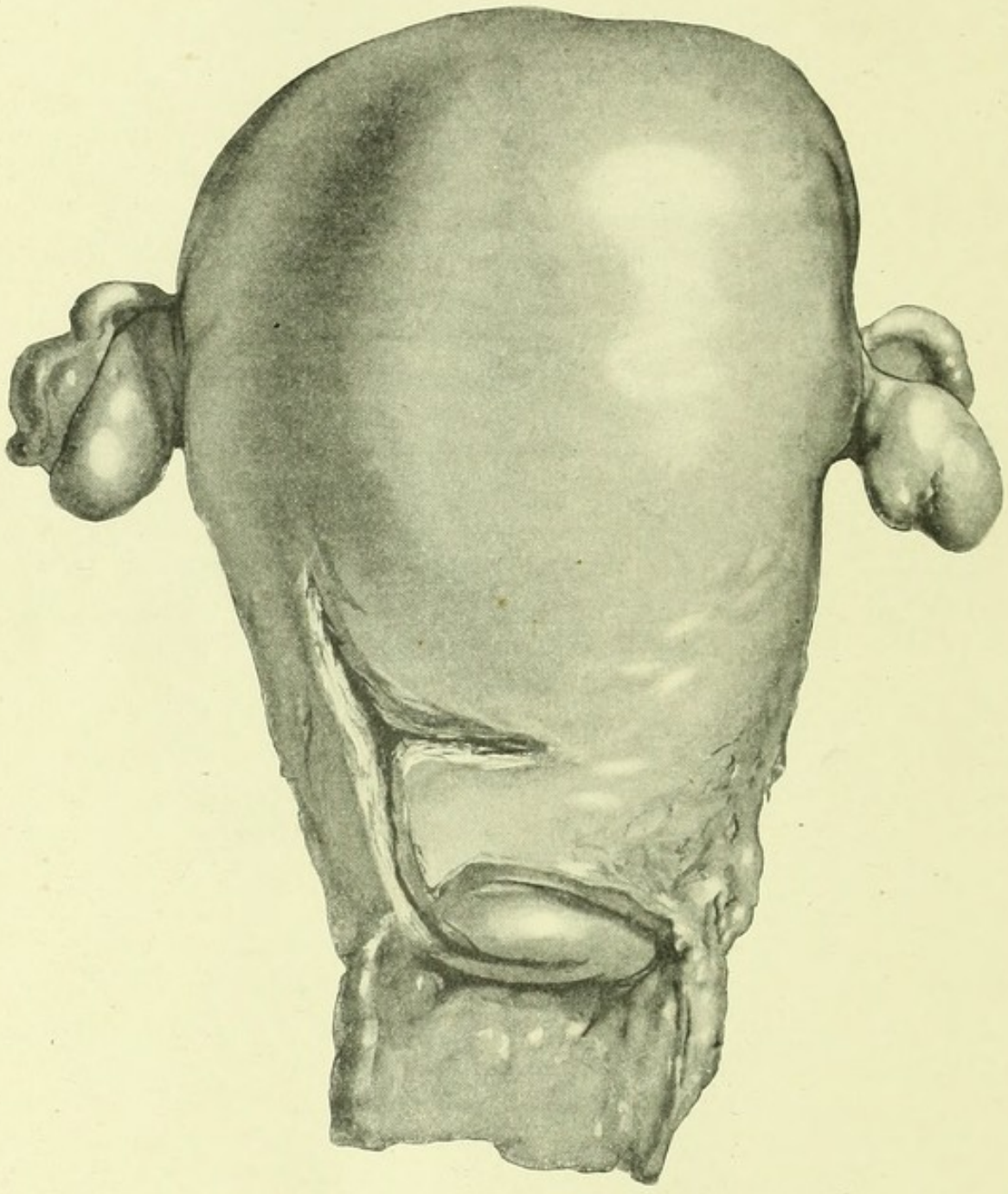


Fig. 275.—Laceration of the Lateral and Posterior Uterine Wall.

certainly a very unfavourable attitude, for the long diameter is thrown across the pelvic brim (p. 43). It is dangerous, therefore, to attempt to deliver the child by forceps. Indeed, should such a course be persisted in after one or two futile attempts, the risks of rupture are considerable. Very much less likely to cause injury are face and

occipito-posterior vertex presentations; when they are associated with rupture the cause has usually been some coexisting condition, or the manipulations have been badly carried out.

The other important cause of rupture is hydrocephalus. In my fourteen cases it occurred once (7 per cent.), while Mertz found it in 7·5 per cent., and Ivanoff in 3 per cent. In most cases of rupture produced by hydrocephalus, however, the hydrocephalus has not really been the cause: either the condition has not been recognized—and it must not be forgotten how easy it is to overlook the condition—or the proper treatment—craniotomy—has not been practised; attempts have been made with forceps, as in my case, or some other method of delivery has been tried. As a cause of rupture in this condition, Freund attaches great importance to the fixation of the cervix by the enlarged head. He believes this occurs more frequently when the hydrocephalus is of medium dimensions, as when it is very large the head cannot engage, and so the cervix slips over the head. Ivanoff attaches more importance to bruising of the tissues. The lacerations are, as a rule, very extensive and longitudinal. In my case the whole lateral wall was torn longitudinally. In connexion with hydrocephalus, however, it must not be forgotten that very often the uterine wall is diseased.

Other conditions, such as tumours, cicatrices and adhesions, etc., obstructing the parturient canal, may naturally predispose to, and may be occasionally associated with, rupture. Old cicatrices, especially about the cervix, are liable to tear, although sometimes the cicatricial tissue withstands the strain, and the tissues, not involved formerly, give way. With tumours the accident should not occur, as it is now recognized that it is quite inexcusable to drag a child past a tumour by brute force.

In a certain number of cases rupture has followed the removal of the placenta. Schwendener[1] has recorded one as a result of expelling the placenta after Credé's method. Fraenkel[1] has recorded another. Oswald[2] has collected thirty-eight cases from obstetric literature where it was produced while manually removing the placenta. Twice while removing an adherent placenta situated at the fundus I have found my fingers almost through the uterine wall, an experience which has led me to exert the greatest possible care in performing this simple operation. I have referred elsewhere to the dangers of rupture in subsequent pregnancies when the uterine wall has been injured by the fingers, curette, or uterine sound.

[1] *Cent. f. Gyn.*, 1903, p. 907.

[2] *Beitrag. z. Geb. u. Gyn.*, Bd. viii., Heft i.; ref. *Cent. f. Gyn.*, 1904, p. 336.

Rupture of Uterus Early in Labour.

We must now turn to the last and most interesting group of cases —viz., those in which rupture occurs early in labour.

This group, as regards etiology, stands midway between the two others, for rupture partly results from disease of the uterine wall, and partly from the effects of the conditions mentioned in connexion with the previous group.

Personally, I cannot but feel that disease of the uterine wall, and probably unrecognized lacerations at previous labours, play the most important part, for looking at the recorded cases one is struck with the frequency of previous difficult labours, injuries, or disease. Take the case described by the late Milne Murray,[1] where there had been protracted parturitions and possibly the wall seriously injured. The various diseased conditions which may exist have already been referred to when rupture during pregnancy was under consideration.

But there is another condition which specially comes into play in ruptures of this group, and it was mentioned years ago by Bandl. The lower segment may have been overstretched at a previous labour, and consequently very early in a subsequent one reaches the same condition. Some of the records would lead one to attach some importance to this view; naturally, it will always be very difficult to distinguish rupture caused by such a condition and rupture caused by the giving way of a previous cicatrix.

Freund considers that even rigidity of the os externum may bring it about. But in order to prove that rigidity *per se* could cause rupture, one would require to satisfy oneself that there did not also exist degeneration of the uterine muscle.

It is not to be wondered at that occasionally rupture of the uterus should be associated more or less directly with placenta prævia, for a placental implantation weakens the lower uterine segment, and manipulations to arrest hæmorrhage, such as turning, which endanger the lower uterine segment, have generally to be had recourse to. All authors refer to the occasional association of the two complications: in my list there was one case, in Ivanoff's twelve. Ivanoff very rightly, it seems to me, emphasizes the fact that in the vast majority of the cases rupture was violent. Taking twenty cases from his own and collected cases, sixteen were certainly violent, two probably violent, and only two spontaneous. In the majority of these cases the laceration was lateral, longitudinal, and incomplete. However, spontaneous rupture does occasionally occur, and a case

[1] Edin. Obst. Trans., 1901, vol. xxvii., p. 39.

was recently recorded where the accident occurred in a primipara. Absolutely nothing was done to interfere with the birth of the child except to rupture the membranes when the os was about three-quarters dilated. The birth of the child quickly followed. The rupture was through the posterior wall of the uterus, and was apparently incomplete.

Varieties of Rupture of the Uterus.

Complete and Incomplete Rupture.—Clinically, it is customary to speak of 'complete' and 'incomplete' rupture of the uterus. By the former condition we mean that the laceration extends into the peritoneal cavity, and by the latter that it stops short of the peritoneum. This distinction is very useful, for we shall find that the treatment differs in the two groups. As regards the relative frequency of the two varieties it appears from most series of recorded cases that complete rupture is more common than incomplete. It must not be forgotten, however, that there are a very large number of cases of incomplete rupture never reported, nor indeed appreciated, while few of the cases of complete rupture escape notice, seeing that the symptoms are more grave. Of the 14 cases of rupture under my care in private and hospital practice, in only 4 has the rupture been incomplete. Braun gives it as 4 incomplete and 15 complete; Merz as 46 incomplete and 181 complete; Ivanoff as 43 incomplete and 58 complete. As would be expected, the lower down in the uterus and the more lateral the tear, the more likely will the rupture remain incomplete. The cases of laceration during pregnancy or early in labour are, with few exceptions, complete.

Amongst the cases which have been under my care, in one only have I found the bladder involved.[1] In Braun's nineteen cases there was only one in which the bladder was injured. Neither in Merz's or Ivanoff's collected cases can I find any evidence of laceration of the bladder. In Murray's most interesting case the bladder was torn and had to be stitched.

There is a very interesting group of cases in which the mucous membrane of the uterus remains intact, although the muscular wall

[1] Rupture of bladder, apart from rupture of uterus and retrodisplacement of the gravid uterus, is very rare. Grimsdale (*Journ. Obst. and Gyn. Brit. Empire*, May, 1905) has referred to a most interesting case in which the bladder was injured in the first stage of labour. On opening the abdomen a large quantity of blood was found in the peritoneal cavity. This had escaped from the bladder through a small opening in its upper part. The opening was closed, and the patient made an excellent recovery.

is torn. The point of importance in these cases is that there are all the symptoms of collapse from internal hæmorrhage without any appreciable lesion of the uterus or vagina. Knauer has drawn attention to the subject recently.[1] In such cases the tears, starting in the muscle, may extend either outwards or inwards. Slight tears of the peritoneum (fissures of the peritoneum) over the surface of the upper part of the uterus have long been known to occur, and have been frequently referred to by different obstetric writers. This laceration of the muscular tissue, however, has not had attention directed to it. Of especial interest are Knauer's observations in connexion with concealed accidental hæmorrhage. In several of these cases he observed laceration of the muscular wall with considerable intramural hæmorrhage. I observed the same condition of matters in a fatal case of concealed hæmorrhage which was recently under my care in the Maternity Hospital.

Rupture of the Vaginal Vault (Colporrhexis).—In recent years the subject of rupture of the vaginal vault (colporrhexis—Fig. 276), as distinguished from rupture of the uterus, has been much discussed. This lesion is no new discovery; indeed, before Bandl's papers lesions of this nature were understood better than lacerations of the uterus. But after Bandl's papers lacerations of the vaginal vault were neglected for uterine rupture, until Freund[2] reawakened interest in the subject. In recent years the most important paper is one by Kaufman,[3] who discusses the subject very fully.

Specially liable to this form of rupture are cases of transverse presentation and pendulous abdomen. Generally the rupture is violent, and often occurs when the hand is being forced into the uterus. But Kaufman, in his collected cases, quotes many that were not violent, and were the result of a diseased condition of the tissues, and of other factors. Where only the vaginal vault is torn there may be no symptoms of consequence. Plugging is generally the best treatment.

Symptomatology and Diagnosis.

The clinical features of rupture of the uterus differ greatly according as the rupture occurs in pregnancy, early in labour, or after labour has been in progress for some time. In the two former there is seldom much warning of the accident, while in the latter very

[1] *Cent. f. Gyn.*, 1903, p. 647.
[2] *Zeit. f. Geb. u. Gyn.*, 1892, Bd. xxiii., Heft ii.
[3] *Archiv f. Gyn.*, 1903, Bd. lxviii., Heft i., p. 152.

frequently, for some little time before, there are premonitory symptoms, which if properly interpreted by the accoucheur should lead him to dread rupture and, consequently, to take every precaution to prevent the occurrence.

Taking first those cases where the rupture occurs early in labour or during pregnancy, one would naturally expect, as with rupture of any other viscus, that the giving way of the uterus would be followed

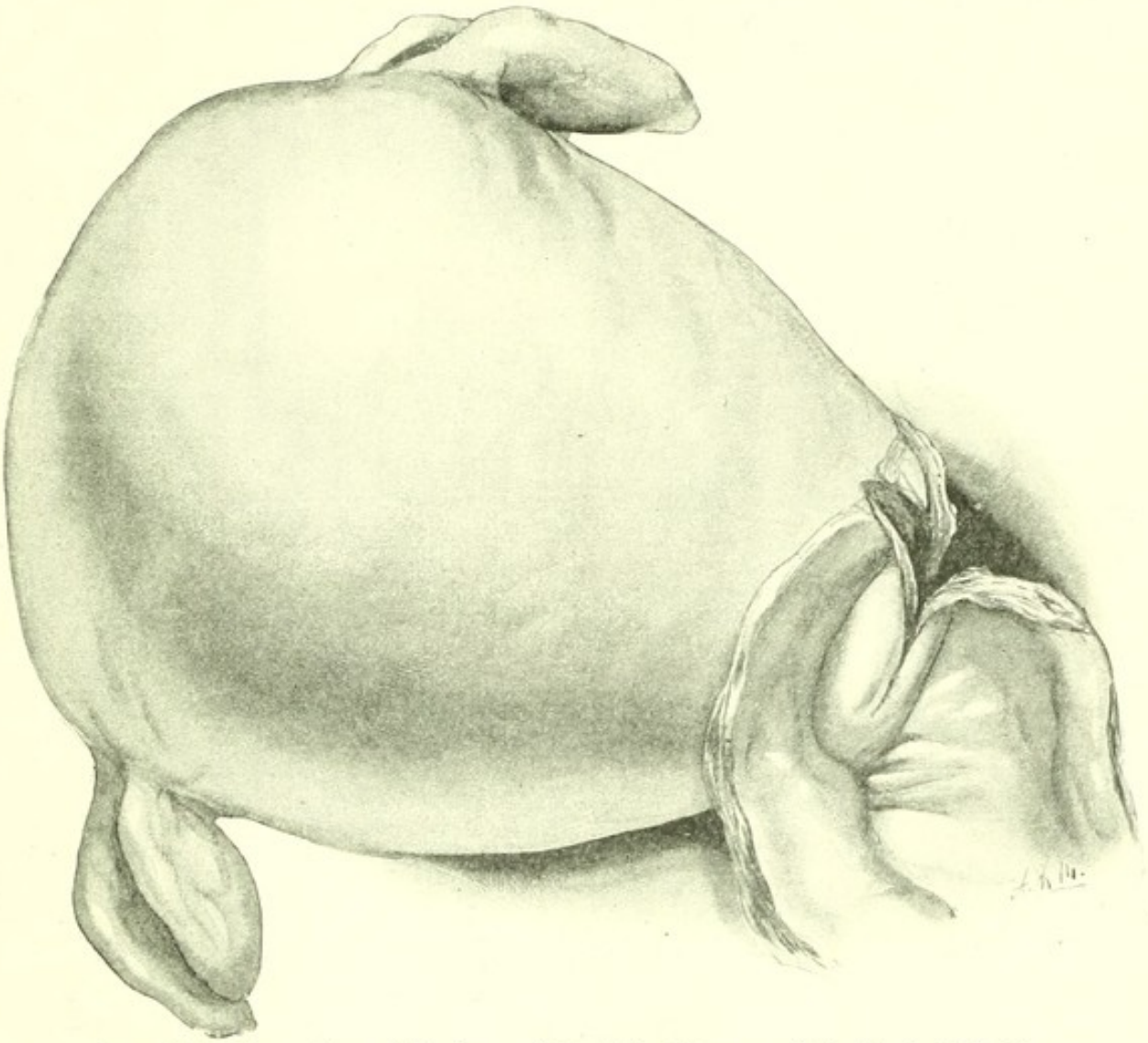


Fig. 276.—Laceration of the Lower Part of the Uterus and the Vaginal Vault. The uterus is turned over to the right to show the laceration.

immediately by severe abdominal pain, decided collapse, and other symptoms of internal hæmorrhage, small thready pulse, cold sweats, etc. Without doubt, in many cases these symptoms are present, and the nature of the condition is self-evident, but what is not fully appreciated is that sometimes they are not evident and the accident is overlooked. Here is a case from my own practice which illustrates how very gradual the onset of the symptoms may be :

Spontaneous Rupture of the Uterus during Pregnancy through the Cicatrix of a Cæsarean Section Wound.—Mrs. M——, 3-para, was admitted on October 28, 1901, to the Glasgow Maternity Hospital. In both the previous labours the children were extracted with difficulty, and were dead. On the last occasion craniotomy had to be performed. The pelvis was of the flat rachitic type, the diagonal conjugate being $3\frac{3}{4}$ inches. I therefore chose Cæsarean section, and employed the 'fundal incision' of Fritsch. I came right down on the placenta, which I removed before extracting the child. The child, which weighed eight pounds, was extracted very easily, and the uterine wound stitched with little trouble or bleeding. She was not sterilized. The temperature was never above normal, and the pulse, after the first three days, was not accelerated. The abdominal wound healed by first intention, the stitches being taken out on the fourteenth day. The patient left hospital on November 30, both she and her baby being perfectly well.

The following note was made on her admission for the second Cæsarean section on January 26, 1904 : As far as can be judged the patient is now in her thirty-seventh week of pregnancy ; she has been in good health, and has suffered no special discomfort since she became pregnant. She is well nourished and of good colour ; her pulse is of good tension, regular in force and rhythm, and numbers 84 per minute. The abdomen is irregularly enlarged, the bulk of the swelling being to the right side. There is a median firm scar of the previous Cæsarean section. Fœtal movements are active. The cervix is not taken up, but admits the tip of one finger.

After an enema, given about midnight, the patient complained of abdominal discomfort — slight pain in the epigastrium ; this extended upwards and to the right. She mentioned this to the night-nurse, but as she did not complain further and fell asleep, the nurse did not think it necessary to report the fact to the house-surgeon. She slept from about 12.30 till 5 a.m., at which time a sanguineous discharge from the vagina was noticed, and slight pain in the right iliac region was complained of. At 7 a.m. the temperature was 97·6° F., and the pulse 80 ; the pain, which had now spread over the abdomen, was not very great, so it was taken for painful uterine contractions. There was no sickness or vomiting. At 11 a.m., on making my ward visit, I spoke to the patient quite by chance, for no one considered her condition serious. I then found that there was considerable abdominal tenderness, and suggested to those present the possibility that the old uterine cicatrix had given way. As, however, the pulse was 84, regular, and of good tension, I simply advised my house-surgeon, Dr. Rodgers, to go into the case and note the patient's condition carefully. An hour afterwards I was summoned by him, as the abdominal tenderness was now more marked, the pulse 90, the temperature sub-normal, and the breathing more rapid. At this time the condition of the abdomen was as follows : She lay with her feet slightly drawn up ; on palpation there was considerable tenderness over the whole abdomen, more marked to the right and below the umbilicus ; the pain also extended up to the right shoulder. On placing the hand over the abdomen one was struck by the readiness with which the fœtal parts could be defined ; above the

umbilicus, and slightly to the left of the middle line, a limb could be made out, while the head lay towards the left iliac fossa. Two tumours could not be differentiated; percussion gave a slightly dull note in the flanks. On vaginal examination the tip of one finger could be pushed through the cervix, but the presenting part could not be felt; on withdrawing the finger they were blood-stained. The pulse numbered 88.

Strychnine $\frac{1}{30}$ grain was given, and the patient prepared for laparotomy.

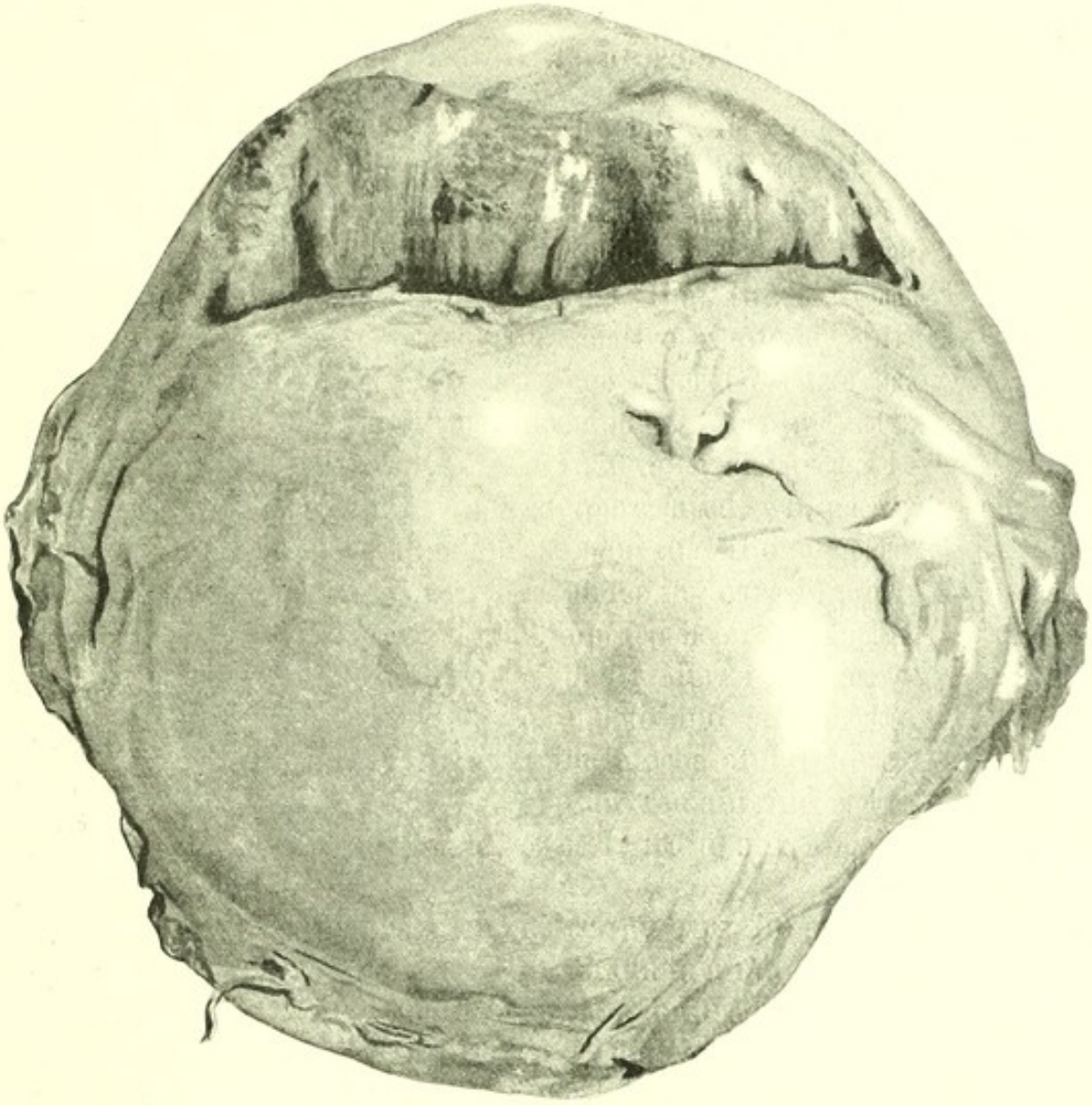


FIG. 277.—Rupture of Uterus through the Cicatrix of a Previous Cæsarean Section Wound. (Author's Case.)

She was anæsthetized, and the abdomen opened along the side of the previous incision. Immediately that was done a large quantity of dark-coloured blood escaped, and the intact membranes and placenta with the enclosed fœtus presented. The uterus lay retracted behind and down towards the pelvis. The membranes were opened into and a well-formed dead child extracted. The uterus was then examined and a transverse rupture was found extending over the highest part of the fundus (Fig. 277), evidently through the cicatrix of the wound of the previous Cæsarean

section. There were only two slight uterine adhesions, one to the omentum and one to the abdominal wall. The uterus was removed by supravaginal hysterectomy, the peritoneum being carefully brought over the stump. Finally, all blood-clot was removed, and fully 2 pints of saline solution were introduced into the peritoneal cavity. After the operation the patient was considerably collapsed; the lips, cheeks, and extremities were blanched; the pulse was 126, small, easily obliterated, but regular. She soon improved, however: the following day the pulse was 120 and the temperature 98° F. She was dismissed a month after the operation perfectly well.

Sooner or later in almost all cases symptoms arise: the woman complains of increasing abdominal pain. She assumes more decidedly the 'abdominal facies,' while a most important feature is the steady increase in the pulse-rate.

As far as I have been able to find from records of cases, this 'quiet' rupture rarely occurs in cases of spontaneous rupture early in labour; in all such cases the classical symptoms of rupture are present, and there is no difficulty in diagnosing the fact that the uterus has given way. The same also applies, although not quite so universally, to rupture in pregnancy when that accident follows any fall or strain. The cases in which the quiet rupture occasionally takes place are where the uterus is diseased or has been previously injured. In such the ovum seems to pass gradually through the uterine tear. Not infrequently the placenta is situated over the tear; quite a number of writers have called attention to this fact.

An interesting case in which rupture was found in progress was the one recorded by Staude.[1] Early in labour a small elastic tumour developed over the anterior wall of the uterus during the pains. The condition was diagnosed as a rupture, the abdomen was opened, and the diagnosis confirmed.

But after all, rupture of the uterus during pregnancy or early in labour is not a condition which is often encountered, and is, consequently, not a subject upon which one is justified in lingering. We must therefore turn to the cases which form the bulk of the examples of rupture of the uterus—those in which the tear occurs late in labour or during attempts at delivery.

In considering cases of this nature it is customary to discuss the symptomatology before and after rupture. This is a wise procedure, for in a large proportion of cases there are distinct premonitory symptoms.

After a prolonged second stage, where the expulsive forces are not at fault, the patient becomes restless and complains of constant pain over the lower part of the uterus, while the uterine contractions tend

[1] *Cent. f. Gyn.*, 1904, p. 731.

to become more and more tetanic. In addition, the pulse becomes more rapid and the temperature possibly rises slightly. Along with these symptoms there is a steady increase of the lower uterine segment. This can be easily appreciated, for the retraction or Bandl's ring can be felt to rise higher and higher. There is seldom any difficulty in palpating the ring, for it can be appreciated as a hard ridge round the uterus. I have seen it as high as the umbilicus. It is not always at the same level all round; especially is this seen in cases of transverse presentation, where one part is subjected to greater strain than the other. One can often appreciate that the wall of the segment is very thin, but as a rule it is so tense and tender that the fœtal parts cannot be differentiated. With a uterus in such a state rupture may occur at any time.

How general such symptoms are prior to rupture I have not had opportunities of judging, for, with one exception, the patients have come under my care after the rupture has occurred. From what I have been able to gather, however, in many cases they were present, and I have frequently seen them and feared rupture. When a patient in such a condition comes under my care, no attempts to deliver by version or forceps are made; decapitation or craniotomy is immediately performed.

Turning now to the symptoms which follow rupture, it is a very striking fact that in a large number of cases the rupture has not been recognized until after the birth of the child. The classical symptoms of a sudden feeling of something giving way, of cessation of the uterine contractions, of alteration in the shape of the abdominal swelling, of hæmorrhage and collapse, are very frequently absent; nor is this to be wondered at, considering that in many cases the child's head is already well engaged in the pelvis, and the rupture so often takes place during the delivery. Let us consider these symptoms.

In very few indeed of my cases or those reported by Ivanoff and others has the symptom of a sudden feeling of something having given way been present, and naturally it cannot be expected to be appreciated in the cases of rupture from violence, for the patient is then, usually, under the influence of the anæsthetic. When it is present the laceration is extensive, and the child, in whole or in part, generally escapes into the peritoneal cavity.

The same remarks apply to cessation of the uterine contractions. This symptom is again most pronounced where the child escapes into the abdominal cavity. It must not, of course, be confused with the uterine inertia which follows exhaustion of the uterine muscle; the latter is gradual in its onset.

It is hardly necessary to say that an alteration in the shape of the

abdominal swelling can only occur if the child passes in whole or in part outside of the uterus, and this, we have seen, does not occur so often as is supposed. When it does occur, two abdominal swellings can be differentiated, the one representing the parts of the child that have escaped and the other the retracted uterus. Naturally, it is most distinct when the child and uterus lie side by side; for if the retracted uterus is placed behind, as in one of my cases, it is impossible to distinguish the two swellings. When present this alteration in the shape of the abdominal swelling is a symptom of great importance, especially if the accoucheur has observed the uterine outline beforehand.

Occasionally this sign is present in other conditions than rupture. Quite recently I saw a case of dystocia from pelvic deformity in a patient with a bipartite uterus. The double swelling of the uterus and the collapse of the patient led one, on seeing the case for the first time, to think of rupture of the organ. It was a case of accidental hæmorrhage.

Similarly, in cases of plural pregnancy, the uterine outline being often irregular and double, a suspicion of rupture of the uterus may arise if the patient shows any evidence of collapse during labour. Again, in cases where there is a coexisting tumour, either ovarian or uterine, a differential diagnosis has occasionally to be made between such a condition and rupture of the uterus. But a difficulty in differential diagnosis may occur in a much simpler and more common condition—viz., in an impacted oblique presentation, for then there are two swellings with a sulcus between. Sometimes, when such cases are brought into hospital in a markedly collapsed condition, we have great difficulty in deciding if rupture has occurred or not. Indeed, often it is only possible to decide by a vaginal examination under deep anæsthesia.

In addition to an alteration in the outline of the uterus, the fœtal parts become much more easily palpated after the child has escaped into the peritoneal cavity. One must be very careful in deciding upon rupture under such circumstances, unless other symptoms and signs are present, for sometimes the uterine wall is so soft and thin that the fœtal members are felt as if underneath the thin abdominal parietes. In advanced extra-uterine pregnancy the child can also be very easily palpated.

The amount of hæmorrhage which occurs as a result of rupture of the uterus varies very greatly. Amongst my own cases I have only had three in which it was extremely severe. Ivanoff, in his long series of 124 collected cases, found only 53 in which the hæmorrhage proved fatal, and in half of them not until many hours after the accident.

One may be deceived in respect to the actual quantity of blood lost, for a considerable amount may escape into the peritoneal cavity, or into the cellular tissue around the uterus, and remain concealed. Sometimes the bleeding is surprisingly small in amount. The reasons for this are the relative situation of the tear to the larger vessels and the fact that the latter do not tear readily. In the last case of rupture upon which I operated—the case is here briefly detailed—the tear was along the side of the large uterine artery, which could be seen pulsating, but only the smaller veins were torn.

Case of Complete Rupture of the Uterus with Escape of the Fœtus into the Peritoneal Cavity—Panhysterectomy—Recovery.[1]—Mrs. X——, 2-para, aged twenty-four, had been delivered by craniotomy four years before her present admission on March 18, 1907. Present labour came on at term. Attempts at delivery with forceps failed after which she was sent into the Maternity Hospital under my care. When I saw her a little time after her admission her pulse was 140, and she was evidently ill, but not seriously collapsed. My house-surgeon informed me that she was worse than when she was admitted. There was no history of sudden pain, or of anything having 'given way.' She was not very blanched. I could feel the child free in the abdominal cavity. From the vagina I could feel an extensive tear on the right side of the uterus and vaginal vault. There was no profuse vaginal hæmorrhage. Upon opening the abdomen I found the fœtus free in the abdominal cavity, which also contained meconium, vernix caseosa, liquor amnii, and a little blood. After removing the child and placenta I examined the rupture, and found that it extended vertically through the right lateral wall of the lower segment and transversely in front, so that only a small portion of cervix remained attached to the bladder. The bladder itself was not injured. I clamped and then divided all the uterine attachments and removed the entire uterus. I then packed the lower part of the pelvis with gauze and closed the abdomen. The whole operation did not take twenty-five minutes. The patient soon got over the shock. The gauze was removed by the vagina on the fourth day. She made an uninterrupted recovery.

I have already quoted Ivanoff's experience and my own, which agrees with it. In the most recent paper on the subject, that of Eversmann,[2] this writer states that only in some 12 to 15 per cent. of cases does the blood come from the ruptured uterine vessels. It is a very erroneous idea, therefore, but one generally expressed by those with little experience of this complication, that rupture of the uterus is followed immediately by profuse bleeding. Infinitely more common is a slow but steady hæmorrhage. The pulse-rate in such cases slowly rises, and uneasiness and general abdominal pain and the

[1] *Brit. Med. Journ.*, August 24, 1907.

[2] *Arch. f. Gyn.*, 1905, Bd. lxxvi., Heft iii., p. 601.

ordinary symptoms of collapse become gradually more pronounced. The case already recorded is an illustration of this, as was also one brought to me from the country some little time ago. The patient, although driven some eight miles, had absolutely no symptoms of collapse, and her pulse was not more than 80. She was found to have a complete rupture of her uterus. I removed the uterus, and she made a most satisfactory recovery.

When all the classical symptoms are present, there is very little difficulty in coming to a diagnosis. There are few other conditions associated with similar symptoms. Accidental hæmorrhage and placenta prævia, are undoubtedly attended with all the symptoms of collapse and hæmorrhage, but a vaginal examination, at least in the case of placenta prævia, reveals the condition. With accidental hæmorrhage, either apparent or concealed, it occasionally happens that the diagnosis is rendered difficult, and scattered through obstetric literature are several recorded cases of mistaken diagnosis. In such cases the history and the presence or absence of tenseness and tenderness of the uterus will usually clear matters up. Besides, in most cases of uterine rupture one can feel the tear.

The diagnosis between complete and incomplete rupture can only be arrived at by a vaginal examination, except in the cases where the child is evidently free in the peritoneal cavity. When the rupture is complete, one feels the intestines distinctly; when it is incomplete, that is not possible. In theory, that is simple enough, but once or twice I have had a little difficulty in deciding, for the peritoneum is very thin. Some years ago I performed hysterectomy upon a case of rupture sent into the hospital by a confrère of great obstetric experience; he had packed the rent, and told me it was complete, as he had felt the intestines between his fingers. When I opened the abdomen there was no laceration of the peritoneum.

Prognosis.

The prognosis of rupture of the uterus is much more favourable to-day than it was when the condition was treated expectantly. When the latter treatment was in vogue many cases were, of course, never appreciated. But even amongst those which were recognized occasional recoveries followed. A former physican of the Maternity Hospital told me of one in which after delivery of the child he had pushed his hand through an extensive and complete rupture, and had easily felt the bowels, but yet the patient made an uninterrupted recovery without any treatment. Scattered through obstetric literature are many extraordinary cases, but certainly amongst the most

wonderful is one recorded by Leopold,[1] in which rupture occurred at the fourth month, and yet pregnancy continued to term, when the child died. On opening the abdomen three months later the child was removed. Its umbilical cord was found to run through an opening in the posterior wall of the uterus. But it is profitless to consider such rarities.

Various estimates have been given of the mortality from the expectant treatment, but it appears to have been 90 per cent. at least amongst recognized cases of complete rupture. Naturally, it was much lower in the incomplete variety.

In recent years, with a more exact understanding of the condition and with the adoption of active treatment, the mortality has fallen fully a third. It is still, however, 50 to 60 per cent., being a little higher than that figure for complete, and a little lower for incomplete, rupture. This question, however, will be more carefully considered when the different methods of treatment are being discussed.

Treatment.

As rupture of the uterus is so often a preventable accident, it is necessary that I should say a word or two about its prophylaxis. As regards those cases where the uterus has been previously injured, either by tears, incisions, curettage, or disease, subsequent pregnancies should be watched, and especially should the patient be under careful observation during the later weeks, so that, should rupture occur, an operation could be immediately undertaken. The same applies to cases in which previous labours have been difficult and protracted, owing to malformations of the pelvis, or undue size of the children, for, as we have seen, previous lacerations are often passed unrecognized, and a lower segment which has once been overstretched yields and tears more readily.

As the danger of rupture during the first stage is practically nil, excepting in cases where there have been previous lacerations or injuries to the uterus, there is nothing to be done.

In the second stage, however, if any of the premonitory symptoms of rupture arise, delivery must be carefully completed. In contracted pelvis the degree of deformity and the relative size of fœtal head and pelvis must be carefully calculated, and the safest treatment adopted. As rupture of the uterus occurs so commonly in neglected transverse presentations, it is of the greatest importance that such a malposition of the child should be early recognized and corrected. Again, if, for any reason, the presentation has not been

[1] *Archiv f. Gyn.*, 1896, Bd. lii., p. 376.

appreciated, or the accoucheur has not seen the case until after labour is far advanced, attempts at version must on no account be made, unless there is every prospect of the child being easily turned. The treatment of cases of impacted transverse presentation has been already discussed (p. 323). I would commend to my readers the remarks there made. The disastrous results that follow attempts at version in such cases are greatly to the discredit of the obstetric art.

Hydrocephalus, another condition, as we have seen, occasionally followed by rupture, is much more difficult to recognize, especially if the child presents by the breech. Its diagnosis and treatment have been considered elsewhere, and so I need not detail them again.

Before leaving the subject of prophylaxis I must again warn the accoucheur against the danger of performing vaginal operations, such as turning, etc., with the woman only partly anæsthetized. Strong contractions of the abdominal and pelvic muscles and of the uterus are set up by the introduction of the hand, and in consequence many cases of rupture, especially of rupture of the vaginal vault, are brought about by the operator requiring to employ undue force in overcoming the resistance of the tissues.

Active Treatment.—The treatment of rupture of the uterus is a subject regarding which there are still considerable differences of opinion, and in all probability it will continue in this position for some time to come.

Before, however, the active treatment of rupture can be discussed, we must consider what is to be done with the child if it is still undelivered when the rupture is recognized. In certain cases this is easy to decide, in others it is difficult. If the head is presenting and can easily be reached, it should be extracted with forceps. Often it will be necessary to perforate it, for in many such cases the pelvis is deformed, the head is of unusual size or in an unfavourable position, and the child is dead or dying. Similarly, if the breech is accessible and one or both legs can be seized, the child should be extracted by traction, and if there is any difficulty with the after-coming head it should be perforated.

Another group of cases in which the course of treatment is obvious are those in which the child has entirely escaped into the abdominal cavity. In such cases the uterus has retracted, and extraction *per vaginam* is evidently impossible; consequently the fœtus must be removed by abdominal section.

The cases which present the greatest difficulty are those where the child has partly escaped through the rent. In many of these the presentation was originally transverse, but in some the head was

the presenting part. Whatever the presentation was, the head is the part which is generally through the rupture. In such cases the course to be pursued will depend on whether one intends to continue the further treatment of the case one's self, or to place the patient in the hands of another, be it in the woman's own home, a hospital, or a nursing home. The reason for this is obvious: in all probability the tear is firmly grasping the child; the child is acting as a plug. It should only be removed, therefore, when the operator is ready to proceed with the further treatment. Whoever takes charge of the further care of the patient will have to decide between removing the child *per vaginam* or *per abdominem*. If possible, he should do it *per vaginam*, because if he drags up the child after opening the abdomen he will carry up infection. Usually the vaginal delivery will be best accomplished by bringing down one or both feet; rarely will it be possible to complete it by craniotomy or decapitation of the fore-coming head. The cases in which the operator should choose the abdominal route are those where the child's shoulders are beyond the tear.

The treatment of the lacerated uterus after the child has been delivered depends largely upon the variety of rupture. In cases of incomplete rupture, plugging the tear is the best course. There are two ways of plugging the tear—it may be done tightly or loosely. The former method must be employed if the bleeding is at all severe, but the latter, especially if a drainage-tube is inserted along with the gauze, gives better drainage. It is not necessary to douche out the tear before plugging. The gauze should be inserted with the cervix steadied by means of vulsellum forceps.

In cases of incomplete rupture, in which the abdomen is opened under the suspicion that the rupture is complete, it is usually advisable to leave the uterus, plug the cervix from the vagina, and then close the abdomen.

A very pertinent question in connexion with this method of dealing with a ruptured uterus is the subsequent treatment of the organ, for the danger of rupture at a succeeding pregnancy is considerable, as recorded cases show. A ragged tear treated by plugging must always be followed by a cicatrix, which is liable to give way in a succeeding pregnancy, and not only in the later weeks, but even as early as the fourth or fifth months. Probably the safest course to pursue in such cases is to remove the uterus some time after the patient has recovered from the accident. If the accoucheur deems it safe enough to permit a patient having another pregnancy, he must make sure that she is kept under observation during the later weeks, in case the old tear gives way.

With the great improvement in technique and the results of abdominal surgery, it is not surprising that good results were expected from opening the abdomen and removing the uterus or stitching the tear. But I fancy most of us who have adopted such a course have been not a little disappointed with the results. Without doubt, a large number of cases have been saved by such treatment. Three cases in my own list were successful, and all other operators of any experience have had occasional recoveries; but the mortality is still extremely high, because of the collapsed condition of the patient at the time of operation and the sepsis that so frequently follows. Of my fatal cases, two died of shock very shortly after the operation, and four of sepsis. One is not disheartened by death from shock, for in this condition it is often impossible to prevent it; but it is very disappointing when a patient recovers from the shock and dies of septicæmia. In the cases which died of sepsis the patients died on the fourth, fifth, eleventh, and thirteenth days respectively. It is not to be wondered at that septicæmia so frequently follows. Many of the cases have been carelessly handled; the tissues have been much bruised; micro-organisms have been introduced, and actually rubbed into the tissues during the various manipulations carried out; and the patients are exhausted by prolonged labour and loss of blood. Nothing could be more favourable for the occurrence of infection.

Table of Author's Fourteen Cases.

	Number of Cases.	Maternal Deaths.
Died unoperated upon (both complete)	2	2
Plugging (all incomplete)	3	0
Hysterectomy (Porro's) (incomplete)	1	1
,, retroperitoneal treatment of stump (all complete)	5	3
Panhysterectomy (all complete)	3	2

Total maternal mortality in cases treated ... ... 50 per cent.
Mortality for hysterectomy (9 cases, 3 deaths) ... ... 67 ,,

When the abdomen has been opened for the purpose of extracting the child, or when abdominal section is decided upon after the child has been removed by the vagina, there are several modes of dealing with the uterus.

(*a*) Complete removal of the organ—panhysterectomy.
(*b*) Supravaginal amputation, with retroperitoneal treatment of the stump.

(*c*) Amputation of the uterus after Porro's method.
(*d*) Stitching the laceration and plugging.

Panhysterectomy is the most radical treatment. My own results show a mortality of 67 per cent.

Klien,[1] in his thirty-eight collected cases, 1880-1900, states that total hysterectomy was performed thirteen times, and the mortality was 54 per cent. Eversmann[2] puts it at 54 per cent., while in my collected cases from English and Continental literature for three years, 1903-1905 inclusive, there were seven deaths in twenty, a mortality of 35 per cent. This latter figure, however, does not, I believe, represent the actual mortality from the operation. For statistical purposes individual cases are of little value; one requires to get a series of cases from different authors. At the present moment the operation of total extirpation has, I feel sure, a mortality of over 60 per cent.

The method of carrying out the operation is detailed elsewhere (p. 420). It is the operation which I think will ultimately give the best results. The only treatment which I think may come into competition with it is simple stitching of the peritoneum and draining. I shall refer to this treatment later.

Panhysterectomy is, theoretically, the soundest treatment, because by this method one removes the uterus (body and cervix), both of which are infected. If the cases of ruptured uterus which die of sepsis are examined, it will be found that the sepsis is generally local. That being so, the best thing to do is not only to remove the entire uterus, but to pack the pelvis with iodoform gauze, bring the end out through the vagina, and leave the gauze in for three to four days. I used to be afraid of leaving gauze in so long, but I often do it now when I make a complete clearance of septic reproductive organs.

The operation which is most favoured when hysterectomy is performed is supravaginal amputation of the uterus, with retroperitoneal treatment of the stump. In other words, the peritoneum is stitched over the stump. The steps of the operation have been already fully described (p. 417). The advantages claimed for this method are that it is easier than total hysterectomy, takes less time, and so is attended with less shock. I think these advantages are theoretical, and I feel sure are more than counterbalanced by the ill-effects which result from leaving the ragged infected stump of the cervix behind. Klien gives the mortality by this method in fifty

[1] *Archiv f. Gyn.*, 1901, Bd. lxii., Heft ii., p. 193.
[2] *Op. cit.*, p. 663.

cases as 46 per cent. In Eversmann's collected cases the mortality works out at 51 per cent., and for my collected cases at 35 per cent.

My own personal experience has not been very fortunate. I have adopted this method of operation five times, but have only had two successes—a mortality of 60 per cent. One died of shock a few hours after the operation, and the others of sepsis on the fourth, seventh, eleventh, and thirteenth days respectively. This is the great danger. In reading over the recorded cases it appears that the best results are obtained by simply bringing the peritoneum over the stump, not carefully stitching the latter, as described (p. 420). The late Milne Murray[1] specially referred to that in a case he recorded shortly before his death. In addition to giving good drainage, it saves time, so that the operation can easily be carried out in twenty minutes. The cellular tissue should also be drained by gauze loosely packed round a rubber drainage-tube.

Formerly the removal of the uterus and the treatment of the stump after Porro's method was most favoured, but in recent years it has almost been given up, so that in cases collected from the literature 1903-1905 I found only ten reported, with 50 per cent. mortality. Porro's method is a very crude method of treating the stump. The claim by Spencer, Fehling, and a few others, for its employment in certain cases of Cæsarean section where the uterine cavity is infected, I can understand; but its employment in rupture of the uterus is of no advantage, for the cervix, the vaginal vault, and the cellular tissue are infected.

It is very probable that the last method, stitching the peritoneum, may come into favour, as it has been recently advocated by no less an authority than Zweifel, whose results from hysterectomy have been so unsatisfactory.[2] He advocates a very careful abdominal toilet, stitching the peritoneal coat, but is opposed to draining from the vagina. The method has this great advantage, that it can be easily performed and may be carried out in the patient's own dwelling, as witness a most interesting case recently recorded by Down,[3] who not only saved the mother, but saved the child.

It is a mistake, however, not to drain, for there must be some infected material left in the peritoneum. Eversmann's figures indicate that the results are better when drainage is employed.

It is very questionable if stitching the whole thickness of the torn edges of the wound is advisable, for it is not sound surgery to stitch

[1] Trans. Edin. Obst. Soc., vol. xxvii., p. 39.

[2] *Hegar's Beiträge*, Bd. vii., p. 1.

[3] *Lancet*, 1904, vol. ii., p. 755.

a lacerated infected wound (in Zweifel's recent recommendation of stitching it is only the peritoneum that is stitched).

Plugging and draining the tear, even although the laceration is complete, is favoured by several operators, and in this country has a strong advocate in Spencer. At the present time I believe it gives the best results. In one respect this is highly satisfactory, for it is the simplest treatment for the practitioner who has no experience of abdominal surgery. Naturally in all cases where this conservative method is employed the accoucheur must make sure that all bleeding is arrested.

Personally, I believe that the complete removal of the uterus, with subsequent packing of the pelvis with iodoform gauze, will ultimately give the best results.

Laceration of the Cervix.

Slight laceration of the cervix is unavoidable in a primipara delivered at term of a normal sized child. In most cases the laceration is very slight, and in some can hardly be appreciated.

The laceration most commonly occurs on the left side of the cervix. The explanations generally given for this are, that the uterus being usually displaced to the right, there is a greater strain on the left side of the cervix, and that in so many cases the head comes through the cervix with the occiput directed towards the left side. Until recent years I was of opinion that extensive lacerations of the cervix only occurred in cases that were interfered with, either by dragging the child through the undilated cervix or by administering ergot. I have, however, seen cases, in both my hospital and private practice, in which extensive lacerations occurred where labour was spontaneous; nor is this to be wondered at when one thinks that it must be very seldom that the forces and resistance of the parts are normal. But although the obstetrician cannot be blamed for extensive lacerations of the cervix in all cases, it must be admitted that in the vast majority of cases the tearing results from too early extraction of the child with forceps, or dragging on the breech. It is highly undesirable, therefore, unless the life of the mother or child is in great danger, to forcibly drag the child through an incompletely dilated os. In considering forcible dilatation of the cervix and the methods for carrying out this operation, I referred to the dangers of lacerating the cervix, particularly in cases where the cervix was unobliterated and the pregnancy was still of an early date. Details regarding the prevention of cervical injury in such cases will be found in Chapter XXVIII.

In but few cases does laceration of the cervix manifest itself by

any particular signs or symptoms. True, in certain cases there is hæmorrhage of a more or less profuse character, which, as I said before, was to be distinguished from hæmorrhage from the placental site by the fact that the uterus was well contracted, but in not a few cases the hæmorrhage is slight (p. 608).

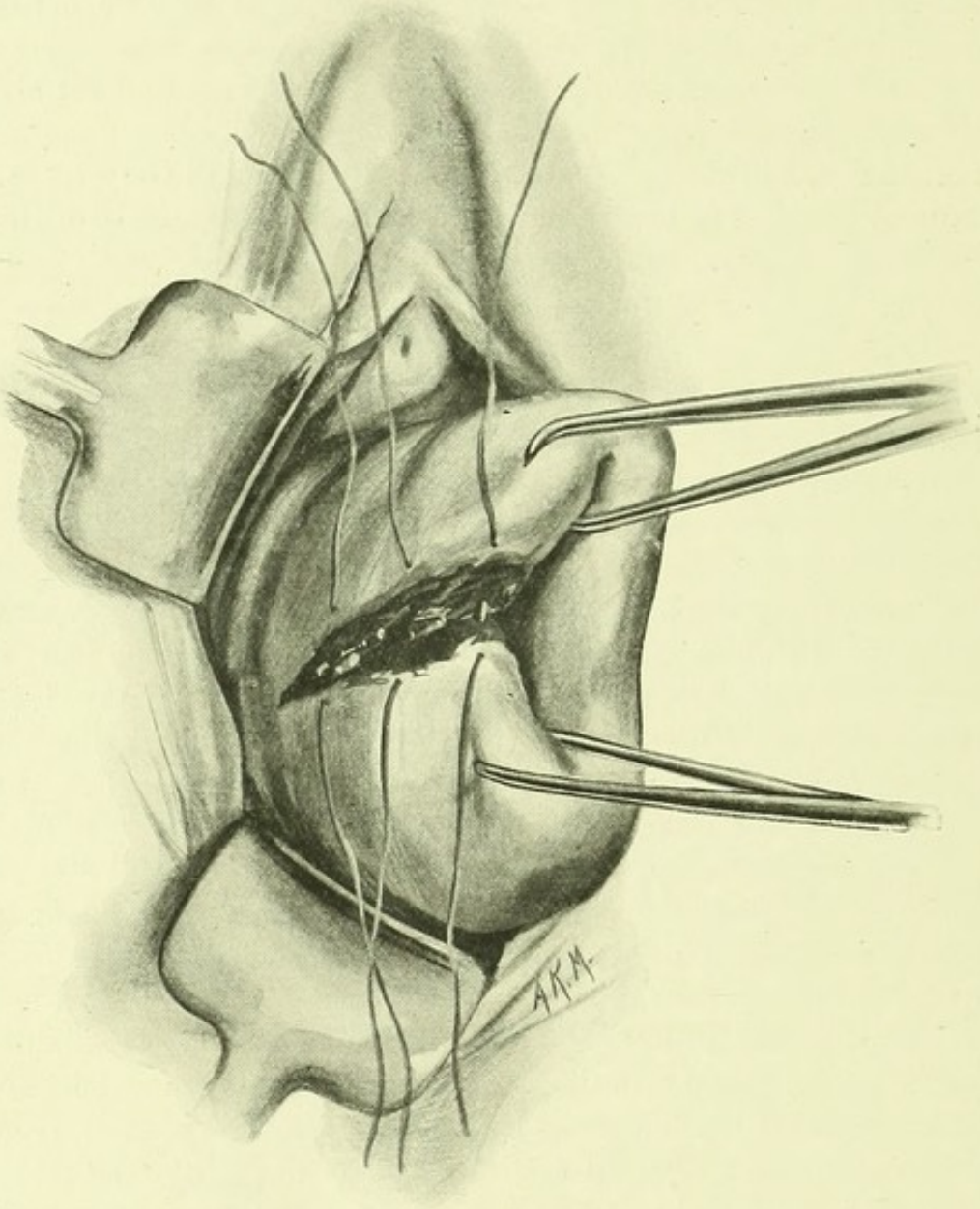


Fig. 278.—Stitches applied in Suturing a Lacerated Cervix.

It is undesirable to introduce the fingers into the parturient canal unless, after a difficult accouchement, there is the probability that the cervix is injured; it is undesirable to search for any laceration; when, however, it is suspected, either from the hæmorrhage or by reason of the operative interference, it is well to examine the cervix. This is best done by attaching vulsellum forceps to the

anterior and posterior lips and pulling the cervix down. In doing this it must not be forgotten that the tissue is very friable and easily torn, so too great traction must not be applied with the forceps. The uterus should also be pressed down from above.

Should a tear in the cervix be discovered, it must be carefully stitched with catgut, and as far as possible the whole thickness of the cervical wall embraced in the ligature. The illustration shows how the stitches are introduced (Fig. 278). It will often be found best to introduce the lowermost one first, and, using it as a tractor on the cervix, place the uppermost ones afterwards. In performing this little operation it is well to protect the vaginal walls with retractors. For stitching the cervix a medium-sized half-circle needle is the best one to employ; also it will be found that a needle-holder is of distinct advantage. When the sutures are inserted they should be firmly tied and cut short.

Laceration of the Perineum.

In ordinary obstetric practice this is, in all probability, the commonest accident that occurs. Left to nature, lacerations of the perineum, more or less extensive, frequently occur—indeed, they are the rule. I have always carefully examined the perineum after delivery in cases of primiparæ, where the birth occurred spontaneously without any attention from nurse or doctor, and I have usually found lacerations. Undoubtedly, in certain cases the perineum has entirely escaped, but that, in my experience, is the exception; indeed, in some cases I have seen very extensive laceration of the perineum result. On the other hand, in most cases conducted by an accoucheur of experience only slight tears are the rule, and, indeed, in a great number of cases practically no tearing at all results; there is a slight tear of the fourchette, but that is all. From these two facts it is evident that a very great deal can be done by the intelligent and practised obstetrician in preventing lacerations of the perineum, and it is most important that the young obstetrician should give this matter his most careful consideration and attention. He will require to attend a large number of deliveries before he gains the requisite amount of skill and dexterity in guiding the head safely over the perineum.

I need not impress upon my readers the importance of preserving the perineum, and should it rupture, as rupture it will in certain cases, of repairing it carefully. The future comfort of the woman depends in great part on the preservation of this all-important pelvic support. Every one is familiar with the chronic catarrhs,

displacements, dragging pains, etc., complained of by women where the perineum has been destroyed and has not been carefully repaired.

Many conditions favour laceration of the perineum. Amongst these may be mentioned a large head, and especially a much ossified head incompletely moulded; unfavourable presentations of the head, especially occipito-posterior presentations; rapid extraction of the unmoulded after-coming head; and large shoulders. On the side of the mother, we have a narrow pelvic outlet, which necessitates a special distension of the perineum before the head can round the symphysis. One very frequently hears the accoucheur blame the consistency of the perineum for the laceration, and although he is often simply excusing himself, in not a few cases he is justified in his contention, because the tissues are sometimes so soft that they tear on the slightest distension, or so rigid that they refuse to distend. In the former condition of the perineum nothing can be done to prevent laceration; all that one can aim at is to control the tear as far as possible. In the latter condition, however, laceration of any extent may be prevented by the administration of opium or chloroform, which relaxes the part sufficiently to permit of a more complete distension. In these cases when the perineum is rigid fomenting the perineum or smearing it with a lubricant has been recommended; neither of these devices is of any value.

Apart from these conditions referred to, laceration of the perineum not infrequently occurs through a faulty manual or instrumental delivery. In difficult deliveries the accoucheur, in his anxiety to extract the child, tears the perineum with his hand or with the instrument. I have not infrequently seen cases in consultation or brought into hospital where the perineum has been destroyed before the head has been brought down to the pelvic floor. Lacerations of this nature should not occur if the operator is careful and does not excitedly carry out his manipulations.

In ordinary cases there are three points to attend to in preserving the perineum: (*a*) The presenting part should be allowed to distend the perineum when that is at all possible; (*b*) the head should be maintained in an attitude of flexion when it is delivered; (*c*) the head should be allowed to escape slowly through the vulvar orifice.

It is most desirable, when at all possible, to allow the perineum to become slowly stretched by the presenting part. Of course, in certain cases, where the life of the child or the mother is in danger, this cannot be permitted; but these cases are fewer than is generally supposed, and if a little more patience were exercised by the medical attendant, they would become much less frequent. When it is necessary to drag a child from the pelvic cavity, this should be done

slowly and cautiously, so as to permit of gradual stretching of the pelvic floor. It should also be always done under an anæsthetic, in order that the parts may be as relaxed as possible.

Next to allowing the perineum to be distended, it is of the greatest importance that the head should escape flexed. In that attitude the smallest circumference of the head—the suboccipito-bregmatic—passes through the vulvar orifice.

Lastly, the head must be allowed to escape slowly so that the vaginal outlet is gradually distended.

There are many methods described for guiding the head over the perineum, but the differences in detail are of comparatively little moment, provided the three important points already mentioned are

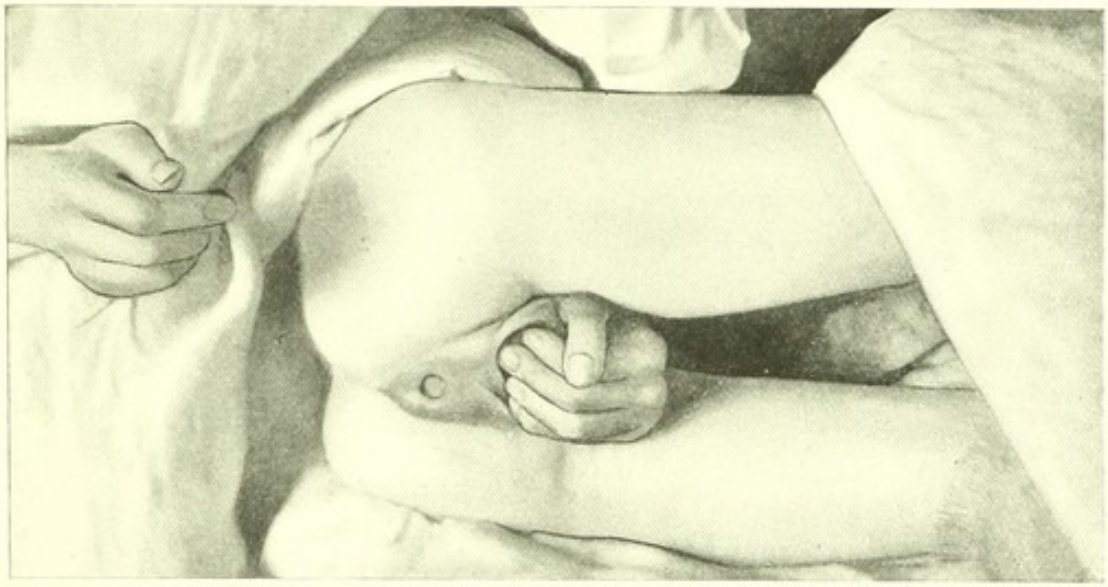


Fig. 279.—The Prevention of Perineal Laceration.

The accoucheur is controlling the passage of the head through the vulvar orifice.

attended to. I will, therefore, only describe the method which I have found the best, and which is employed in the Glasgow Maternity Hospital. When the head appears through the vulvar orifice, its progress is very carefully watched, and the patient and accoucheur take up positions as indicated in the illustration (Fig. 279). The patient, lying in the left lateral position (I believe one has better control over the patient in this than in the dorsal decubitus), is placed across the bed, with her pelvis slightly over the edge of the bed. The accoucheur stands with his back to the patient. His left arm is passed between the patient's thighs, and the palm of the hand is placed over the occiput as the head is driven down with each pain. The palm of the hand controls the escape of the head; but it is also employed from time to time in preventing the occiput hitching against the symphysis

pubis and so becoming extended (Fig. 280). It will be seen also in the illustration that the fingers of this hand take pressure off the posterior commissure of the vaginal orifice. The other hand at first does nothing except assist the right hand in preventing the too rapid escape of the head should the pains be unduly severe. With each succeeding pain a little more of the child's head is allowed to escape. The final delivery of the head should be completed in the interval between two pains, and it is a great advantage to have the patient at this stage deeply anæsthetized. The actual delivery is carried out by pushing the head through the vulvar orifice, with the right hand pressing upon the forehead from behind the anus (Fig. 281). The

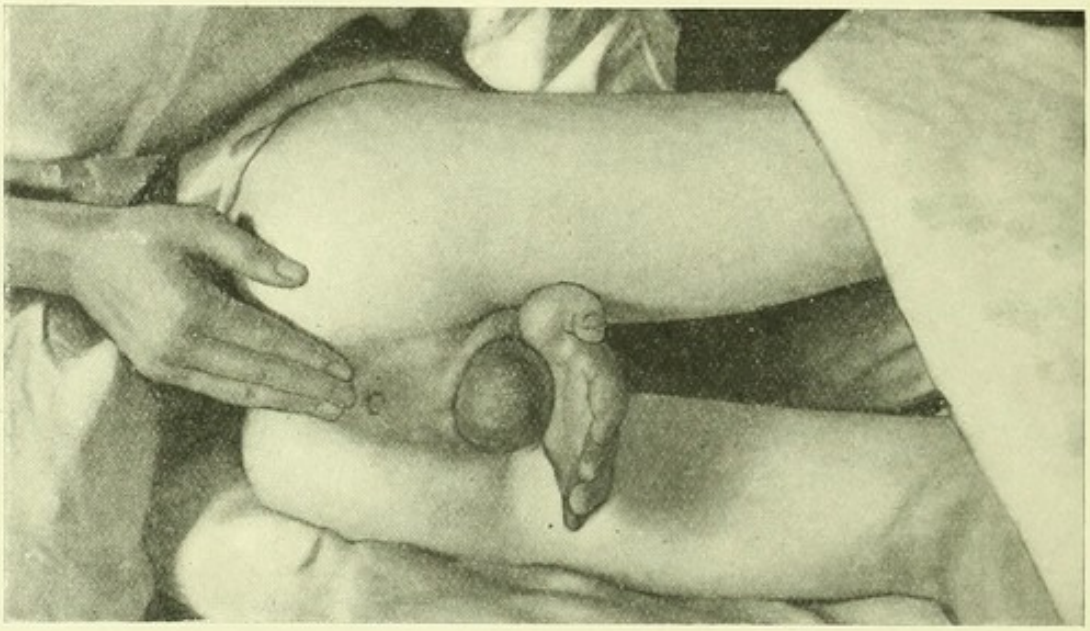


Fig. 280.—The Prevention of Perineal Laceration.
The accoucheur is maintaining flexion of the head and preventing the occiput from catching against the symphysis pubis.

great mistake is in commencing this pushing out of the head too soon, for if that is done the head is extended. Unless there is some reason for unduly hastening the delivery, the anterior margin of the anterior fontanelle should have reached the posterior commissure before this manœuvre is employed. One is often disappointed by seeing a laceration occur just at the last moment when the forehead is escaping, especially if the head is imperfectly moulded.

The method described and the position taken by the accoucheur is, I believe, the best, for if one attempts to control the delivery without having an arm round the thigh of the patient one has not the same command over her. She may suddenly make a movement at the height of a pain, and the head may slip from one's grasp.

It will be frequently found that the shoulders increase the perineal

tear if they are not carefully guided over the perineum. They seldom originate tears, but the point of the shoulder gets into the laceration already made and extends it.

At this point it may be well to say a word regarding the making of lateral incisions in the vaginal orifice, with a view to preventing lacerations of the perineum. The technical name of this operation is "episiotomy." On theoretical grounds there is much to be said in its favour, for by having recourse to it one often preserves the perineum from laceration, and it is much simpler to stitch up exactly a clean incised wound in the lateral wall than a ragged one in the posterior. It is an operation, however, that is only rarely required, provided the

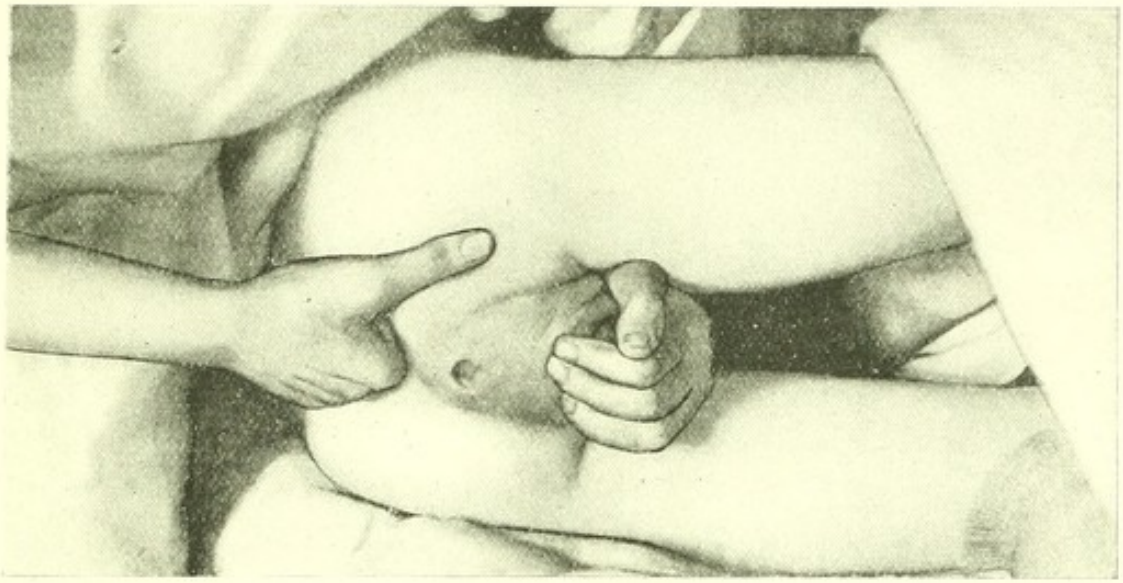


FIG. 281.—The Prevention of Perineal Laceration.

The accoucheur, while maintaining the head in a condition of flexion, is now allowing it to escape from the vulvar orifice during the intervals between the pains.

accoucheur is careful and attends to the points already referred to in the management of the perineum. It is difficult to decide in what cases one should have recourse to the operation, for on the one hand, if one has recourse to it too often it will be frequently performed unnecessarily, while on the other hand, if one delays too long, any advantage to be gained in performing it will be lost. For my own personal guidance, I have made this simple rule—I incise the lateral wall if the posterior commissure of the vagina tears before the head has escaped to any extent. The incision is best made with scissors in the manner seen in the illustration (Fig. 282); afterwards the wound is carefully stitched with silkworm gut.

The Repair of Perineal Lacerations.—In spite of all one's efforts to prevent them, perineal lacerations will occasionally occur. They are frequently described as being of three degrees: the first,

when the laceration is only slight; the second, when it reaches the margin of the anus; and the third, when it reaches the sphincter and extends into the bowel.

No matter how small the perineal tear may be, it should be carefully stitched, for it is important not only to preserve the floor of the perineum, but to preserve the sphincter of the vagina. Besides, any raw surfaces left, especially about the perineum, are open channels for infective organisms to gain an entrance.

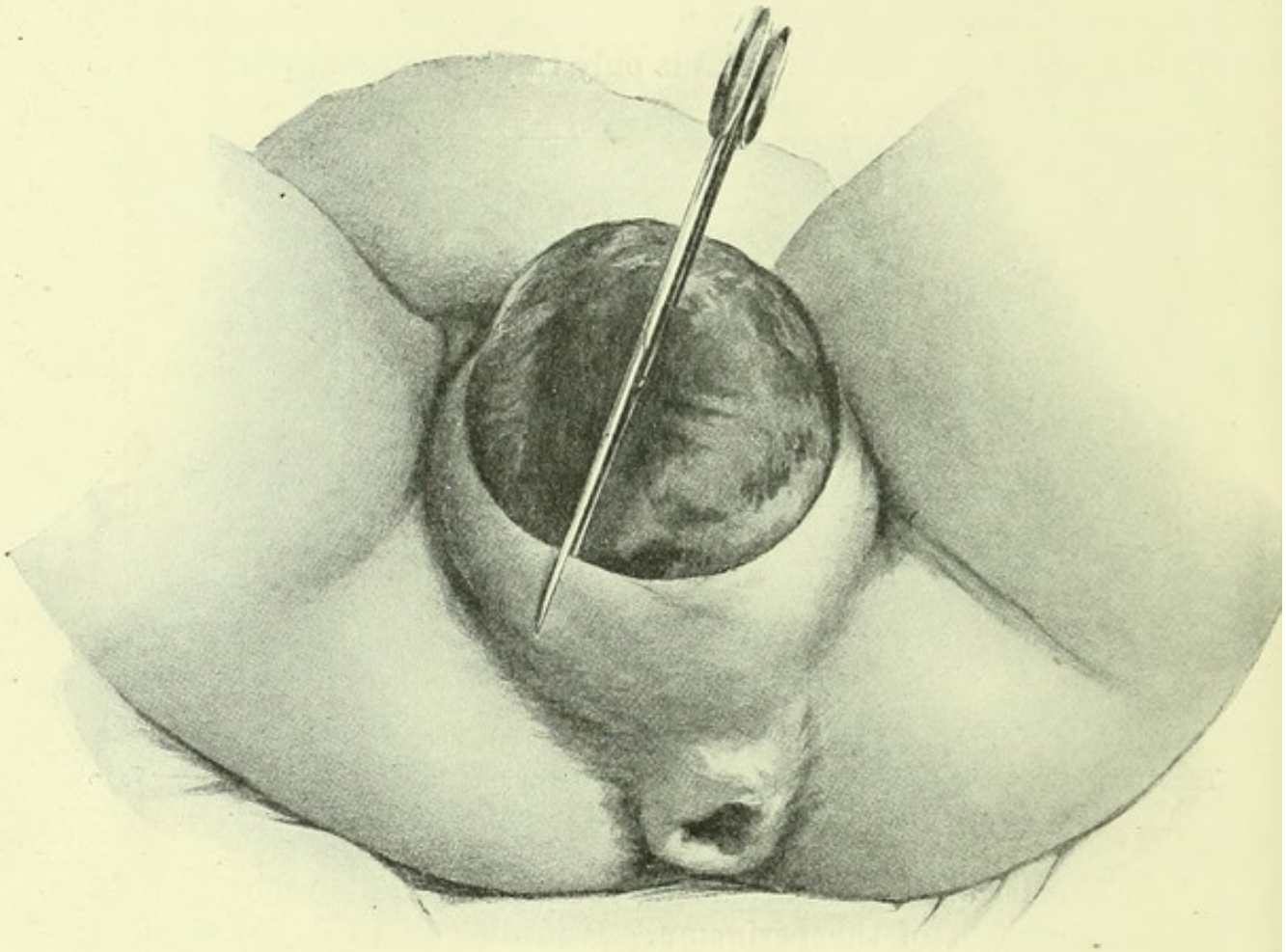


Fig. 282.—Episiotomy. (Bumm.)

For very slight tears through-and-through catgut sutures are quite sufficient. With the more extensive lacerations, however, more careful suturing is required, even although the laceration is only of the second degree and the sphincter ani is not involved. Personally, I have found the results from stitching the whole tissue through and through with silkworm gut hardly satisfactory, for the laceration often extends up the posterior vaginal wall, and exact coaptation of the edges of the wound cannot be obtained. One secures quite satisfactory skin union, but not complete union of the

torn recto-vesical fascia and levator ani muscles. The consequence of this is that the thin pelvic floor yields as time goes on, and is practically no support to the pelvic organs.

In these cases, therefore, I think it well to put in one or two

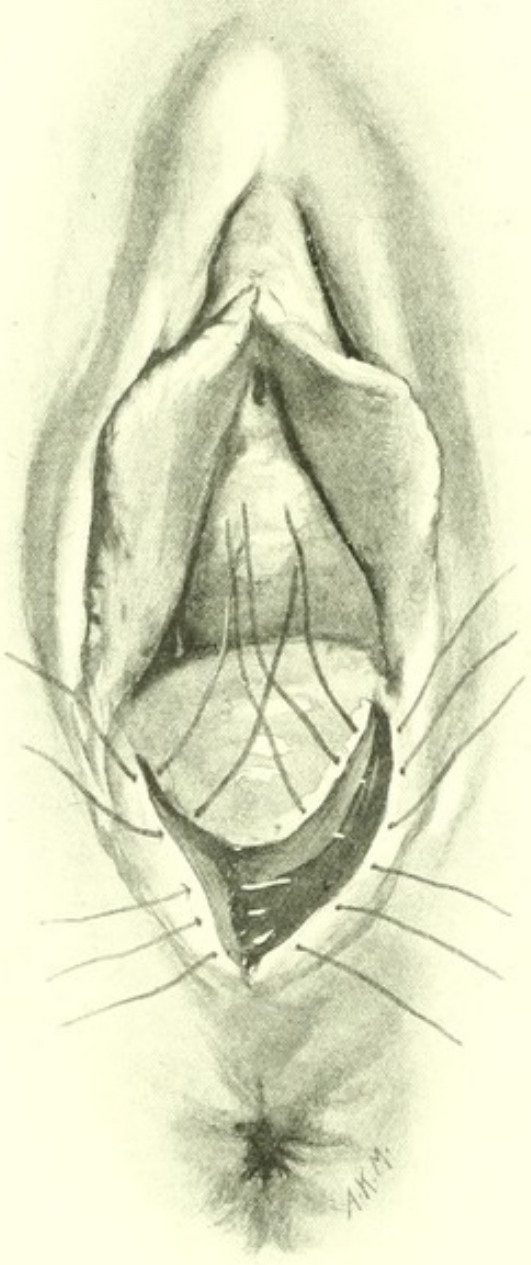


FIG. 283.—Repair of a Slight Perineal Tear. (After Bumm.)

vaginal sutures of catgut, with the object of bringing the vaginal edges of the wound into exact apposition (Fig. 283). This, I think, is better than inserting a continuous suture from the vaginal side, although others prefer the latter method. Whichever method is

employed, four or five silkworm gut sutures should be inserted and tied externally. As the cut ends of these sutures sometimes cause a good deal of discomfort, it is a very good plan to knot the ends of each suture together. The only objection to this device is that blood-clot and lochial discharge get entangled in the loops. How-

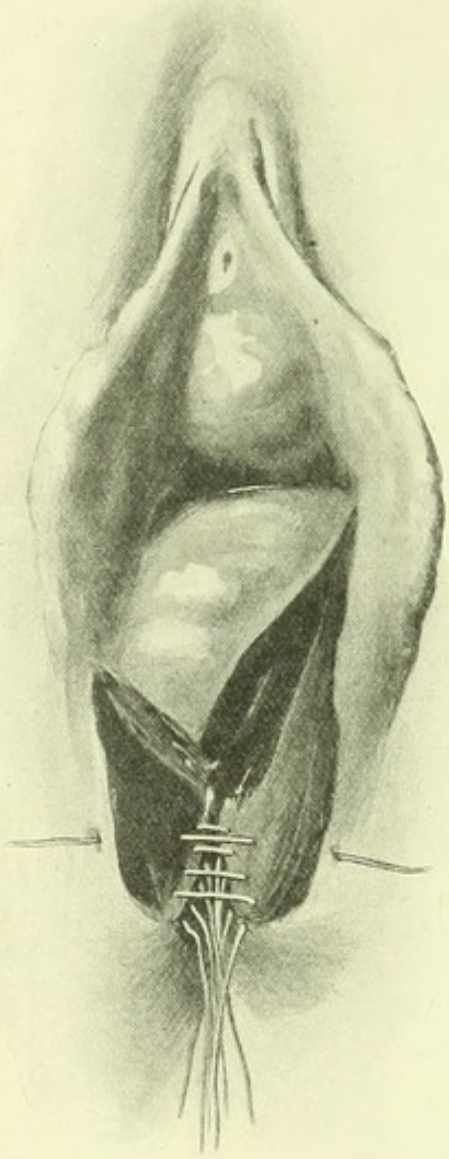


FIG. 284.—Repair of a Complete Tear. (After Bumm.)

The stitches as here applied are knotted in the rectum. This is the better method of stitching a complete tear.

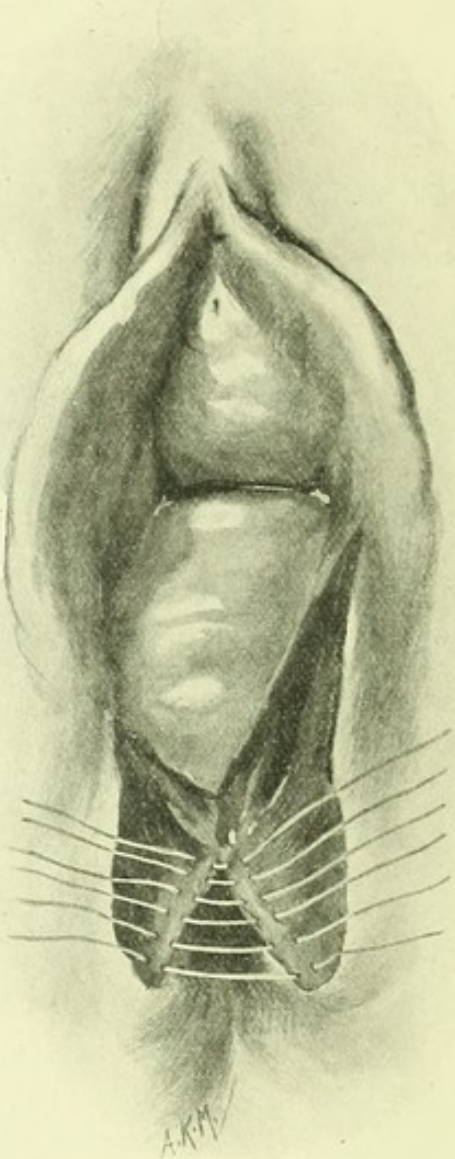


FIG. 285.—Repair of a Complete Tear. (After Bumm.)

The stitches as here applied are knotted on the vaginal side and left buried.

ever, if the nurse is careful in sponging the parts this should not occur, and the additional comfort to the patient and the ease with which the stitches can be withdrawn afterwards is in most cases, I have found, a decided gain.

Should the sphincter be involved and the laceration extend into

the rectum, the wound must be stitched as shown in the illustrations. First of all, two or three sutures are passed through from the bowel so as to close up the tear in the latter, then one or two buried sutures are inserted in the deep part of the perineal body to bring the vaginal torn edges together, and, last of all, three or four silkworm stitches are introduced from the outside in the manner described for an incom-

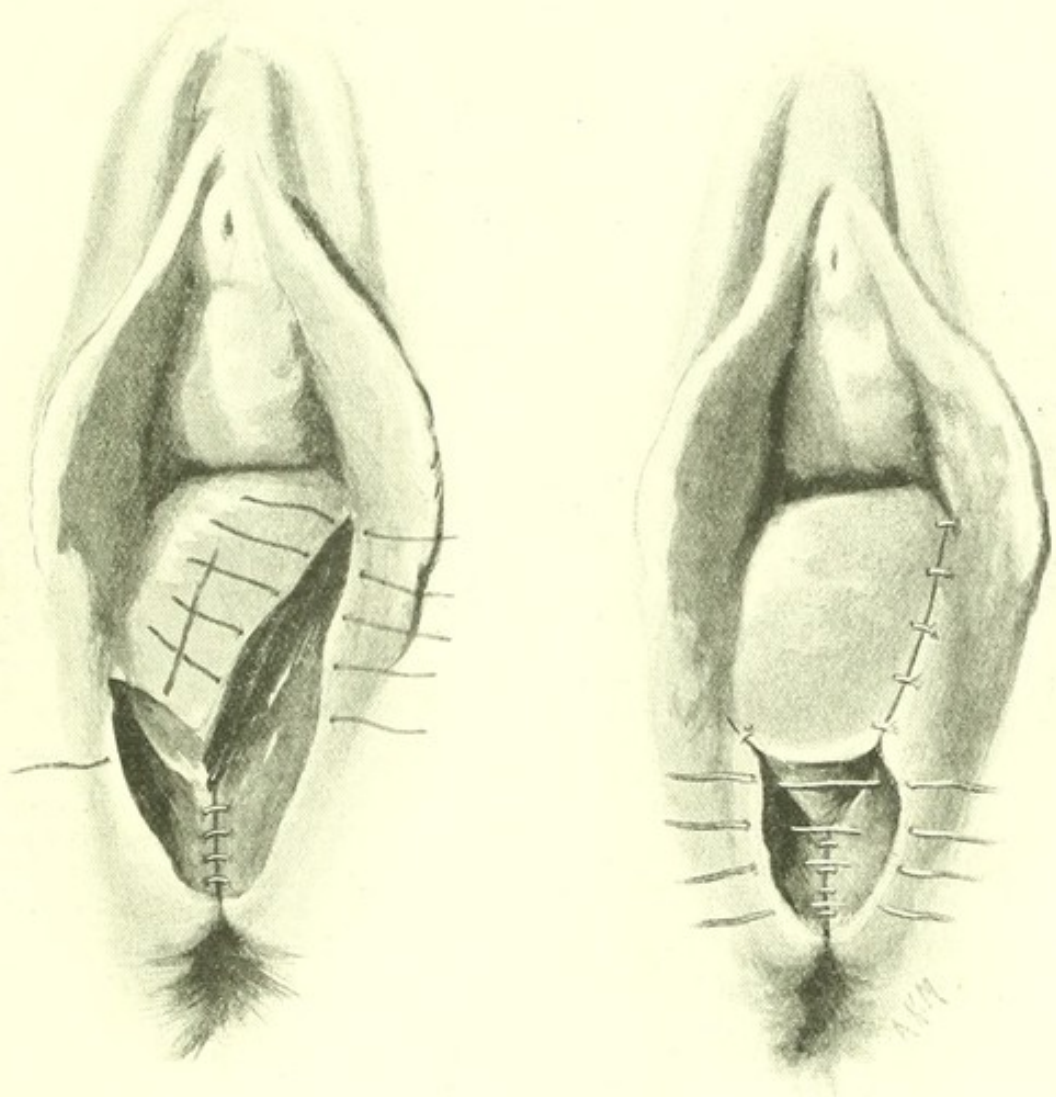


FIG. 286.—Repair of a Complete Perineal Laceration. (After Bumm.)
The wound into the rectum having been closed, there is here shown the further steps in repairing the rupture.

plete laceration. In the illustrations (Fig. 284 and 285) are shown the alternative methods of inserting the stitches in the bowel. I have tried both methods, but am fully convinced that it is better to employ the one shown in Fig. 284, and knot the sutures in the bowel. After suturing the bowel, the repair of the perineum is completed as shown in the illustration (Fig. 286).

Rupture of the Symphysis Pubis.

Never to my knowledge has this accident occurred in any of my private or hospital patients. In two cases, however, after severe parturitions, the patients complained of great pain in the neighbourhood of the symphysis pubis. I was satisfied at the time that the joint had been injured, but I could not discover any separation of the bones or undue mobility of the joint.

One would naturally expect that the accident would result from a difficult instrumental labour. Strassmann,[1] for example, has described one in which it followed the employment of high forceps. But in not a few cases the delivery has been spontaneous. Mayer[2] recently detailed such a case, and referred to others of a similar nature. In Mayer's case the joint became infected, and as there is usually some vaginal laceration, it is readily understood how this may occur. The treatment for the condition is to stitch any vaginal laceration, and to strap the pelvis and apply a firm binder. Should the joint become infected, it should be drained.

[1] *Verhandlung Deut. Gesell. f. Gyn.*, 1907, p. 726.
[2] *Hegar's Beiträge*, 1907, Bd. xi., p. 200.

CHAPTER XXXVI

ACCIDENTS TO MOTHER (*continued*): INVERSION OF UTERUS—PULMONARY EMBOLISM—SUBCUTANEOUS EMPHYSEMA

As the present work is devoted entirely to operative midwifery, I do not deem it suitable to consider in any detail the complications which follow parturition. I feel, however, that I must refer to three which occasionally manifest themselves immediately after labour. These three are: inversion of the uterus, pulmonary embolism, and subcutaneous emphysema.

Inversion of the Uterus.

We are here only concerned with this accident as it occurs immediately or shortly after the birth of the child, so-called 'acute inversion.' I do not intend considering cases of chronic inversion, or those which result from the presence of tumours, etc.

The frequency of this condition is variously stated. Jardine, for the Glasgow Maternity Hospital, found that it occurred three times in 51,290 cases.

Naturally, there are different degrees of inversion—from the simplest, where there is only a depression over the fundus, to the most extreme, where the uterus is turned inside out and the vaginal walls also are everted (Fig. 287).

Etiology.—As regards the etiology of the condition opinions differ, for while some consider that a localized atony, more particularly of the placental site, along with active contractions of the rest of the uterus, is all that is necessary, others hold that the accident results from pure atony, the inversion being produced by pressure from above, by the hand, or by the contraction of the abdominal muscles, or dragging on the cord from below. The latter, without doubt, in a large proportion of cases, seems to be the correct explanation of the occurrence; but it is quite conceivable that the former view may also be correct, for once an indentation has occurred, it is evident that complete inversion may be produced by uterine contractions alone.

The most valuable and original contributions to the etiology and treatment of this condition in recent years are those made by Bar.[1] Bar has pointed out how little the anterior vaginal and uterine walls are supported, and how, therefore, they fall down and drag the rest of the uterus after them. Apart from uterine retraction, the chief supports against inversion are the infundibulo-pelvic ligaments (Fig. 288).

Although, as one would expect, multiparæ are more liable to this complication than primiparæ, still, there are quite a number of the

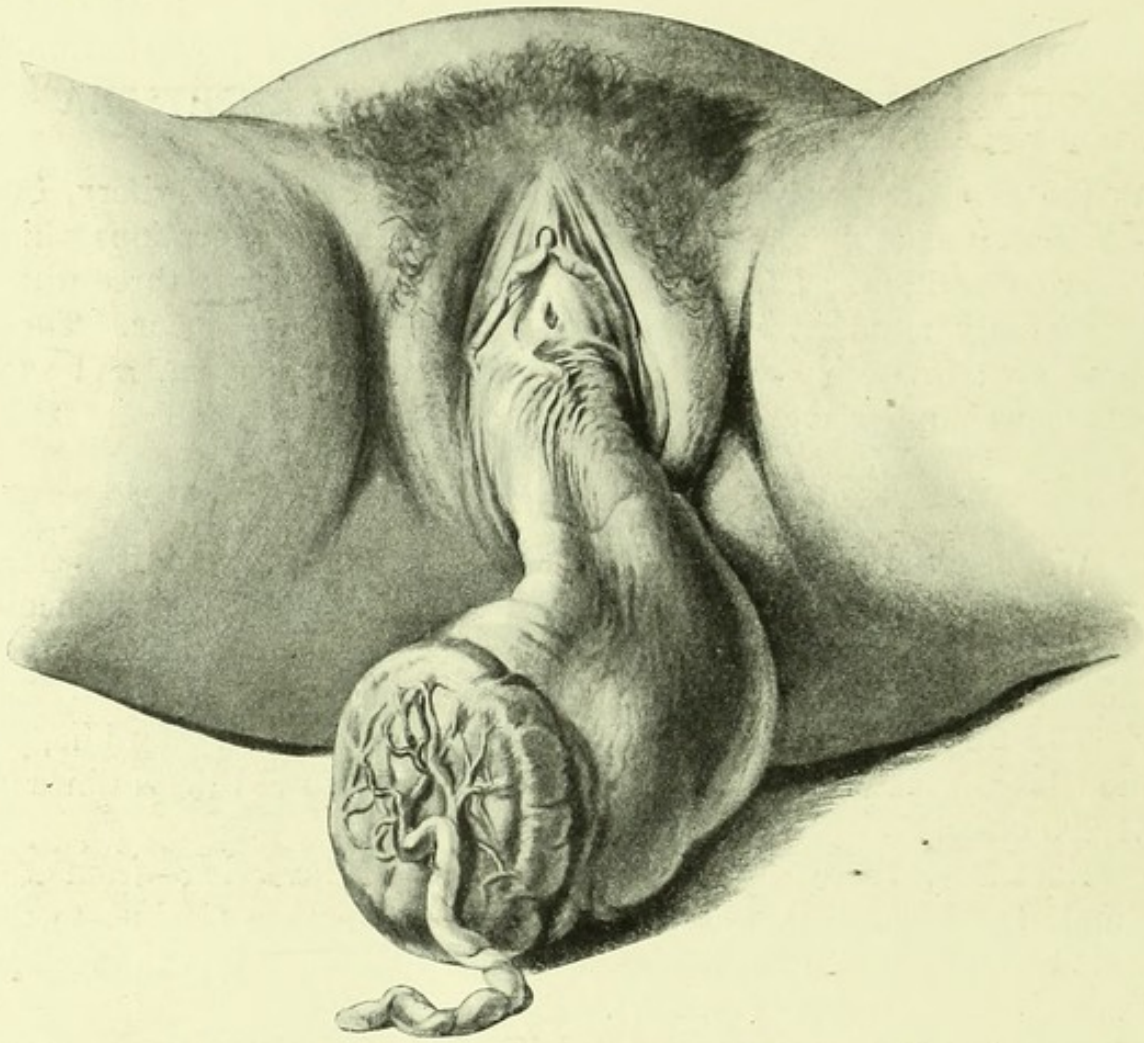


Fig. 287.—Complete Inversion of Uterus and Vagina. (Bumm.)

latter; in my series of collected cases the proportion of primiparæ to multiparæ is as 9 to 12.

Without attempting to make an exhaustive table of the recorded cases of the last few years, I collected, for the years 1903 to 1905 inclusive, twenty-three cases from English and Continental literature. In examining them it is very evident that in the majority of cases the occurrence has followed pressure from above or traction from below.

[1] *Bull. de la Soc. d'Obst. de Paris*, 1901, 1902.

In looking over the series I was not a little surprised at the large proportion of cases in which traction on the cord was the cause. With few exceptions, in these cases midwives had charge of the patients. Of course one must not forget that in recording cases of inversion of the uterus, the tendency is for the practitioner to record those cases in which he has not been to blame, still, even allowing for that, traction on the cord appears to be a very important cause of inversion, a much more important cause than I supposed. In this connexion an interesting case is recorded by

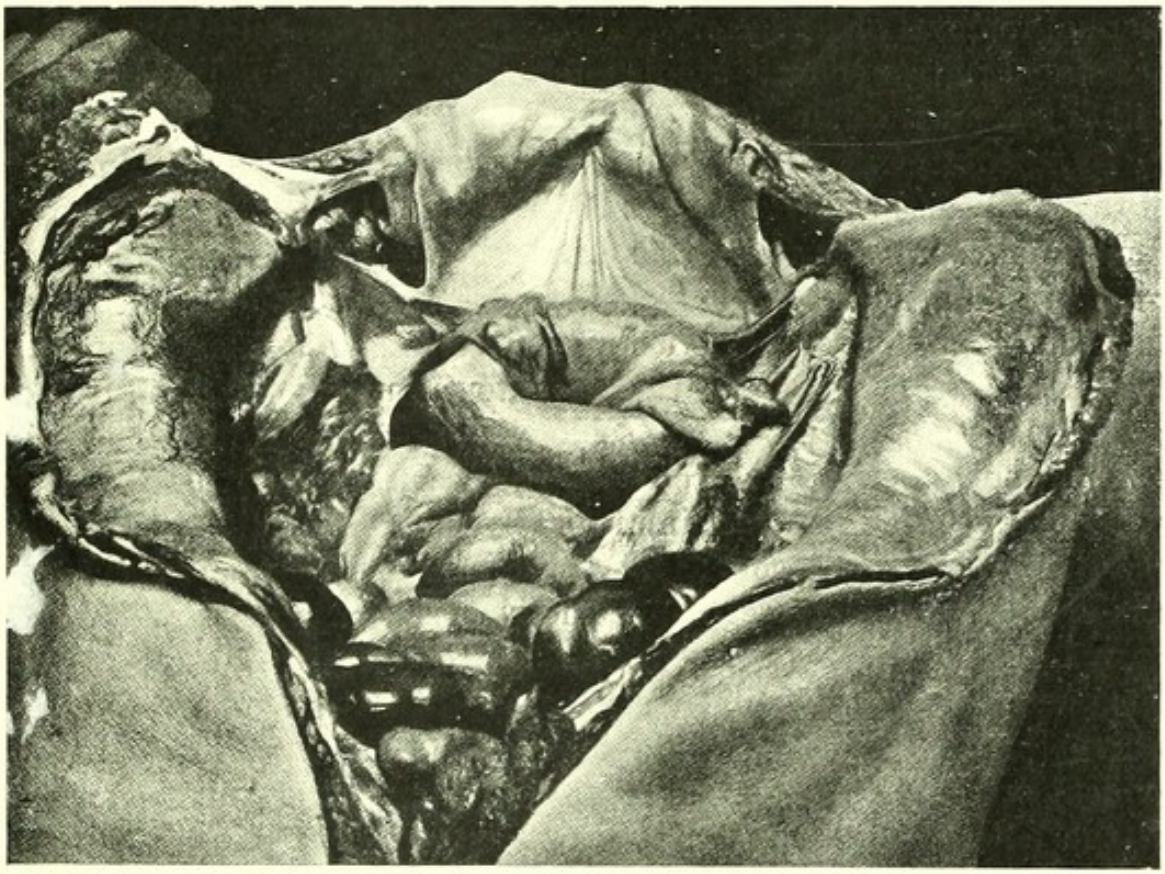


FIG. 288.—Partial Inversion of Uterus. (Bar.)

Dighton and Collins,[1] where the inversion followed the birth of a child with an unusually short cord; the cord was wound round the neck and trunk of the child several times. Similar cases where the cord was actually short, or short by reason of being wound round the child, have been recorded by several writers. Then, again, inversion has followed a precipitate labour in which the child has been born with the woman sitting in an erect posture, the child in its fall dragging on the cord.

Next in frequency to dragging on the cord comes increased abdominal pressure, such as is produced by straining, coughing,

[1] *Journ. Obstet. and Gyn. Brit. Empire*, October, 1905, p. 250.

sneezing. In two cases, those reported by Pompe[1] and Falk,[2] the inversion appears to have been produced by injudicious employment of Credé's method of expressing the placenta. On more than one occasion I have produced during the third stage slight indentations by pressing upon the fundus of an atonic uterus. In such cases, if pressure had been continued, without doubt complete inversion could easily have been brought about. Credé's method of expressing the placenta should never be employed until the uterus is firmly contracted.

It has occasionally happened that inversion has followed the manual removal of a placenta, either by reason of the external hand pressing firmly upon an atonic uterus, or the internal hand being withdrawn and establishing a negative pressure.

Symptoms, Diagnosis, and Prognosis.—As a rule, the symptoms of this accident are very pronounced. Generally there is a feeling of something coming down, quickly followed by more or less pronounced collapse and hæmorrhage. That is true, at least, of those cases where inversion is complete. Where it is only of a slighter degree, and the fundus does not come beyond the os externum, only pain and hæmorrhage may be present. Very seldom indeed are symptoms entirely absent, but Galabin has recorded a case in which there were no symptoms whatever, either immediately after the delivery or during the puerperium; the condition was only recognized after lactation had ceased and when irregular hæmorrhages occurred. Similar cases have been described by several other writers. Careful vaginal and bimanual examination will at once reveal the nature of the condition where there exists a complete inversion, for a large body will be evident projecting from the vaginal canal, and there will be no trace of the enlarged uterus above. Sometimes the indentation can be made out from the abdomen.

The only condition that simulates inversion of the uterus is a submucous myoma projecting down through the os, but in such a case there would still be present the enlarged uterus above the pubes. Theoretically, the contractility of the inverted uterus is a diagnostic feature of importance. I question, however, if it is of real value in practice. Even in the cases where there is only slight inversion a careful bimanual examination will reveal a depression, and, if the fingers are inserted through the os to confirm the diagnosis, a projecting body will be felt. It must not be forgotten, however, that these remarks regarding the diagnosis only apply to acute inversion; chronic inversion may be more difficult of recognition.

[1] *Cent. f. Gyn.*, 1903, p. 612. [2] *Ibid*, 1904, p. 1441.

One of the most extraordinary cases of mistaken diagnosis is a case described a few years ago by Hicksorf Smith,[1] where a midwife, thinking she had to deal with a second child, pulled upon the inverted uterus, and after three-quarters of an hour succeeded in removing it. When Dr. Smith arrived, the inverted uterus was examined by him. Even more extraordinary is the fact that the hæmorrhage was slight, and that the patient made an excellent recovery. The treatment adopted by Dr. Smith was simple vaginal plugging.

Another very extraordinary case is one described by Henkel.[2] In this case an inverted horn of a double uterus (uterus bicornis unicollis) was taken first for an inverted uterus, and then, because a uterine sound passed in 6 centimetres, it was deemed to be a polypus. The tumour was removed, when it was found that an opening had been made into the peritoneal cavity, proving that the condition was an inverted horn of a double uterus.

The prognosis for inversion of the uterus is very much better now than formerly, for it is less likely to be overlooked and sepsis is less likely to follow. Still, the number of fatal cases is not inconsiderable. Bar recorded three quite recently. Nor is this to be wondered at, as the accident occurs most commonly amongst those who are attended by midwives. It is difficult to explain some of the deaths, for the amount of blood lost is not sufficient to account for them. The shock, however, is often very considerable. Of the twenty-three collected cases, the complication proved fatal in six (28 per cent.).

Treatment.—Before considering the treatment of inversion when it has occurred, let me say a word regarding prophylaxis. On no account should the cord be dragged upon; on no account should Credé's method be injudiciously employed; and on no account should a woman be left whose uterus is not firmly retracted. As regards the last point, a hot intra-uterine douche and ergot will generally cause firm retraction. Personally, I am entirely opposed to the employment of a pad underneath the binder, as was very commonly the practice in this country until recently, for should the uterus become atonic and any increased abdominal pressure occur, the pad will actually favour the occurrence of inversion.

The reduction of an acutely inverted uterus is usually accomplished without much difficulty. In my twenty-three collected cases it is stated to have failed in three, and to have been accomplished with difficulty in four. It is commonly recommended to replace first the part that became last inverted, and Bar especially recommends,

[1] *Brit. Med. Journ.*, 1897, vol. i., p. 1476.
[2] *Zent. f. Gyn.*, 1905, p. 751.

in difficult cases, attacking the anterior part first. In those cases where the whole uterus is relaxed there is seldom any difficulty, but where Bandl's ring remains firmly contracted an incomplete reduction —viz., the removal of the inverted cervical and lower uterine segment —is all that can be accomplished. It is very important to remember that it is generally Bandl's ring that prevents reduction, not the cervix, which is flaccid after delivery. In such cases the employment of much force is not a little dangerous, for the lower segment being so thinned out and non-resistant, there is no *point d'appui;* the hand must be applied externally in order to supply the resistance necessary.

Many recommend pushing the fingers into the depression through the abdominal wall and stretching the constriction. They claim that they have succeeded in doing this; but in all probability they have not dilated the ring; they have only supplied a *point d'appui*. In such cases, undoubtedly, deep anæsthesia, and especially chloroform anæsthesia, is of great advantage, and although I cannot speak from personal experience, I imagine that a full dose of morphia would be beneficial. In all cases, and especially when chloroform and morphia have been freely given, there is a distinct danger of post-partum hæmorrhage. One should therefore always have ergot, a hot douche and packing ready in case hæmorrhage occurs.

In not a few cases the placenta has remained attached to the inverted uterus, and in such it is generally recommended to first attempt replacement with this body attached, as it is a certain protection to the uterus. Should, however, replacement be impossible, the placenta and membranes must be carefully stripped off.

As regards those cases where reduction entirely fails, various methods of treatment have been advocated: the most radical is abdominal section and replacement of the uterus by various methods, such as Kustner's and others, or hysterectomy. Very few, however, favour such procedures, and certainly the results from abdominal section have been highly unsatisfactory. In a certain number of cases where reposition has failed, a spontaneous rectification has occurred. Boxall[1] records a most interesting case, and Spencer and Galabin, in the discussion which followed, referred to similar experiences. In fact, it seems to be quite a recognized occasional occurrence, for the older writers in obstetrics refer to it also. In Boxall's case the patient had had continuous douches, and the author very naturally believed 'that the constant douching may have very materially assisted the process of reposition.' How such a spontaneous reposition occurs is a little difficult to explain, but if one reads the careful description of the

[1] Trans. Lond. Obst. Soc., 1904, vol. xlvi., p. 292.

anatomy of this complication given by Bar,[1] it does not cause one so much surprise. We all know how frequently a retroverted gravid uterus spontaneously rights itself, and so it is no wonder that occasionally the inverted uterus should do the same. In those cases, then, where one fails, the part should be carefully washed, some aseptic gauze applied carefully round the organ, douches given twice daily, and subsequent attempts made at replacement. In this class of case the various repositors, such as Aveling's, which are so useful in chronic inversion, are rather difficult to apply because of the large size of the uterus. There have been several cases of successful reduction where the cup has been constructed to suit the size of the uterus, and especially where the repositor has been used a week or ten days after the delivery. Galabin[2] refers to such a case. The various metreurynters may also be tried; Pinard[3] mentions several successful cases where Champetier de Ribes' bag was employed.

By adopting the conservative treatment just sketched, one will without doubt succeed in getting the organ replaced in almost all cases, and even should one fail and require ultimately to have recourse to abdominal section, the chances of a successful result will be much greater than if one had hurriedly opened the abdomen because in the first attempts reduction failed.

Recently Tate[4] described a most interesting case where he removed *per vaginam* a septic inverted uterus.

Pulmonary Embolism.

Amongst the most fatal accidents following on parturition is pulmonary embolism. This complication is due to the dislodgment of a portion of thrombus from some of the pelvic veins. It usually occurs in the third week of the puerperium, but occasionally it takes place immediately after delivery. No matter when the accident occurs, the condition is an extremely grave one, and the vast majority of patients attacked die. The disease will be best illustrated by recording two cases from my practice. In the first the accident happened at the end of the second week, and in the second immediately after delivery.

CASE 1.—*Case of Death on the Fourteenth Day of the Puerperium from Pulmonary Embolism.*—Mrs. B——, aged thirty-four, 4-para, had been a patient of mine for several years. She first came under my care in her second pregnancy, which terminated in a miscarriage at the fourth month.

[1] *Op. cit.* [2] Trans. Lond. Obst. Soc., vol. xlvi., p. 206.
[3] *Anal. de Gyn. et d'Obst.*, May, 1906, p. 25.
[4] *Journ. Obst. and Gyn. Brit. Empire*, March, 1907, p. 248.

Her first pregnancy, she informed me, had ended at full time, when she was delivered with forceps of a large male stillborn child. Her third pregnancy also terminated in an abortion at the fourth month. During her fourth pregnancy she was troubled greatly with digestive disturbances, and towards the end by albuminuria, and even a threatening of eclampsia. With suitable treatment, however, she escaped the latter, and her pregnancy was allowed to continue until full time, when she was delivered with forceps of a living child. During the whole of her pregnancy she was taken great care of. The puerperium was a little unsatisfactory. The pulse was always rapid, usually about 90, and the temperature always a little raised—99·5° to 100° F. On several occasions the uterus was douched with mercuric chloride. Gradually the temperature and pulse subsided, but never quite returned to the normal. At the end of the second week she complained of a little pain in the left iliac region, and she was warned not to rise. On the thirteenth day, however, contrary to my instructions, she insisted upon being lifted into an arm-chair, and the same thing was done on the fourteenth day. On the latter day she felt so well sitting in the chair that she actually tried to walk a little. After going a few steps she was suddenly seized with great precordial pain and dyspnœa. She was immediately lifted into bed by her husband and the nurse, but the breathlessness and pain continued. I reached her house about half an hour after the occurrence. She was, however, dead before I reached her—at least, she gave one last gasp as I entered her bedroom.

At the post-mortem examination both pulmonary arteries contained large blood-clots; the left iliac vessels were thrombosed. Both kidneys were extensively diseased, the right being replaced almost entirely by cysts; the left also contained many cysts, and was much enlarged.

Case 2.—*Pulmonary Embolism immediately after Delivery—Recovery.*—This patient, who was recently under my care, complained of pain and breathlessness shortly after her delivery. She was a primipara with a slight justo-minor pelvis. On examining her under chloroform about the thirty-sixth week, it was deemed advisable, because of the relative size of the head and the pelvis, to induce labour. This was done with a bougie. Labour came on in a few hours, and terminated spontaneously within a very short period. After giving the placenta fully an hour to separate, I introduced my hand into the uterus and found it slightly adherent. I removed the placenta without much difficulty. When the patient recovered from the anæsthesia, she complained of precordial pain and breathlessness. This became steadily worse, and the pulse became more rapid. After a hypodermic injection of $\frac{1}{4}$ grain of morphia the pain was relieved, but she still remained very breathless, and could not lie down comfortably in bed. Inhalations of oxygen from time to time gave her some relief. She made a somewhat slow recovery, but there were no further complications. The temperature was normal throughout the whole puerperium.

A severe case of pulmonary embolism can hardly be mistaken for any other condition. The sudden onset, the severe precordial pain,

the great dyspnœa, and the increasing lividity, render the diagnosis self-evident. In the slighter forms of the accident, however, there may be some doubt. For instance, I have twice seen patients seized with hysterical attacks of dyspnœa which very closely resembled the dyspnœa of pulmonary embolism. It is always, of course, open to doubt whether these attacks were really hysterical. In one case, however, they were quite certainly of this nature, as the patient had several, one some weeks after her confinement, when she received the news that her husband was suddenly ordered abroad with his regiment. The other patient was undoubtedly neurotic also, and has had peculiar nervous symptoms at different times while she has been under my care.

Very occasionally the embolus consists not of blood-clot, but of air. The symptoms are analogous. The air is introduced during intra-uterine manipulations, as in cases of placenta prævia, version, and especially in removing an adherent placenta.

Serious, and even fatal, dyspnœa may also follow the insufflation of vomited material.

A very grave condition indeed, and one which may give rise to sudden death, is acute œdema of the lungs. Some little time ago I was asked to see such a case in consultation, but the patient was dead before I reached her house. The quantities of frothy mucus from the respiratory passages is a very striking feature of this condition.

The treatment of this most serious accident of pulmonary embolism consists in keeping the patient at absolute rest. She must on no account be allowed to move; everything must be done for her. The pain complained of over the pericordial region is best relieved by the administration of morphia hypodermically. This drug, however, must be given with very great caution. Inhalations of oxygen are also of value, although there is often not time to obtain cylinders, as the death frequently takes place within a few minutes. Intra-cellular saline transfusion to dilute the blood is recommended by many writers, but none now attach much value to the liquor ammonia or the alkalis formerly advocated. If the patient at any time shows signs of collapse, stimulants must be given by the mouth and strychnine hypodermically.

Subcutaneous Emphysema.

This complication is one of considerable rarity, although it is probable that slighter examples of the condition are often overlooked. Many interesting monographs have appeared since Depaul published

the first exhaustive memoir on the subject in 1842. In recent years Klots,[1] Hergott,[2] Stevens,[3] and Kosmak,[4] amongst others, have made interesting communications. Klots has collected forty cases and Kosmak seventy-seven. The general view held is that the condition arises from rupture of the air vesicles at the root of the lung. The air, therefore, escapes underneath the pulmonary pleura into the anterior mediastinum, and so underneath the cervical fascia up over the neck and chest. There are, however, some who believe that the condition is due to injuries to the respiratory tract higher up—for example, in the mouth and trachea.

Judging by the published cases, the patients were invariably primiparæ. In all there were considerable straining efforts made during the second stage. In many the labours terminated spontaneously.

The condition is undoubtedly favoured where resistance is increased owing to the child being of exceptionally large size, or the pelvis being unusually small, and the soft parts unduly rigid. In a considerable number of cases pain is complained of, and is very often situated about the region of the seventh or eighth rib. The outlook is good, the patients invariably recovering. No very special treatment is required, but if the pain is excessive during breathing, the affected side should be firmly strapped, as is done in cases of fractured ribs.

The following two cases illustrate this condition:

Case 1.—Mrs. N——, a patient of Dr. C——, of Greenock, was delivered of a first child in October, 1902. Distinct labour pains began about 10 p.m., and the child was born six hours later. The first stage was of short duration. Soon after the second stage began the pains became very severe, with strong expulsive efforts. About three hours before delivery a slight swelling of the neck was noticed, and increased until the birth of the child, which occurred spontaneously. Shortly after delivery the patient complained of severe pain over the right side, in the region of the seventh and eighth ribs, about 2 inches outside the nipple-line. The swelling in the neck had by this time increased, and had extended up the sides of the head and down over the chest, back and front. Over this whole puffy area crepitation could be elicited. The pain in the side continued for several days, and the emphysema entirely disappeared within a week. There was no cough nor expectoration, and the patient made an uninterrupted recovery.

Case 2.—A. M——, aged twenty-nine, a primipara, was a patient in my wards in September, 1905. The presentation was normal and the birth spontaneous. The first stage lasted some thirty-six hours, but was not unduly severe. The second stage was not specially delayed, but the patient

[1] *Zeit. f. Geb. u. Gyn.*, 1899, Bd. xli., Heft iii.

[2] *Ann. de Gyn. et d'Obst.*, 1904, p. 641.

[3] Trans. Med.-Chir. Soc., Glasgow, vol. iii., p. 99.

[4] Bulletin, Lying-in Hospital, New York, 1907, vol. iii.

screamed excessively, and for half an hour before her child was born had extremely severe pains. About half an hour before delivery she noticed a swelling in the neck, and had a choking sensation. This swelling in the neck extended upwards over her cheek and eyelids, and downwards over her chest. She complained of slight pain in her left side. She directed the house-surgeon's attention to the swelling after her delivery. It was then found that over the swollen area there was distinct emphysema. The swelling disappeared in a few days, and the patient made an uninterrupted recovery.

In cases of rupture of the uterus there is a variety of subcutaneous emphysema occasionally encountered. The air in such cases gets into the cellular tissue of the broad ligament and abdominal wall.

CHAPTER XXXVII

ACCIDENTS TO CHILD: INJURIES TO BONES, MUSCLES, NERVES, VISCERA, ETC.; ASPHYXIA NEONATORUM

All manner of injuries may follow a difficult delivery terminated by forceps, or by traction on the breech and after-coming head. Amongst the least serious are bruises and lacerations of the scalp, face, and other soft parts.

Caput Succedaneum and Cephalo-Hæmatoma.

These simple conditions are familiar to everyone. The caput succedaneum forms over the presenting part. It is an œdematous swelling of the superficial tissues which arises in the most of cases after the membranes have ruptured, and increases in size the longer the second stage continues. The swelling is a harmless one, and disappears in a few days.

A cephalo-hæmatoma, on the other hand, is a collection of blood underneath the pericranium. It is to be distinguished from the caput succedaneum by the fact that it generally does not appear until a day or two after delivery, is limited to particular bones by the attachment of the periosteum, and is most common when parturition is easy and rapid. In most cases it forms over one parietal bone, but sometimes both are affected, and occasionally it is found on the occipital and frontal bones. The swelling is a fluctuant one and often takes weeks to disappear. At the edges of the swelling an irregular ossification occurs, so that a round, hard, raised edge may be felt. Occasionally a more diffuse ossification occurs, so that crepitation may be elicited over the tumour. Very occasionally the swelling becomes infected.

Some writers have recommended puncture, aspiration of the blood and the application of a firm binder or strapping. The effusion need not be interfered with, however, unless suppuration occurs, when the sac should be freely opened and packed with gauze.

Injuries to Nose, Ear, and Eyes.

More serious injuries are fractures of the nose, lacerations, and even complete removal, of the ear, and injuries to the eyeball. These

invariably result from forcible extraction of the child with forceps in contracted pelvis. Fracture of the nose may possibly occur even in spontaneous delivery, but tearing or removal of an ear only results in a forceps delivery when one of the blades slips. These accidents are extremely rare.

Injuries to the eye are often very serious; slight lacerations of the eyelid are not of much consequence, but sometimes it happens that the eyeball is burst or even completely evulsed. Several interesting articles have been written by Buchanan and Thomson[1] on the subject of corneal opacity following forceps deliveries. They have pointed out that a general cloudiness of the cornea often occurs, which finally settles down into a linear cicatrix. Undoubtedly, in many cases the injuries to the eye are directly produced by a blade of the forceps; but in not a few cases, especially those in which evulsion of the eye occurs, the accident results from extreme compression of the head, as when a child is dragged through a deformed pelvis.

Injuries to the Bones.

Fracture of the Skull.—Injuries of the bones of the skull almost invariably occur during parturition, and most commonly when there has been difficulty in extracting the fore-coming head by forceps or the after-coming head by traction. Very occasionally it happens that fractures of the skull occur during pregnancy as a result of falls or blows sustained by the mother. In such cases the head of the child, still movable in the uterus, is suddenly driven against the brim of the pelvis or the vertebral column. The child may be killed by the accident, which is often so severe as to bring on premature labour; but in not a few cases the pregnancy has continued undisturbed and the child has recovered, the injuries having healed *in utero*.

In most cases, when injuries occur during parturition, the labour has been protracted owing to the disproportion between the fœtal head and the maternal pelvis. In some the force of the uterine contractions has been sufficient to overcome this obstruction in the parturient canal, and the injuries, therefore, may be described as spontaneous. In most cases, however, the delivery has been artificially terminated by forceps or traction on the lower limbs, and the injuries are, therefore, of a violent nature. I have seen occasionally very extensive fractures directly produced by the blades of the forceps. In such cases the child's head has usually been grasped obliquely, and the tips of the blades have been the cause of the injuries. The occipital and frontal bones then suffer most. Sometimes, however, although fractures

[1] Trans. Ophthal. Soc., vol. xxiii.

occur, the forceps is not primarily to blame; the injury really arises from dragging the child past the projecting promontory. In these cases the parietal and frontal bones are those usually injured. A most serious injury is separation of the condyloid process of the occipital bone. It usually occurs when there is difficulty in extracting the after-coming head. In this condition death may result from intracranial hæmorrhage or from direct injury to the medulla. Another very serious and fatal accident is dislocation of the upper cervical vertebræ.

Indentations of Skull.—Indentations of the skull are either furrow-shaped or spoon-shaped. The furrow-shaped variety are less serious, and seldom give rise to much immediate disturbance. They may be of various forms. They are sometimes confined to the parietal or frontal bones, but very often involve both.

Much more serious are the spoon-shaped indentations, for, in many cases, they are associated with fracture of the indented portion of bone.

The subject of indentations of the skull of the new-born has been frequently written about, more particularly by French obstetricians. I considered the subject in some detail a few years ago.[1] The injury is usually situated on one or other of the parietal or frontal bones in the neighbourhood of the anterior fontanelle. With few exceptions, it occurs where there is deformity of the maternal pelvis, most commonly a deformity of only a moderate degree. The indentation is usually caused by the head being pressed or pulled against the projecting sacral promontory. Apart from bony deformity, it would appear that the condition has occasionally been produced by tetanic contractions of the uterus, contractions of the muscles of the pelvic floor, ankylosis of the coccyx, and tumours of the bones and soft parts of the pelvis. On the fœtal side, Budin has recorded a case of twins where the after-coming head of the first child, which presented by the breech, was arrested by the presenting head of the second; both the children were born dead, with depressions of their skulls. Braune[2] reported a case where the depression was caused by an arm becoming prolapsed at the side of the head. Occasionally the accident has recurred in succeeding labours. Strassmann[3] has recorded a case where a woman gave birth on five different occasions to children with depressions of their skulls.

No doubt defective ossification of the skull predisposes to the accident. Experimenting on stillborn infants I found I could produce

[1] *Brit. Med. Journ.*, January 19, 1901, and Edin. Obst. Trans., vol. xxvi., p. 42.

[2] *Cent. f. Gyn.*, 1896, p. 225.

[3] *Zeit. f. Geb. u. Gyn.*, 1900, Bd. xlii., Heft 3, p. 615.

depression with little pressure in some cases, but in others I could make no impression on the bones at all, even although I used considerable force.

In the majority of forceps deliveries, as I have already indicated, it is the pressure of the head against the promontory, not the blades, that causes the injury.

The effect of these injuries upon the child varies. In some cases they cause death. When the children are born alive, the indentations sometimes disappear spontaneously in a week or ten days. In such cases there has probably been no real fracture of the bone; it has been a simple indentation. Most commonly the depressions remain, but cause no immediate or late disturbance. On other occasions they give rise to more or less severe nervous phenomena, and later in life to permanent mental weakness.

Here are two illustrative cases:

Case 1.—Some years ago I delivered a mature child with forceps through a slightly flat rachitic pelvis. The child was born with a spoon-shaped depression over the right frontal bone; it seemed otherwise well. It did not thrive, however, and about a fortnight after its birth took a few convulsive seizures and died.

Case 2.—Some months after the above case occurred, Dr. Malcolm Black, Consulting Physician to the Maternity Hospital, told me of a case in which he had great difficulty in extracting the head with forceps, owing to a deformity of the pelvis. There was a large spoon-shaped depression over the left frontal bone; the child's heart was beating very slightly, and artificial respiration brought about little improvement in its condition. Recollecting my request, he tried compression of the skull, with the result that the indentation came up suddenly with a jerk, the child immediately began to make attempts at respiration, the heart commenced to beat more strongly, and before long the child was quite out of danger.

Removal of Indentation.—At one time I was not in the habit of interfering with cases of spoon-shaped indentations, but in recent years I have almost invariably operated upon them. When I made the contribution already referred to, I suggested a simple treatment which I had found successful—viz., very firm antero-posterior compression of the head (Fig. 289). This simple procedure, which often succeeds, I discovered accidentally at a confinement of a private patient. This briefly is a history of the case:

A child which was of average size and full time was extracted with forceps, the indication for the latter being a persistent occipito-posterior presentation. On extracting the child I discovered a deep spoon-shaped indentation on its right frontal bone. The child was only slightly asphyxiated, and soon cried and seemed little disturbed by the deformity.

While looking at the indentation, it occurred to me that by firmly compressing the head antero-posteriorly, sufficient pressure might be exerted on the depressed bone to cause it to spring up. I hardly expected the simple manœuvre to be so successful, but on the first attempt the depression came out, producing a sound as when a dent in a felt hat is removed.

During recent years I have had several equally good results from this treatment, although in not a few cases it has failed. Several

Fig. 289.—Indentation of Frontal Bone removed by Antero-Posterior Compression. (Author's case.)

confrères have told me of successes, but many also have told me of failures. In all probability success or failure depends upon the degree of ossification of the cranial bones, and the presence or absence of fracture. In carrying out the treatment I use very firm pressure indeed, and in two of the cases I have succeeded in bringing out the indentation when a confrère failed.

All manner of instruments have been suggested for removing the indentation. Sir James Simpson, for example, recommended an air-

tractor. The simplest of all devices, however, is that employed by Tweedy.[1] One blade of a vulsellum forceps is bored through the bone; the point of the instrument is then turned round, and the indentation pulled up.

Major Operative Treatment.—The oldest references to major operative treatment on cranial indentations in the new-born is, as far as I can find, the case reported by Tapret in 1877. Boissard[2] describes the case. There was a marked depression, with fracture of the left parietal bone, left exophthalmos, and right facial paralysis. The child cried

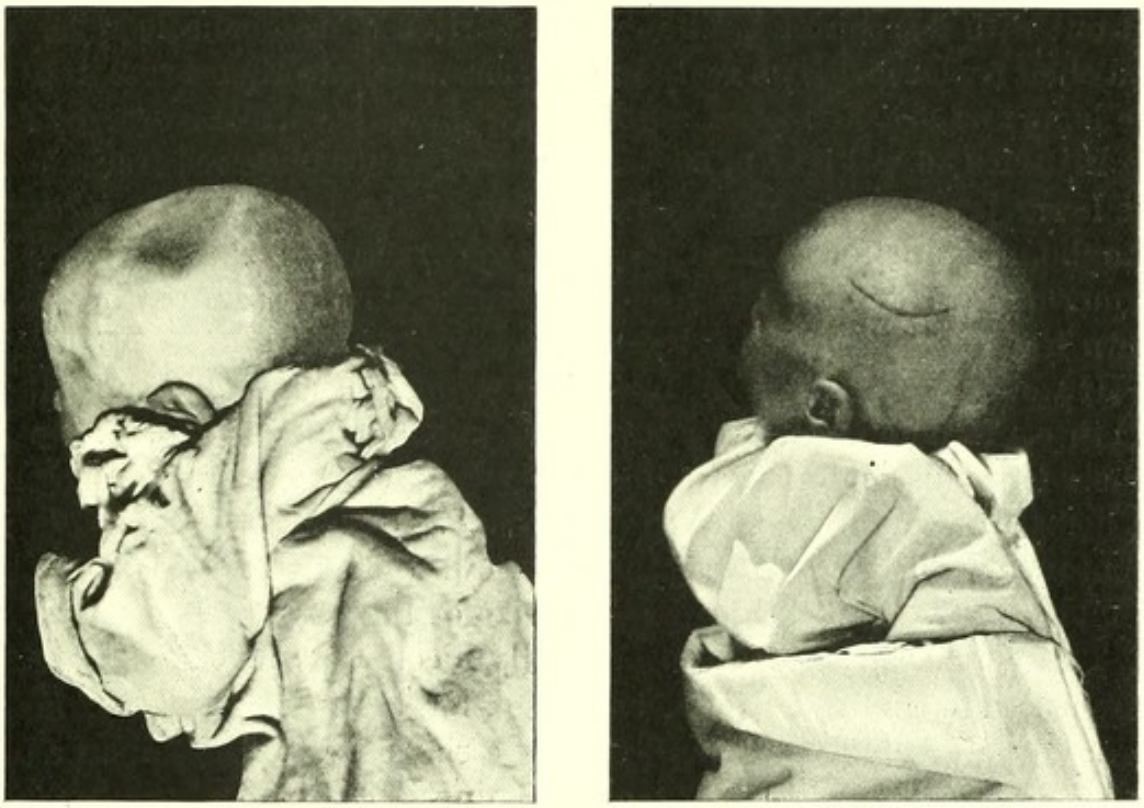


Fig. 290.—Indentation of Skull removed by Operation.

very feebly. M. Millard bored through the skull and raised the depressed bone, with the result that the child cried immediately. The convulsions ceased, the exophthalmos gradually disappeared, and on the following day only a trace of the facial paralysis remained. In recent years a number of successful cases have been recorded. In some the operator has trephined over the depression, in others he has incised the skull along the margin of the depression. All manner of instruments have been used for raising the bone. In most cases, when the operation is undertaken immediately, the bone is very easily raised, but after a few days it becomes increasingly more difficult.

[1] 'Rotunda Practical Midwifery,' 1908, p. 311.

[2] 'Lelièvre's Thèse,' Paris, 1892.

The method I have employed in the Maternity Hospital is the making of an incision through the scalp and pericranium along the margin of the depression, cutting the bone with sharp scissors, and then inserting a flat elevator between the dura mater and skull. In the illustration (Fig. 290) is seen the result from such an operation. There is no flap turned down; if this is necessary, then the incision would be made along the upper margin of indentation.

For cases seen some time after the occurrence of the accident an ingenious device is that suggested by Nicoll.[1] A flap of the scalp and pericranium is turned down, and the indented portion of the bone is cut out with a trephine. The excised portion of the bone is reversed and then replaced. The scalp and pericranium are then brought over the bone and stitched.

Injuries to Other Bones.—I have only once observed fracture of the lower jaw; it was caused by the tip of the blade of the forceps. The bones which are most liable to be fractured are the clavicle, humerus, and femur. The accident most generally occurs in bringing down the limbs in breech presentations.

It would appear from the investigation of Riether[2] and Muus[3] that fracture of the clavicle is by no means uncommon. As it frequently causes little discomfort to the patient and does not prevent its moving its arms, the condition is often overlooked. Occasionally it occurs in spontaneous births, but usually it follows difficult extraction of the shoulders, when the child is large in size or the passage is narrow.

The clavicle fractures are generally incomplete, but those of the humerus and thigh are often complete, for the bone is broken right across. In dealing with fractures of the clavicle and the humerus the child's arm should be firmly bound against the trunk. Fractures of the lower limbs are more difficult to treat, as Jones[4] of Liverpool has recently pointed out.

Injuries to Muscles.

Although tears and lacerations of any of the muscles may occur in difficult deliveries, more especially difficult breech deliveries, the only one which requires special mention is that of the sterno-mastoid. Injuries to this muscle are followed by the development in its substance of a hæmatoma. This accident may occur in head-first and in head-last deliveries. In head-first deliveries it is produced in very much the same manner as 'birth paralysis' (p. 679). The hæmatoma is often

[1] Trans. Glas. Med.-Chir. Soc., vol. iv., p. 424.
[2] *Wien. Klin. Woch.*, June 12, 1902, No. 24.
[3] *Cent. f. Gyn.*, 1903, No. 23.
[4] *Brit. Med. Journ.*, 1908, vol. i., p. 1358.

not noticed for some little time after the birth. It usually takes time to disappear, but clears up completely and leaves no bad effects. Occasionally it is the cause of torticollis.

Injuries to Brain, Spinal Cord, Nerves.

Hæmorrhage into the Cranial Cavity.—As might be expected, intracranial hæmorrhages are most frequently the result of difficult and artificial deliveries. It occasionally happens, however, that these hæmorrhages take place in easy and spontaneous births. All writers, including Gowers,[1] refer to the fact that in not a few cases labour was precipitate. According to Seitz,[2] in 20 per cent. of cases this was so. As might be expected, the occurrence is more frequent with boys than with girls.

Hæmorrhages into the substance of the brain are not common. For the most part they are meningeal, and are generally situated over the surface of the convexity of the brain, although not infrequently they are found also at the base. According to Gowers, when the hæmorrhage is over the convexity of the brain, it is generally bilateral, and is most considerable over the central region and towards the middle line. This is in agreement with Spencer's findings.[3] Cushing[4] states, although evidently it is only an impression, not a conviction from observations made: 'I am of opinion that the extravasation is usually limited to one side of the falx, though, indeed, a bilateral lesion is common enough, as the many patients with diplegia would indicate.' It will be observed that in two of the four cases described by Cushing there was extensive hæmorrhage over both hemispheres, and it is very possible in Case 1 that this was so also. Seitz also says they are mostly unilateral, but he only speaks from six cases. This question, as to whether the hæmorrhages are generally unilateral or bilateral, has become a matter of practical importance since operative treatment has been advocated by Cushing, Carmichael,[5] Seitz, and others. I shall refer to this later.

In a very large proportion of cases the hæmorrhage is associated with asphyxia neonatorum. No doubt in many the hæmorrhages are the result of the asphyxia, for in a very large proportion of cases the hæmorrhages are not limited to the cranium, but are found in kidneys,

[1] 'Diseases of Nervous System,' vol. ii., p. 414.

[2] *Cent. f. Gyn.*, 1907, No. 26, p. 780.

[3] 'Visceral Hæmorrhages in Stillborn Children: an Analysis of 130 Autopsies.' Trans. Lond. Obst. Soc., 1892, vol. xxxiii.

[4] 'Concerning Surgical Intervention for the Intracranial Hæmorrhages of the New-born,' *Amer. Journ. Med. Sciences*, October, 1905.

[5] Trans. Edin. Obst. Soc., xxxi., p. 105.

liver, spleen, intestines, uterus, etc. It must, however, be admitted, I think, that in a certain number the hæmorrhages are the cause of the asphyxia.

Without doubt, as has been indicated already, in a very large proportion of cases direct external violence has been the cause of the hæmorrhage; but apart from this cause, there are other factors than violence, such as the delicacy of the vessel walls, and the mobility between the different bones of the fœtal skull. This latter factor is a matter of extreme importance. When the head moulds, the parietal bones overlap and are pushed over or under the frontal and occipital bones. Both Gowers and Cushing explain the frequency of these hæmorrhages over the upper aspect of the hemispheres by the overlapping of the parietal bones. By this overlapping the veins which ascend over the cortex and open into the longitudinal sinus are torn before their entrance into the latter; it may even happen that sometimes the sinus itself is torn.

Spencer[1] says: 'There are, however, two conditions to which I wish to draw special attention as determining causes of meningeal hæmorrhage—namely, softness of the skull bones and increased mobility of the bones from laxity of the sutures, and particularly of the lower edge of the parietal bone. . . .

'As stated above, in eleven instances the hæmorrhage was found limited to the parietal region of the Sylvian fissure—that is, to the part drawn by the great anastomotic vein. In many of these cases it was obvious that the effusion was due to the clamping of the vein from the pressure of the lower anterior corner of the parietal bone, which immediately overlies the main trunk of the vessel. In other cases, where the hæmorrhage was more diffuse, it is more than probable that the depressibility of this part of the bone was an important factor in the causation of the hæmorrhage, though it was less demonstrable than in the cases just mentioned.

'The above observation leads me to regard the part occupied by the lower anterior portion of the parietal bone as the most vulnerable part of the child's head.'

The symptoms of cerebral hæmorrhage are by no means constant. If the hæmorrhage is very extensive, symptoms may show themselves immediately after birth, but in not a few cases symptoms have not appeared till some days after delivery. Where the intracranial pressure is great the anterior fontanelle is very tense, the bony outline of the space cannot be defined, and pulsation is absent. The eyeballs often protrude and the lids are œdematous. Convulsions are frequent, but rarely appear until some time after delivery. These

[1] *Op. cit.*, p. 268.

convulsions are often accompanied by rigidity of the limbs. If the child recovers, they usually cease after a week or two. With great increase of intracranial pressure the child becomes progressively worse. It refuses to take its food, becomes increasingly listless and drowsy, and finally sinks into a condition of coma. The history of a difficult delivery will often help the diagnosis, but, let me again remark, the occurrence may take place in precipitate labours. A valuable aid to diagnosis is lumbar puncture, for with intracranial hæmorrhage the fluid withdrawn will be blood-stained.

In recent years several writers, as I have already stated, have recommended operative treatment for cerebral hæmorrhage, and without doubt, if the hæmorrhage is slight and is limited to one hemisphere, the results will be highly satisfactory, and the operation should be undertaken. There is often a difficulty, however, in making sure that hæmorrhage exists, and in determining whether or not the hæmorrhage is bilateral. This is well indicated in Cushing's cases, and especially in Case 3, where first the one and then the other parietal bone was turned down, and blood-clot washed away from each hemisphere.

I am in entire agreement with those operators who point out how well the child bears these operations, for in the cases which I have seen operated upon, or have operated upon myself, the children were singularly little disturbed.

In dealing with cases of cerebral disturbance immediately following parturition, it must not be forgotten that in a considerable number of cases the disturbances are not produced by gross intracranial hæmorrhage. In two cases which were under my care where there was evidently increased intracranial pressure, and where convulsive seizures appeared a few days after delivery, more especially marked on the one side, I was disappointed to find when the skull was opened that there was no hæmorrhage to speak of. In one there was a very small blood-clot, about the size of a split pea, which I could not believe was sufficient to cause the disturbance. The children in these two cases were born spontaneously; indeed, the births might almost be termed precipitate. In one of the cases there was no history of nervous disturbances in the family, in the other the father and a paternal grand-uncle both had infantile paralytic affections. The mothers were both particularly healthy during pregnancy. They had no disturbances whatever and had no albuminuria. One of the children was very much better after the operation—the convulsions, etc., ceased—but it now presents nervous phenomena. It is three and a half years old. Its mental development has been very slow, and it was nearly two years old before it could walk. In the

other case both parietal bones were turned down in the hope that a hæmorrhage might be discovered, but no blood-clot whatever was found. The child died some twelve hours after the operation.

In these cases where nervous phenomena appear in very early infancy and childhood, there is a tendency to attach too much importance to the injuries at birth. It must not be forgotten that in many cases there has been no cerebral hæmorrhage. The disease is the result of hereditary weakness and of a toxæmia. For example, in not a few of the cases there has been a history that the mothers suffered from eclampsia. I have repeatedly seen the children born of eclamptic mothers seized with convulsions shortly after their birth, and in almost all children born of eclamptics albumen will be found in the urine. It is quite probable also that the poisons in the other toxæmias, such as pernicious vomiting, may also have an injurious effect upon the fine tissue of the brain of the fœtus.

Last of all, asphyxia, apart from that produced by extreme dystocia and operative interference, very decidedly favours the condition, as can be judged by the writings of all who have investigated this subject.

Late nervous manifestations, such as Little's[1] disease, etc., cannot be considered here. The practical question in connexion with these cases, which show cerebral disturbances shortly after delivery, is—under what circumstances should the skull be opened? Certainly, if there is extreme intracranial pressure and blood-stained cerebrospinal fluid, it should be done; but where there are no such certain signs of intracranial hæmorrhage, it is much more difficult to decide when surgical interference is advisable.

Facial Paralysis.—The most frequently injured nerve is the seventh cranial (facial), but happily the ultimate results are not usually serious. From its anatomical situation one can easily understand how exposed it is. Thus it happens that the tip of the blade of the forceps frequently presses on the nerve-trunk at its point of exit from the skull. This accident is most likely to happen when the grip is not the 'ideal' one, as where the head is grasped more or less obliquely. On account of the obstruction to labour which deformity of the pelvis offers (flat rachitic), facial paralysis is distinctly more frequent in this type. The lesion, as a rule, is unilateral; occasionally, although extremely rarely, it may be bilateral. The prognosis is good. As a rule, the paralysis, which at first is very noticeable, begins to improve within a very short time after delivery, and at the end of ten days is almost

[1] Trans. Lond. Obst. Soc., vol. iii., p. 293.

entirely gone. This is the usual type. Another variety of facial paralysis is of central origin. This form is much less commonly encountered. It is of a gradually deepening character, but usually if the child survives it also entirely disappears.

'Birth Paralysis,' or Duchenne's Paralysis.—This form of paralysis in the new-born is especially associated with Duchenne's name. He described, in 1872, four cases of paralysis of certain muscles of the shoulder and arm, under the title of "Paralysies obstétricales infantiles du Membre supérieur." These cases presented identical symptoms, and in each the same muscles were involved—viz., the deltoid, infraspinatus, biceps, and brachialis anticus. In all but one of the cases the electrical reactions were abolished and cutaneous sensation still remained. The arm hung powerless by the side and could not be abducted; the forearm was extended and could not be flexed; and the hand, in consequence of the inward rotation of the humerus, could not be completely supinated. From the distribution of the paralysis Duchenne came to the conclusion that the lesion was one of rupture or compression of nerve fibres in the brachial plexus before they enter the main nerve trunks of the arm. Erb, in 1874, from his investigations on a form of paralysis in adults presenting almost similar characters to that previously reported by Duchenne, located the injury. This he found to be an injury of the anterior primary divisions of the fifth and sixth cervical nerves, where they unite to contribute to the brachial plexus. Subsequent researches have proved this fact, as it has been shown that the motor nerve fibres in the anterior divisions of the fifth and sixth cervical nerves at their point of junction are those which supply the muscles affected.

Such being the explanation of this form of paralysis, let us see what is its causation. The nerves involved are so definitely demarcated that one must try and find a reason for their specific selection. However the injury is produced, either by compression or stretching of the upper part of the brachial plexus, the fifth and sixth nerves have their conductivity destroyed. Different opinions are held as to the true cause. Some say that the nerves are injured by their compression between the clavicle and the transverse processes of the vertebræ; others affirm that the nerves are damaged by compression between the clavicle and the first rib.

Kennedy of Glasgow,[1] to whose writings I am indebted for the above remarks, and whose name is specially associated with the surgical treatment of this accident, affirms 'that the chief factor in producing the lesion is forcible depression of the shoulder, while the head is bent to the opposite side and rotated.' In this position

[1] *Brit. Med. Journ.*, 1903, vol. i., p. 298.

Kennedy has shown that the junction of the fifth and sixth cervical nerves suffers maximum tension, the lower cords being scarcely affected at all. Harris and Lowe[1] state that only the fifth nerve is involved, and in proof of this assertion show that traction of the neck, as in pulling to one side, is more likely to injure the more delicate fifth nerve than the stronger junction of the sixth. From such an explanation it is clear that this type of injury is likely to occur when, for some reason, considerable force is required to deliver the child. While occurring most commonly in head-first cases (on account of their frequency), the injury may follow any presentation. In breech presentations or transverse presentations, followed by version, the injury results in delivering the arms and after-coming head. In vertex presentations it results from forcibly pulling upon the head when delivering the shoulders.

The prognosis is variable. Some cases recover rapidly; others make only a partial recovery after a year or more; many others are permanently injured. In all cases the opinion of a surgeon should be taken, as operative interference offers most gratifying results in many cases.

Asphyxia Neonatorum.

Much theorizing and speculation has been occasioned in the attempts to find an adequate reason for the genesis of the first respiratory attempts of the child.

From experiments upon the lower animals, it would appear that the gradual accumulation of carbonic acid in the blood stimulates the respiratory centre and is the chief cause, although it is likewise true that peripheral stimulation does independently excite respiratory action. Clinically, this last factor is well known. One is quite familiar with the sight of newly-born children in a moderate degree of asphyxia, who are only made to breathe by external stimuli (slapping, dashing cold water on chest, etc.). But we have proof clinically of the other factor also, for in cases where the children are rapidly extracted by Cæsarean section they are frequently in a condition of apnœa. In these cases there has been no gradual accumulation of carbonic acid.

The application of these foregoing facts to practical midwifery is easy. After the membranes rupture and labour proceeds to the termination of the second stage, the placental circulation is being repeatedly interfered with by the uterine contractions; the child, especially its head, is being subjected to external pressure in its

[1] *Brit. Med. Journ.*, 1903, vol. ii., p. 1035.

passage through the utero-vaginal tract, and finally there is a change of environment from liquid medium at 99° to the air at 65°. The combination of the accumulated carbonic acid in the blood and the external stimulus results in a gasp or cry and the establishment of respiration and the pulmonary circulation.

The causes of asphyxia neonatorum are numerous, and I purpose dividing them into three main groups:

1. Traumatism.
2. Interference with the placental circulation.
3. Interference with pulmonary circulation.

1. *Traumatism.*—As examples of this group we have—(*a*) Badly-applied forceps. (*b*) Undue prolongation of 'moulding of head,' either where the pelvic canal is narrowed by the presence of bony malformations, tumours, etc., or where there is a great disproportion between the head and the pelvis because of undue size of the fœtus. In this group, called by Barnes 'paralytic asphyxia,' the condition is produced by compression or injury to the brain, especially compression or injury to the medulla oblongata. Spencer[1] showed, in his most valuable paper on the post-mortem examination of newly-born children, that injuries to the brain and its membranes are far from infrequent, and that although slighter hæmorrhages are found even in spontaneous deliveries, these hæmorrhages are much more frequent and extensive in cases of dystocia. In these cases one finds meningeal effusions, congestion, and small hæmorrhages into the pons and medulla; less frequently gross intracranial hæmorrhages. Thus the cause of death in these cases would seem to be due to direct and indirect injury to the brain and respiratory and cardiac centres. The fœtus in most of such cases dies without ever making any respiratory efforts.

2. *Interference with the Placental Circulation.*—This interference with the placental circulation may be due to several causes: (*a*) Premature separation of the placenta, as in placenta prævia or accidental hæmorrhage. (*b*) Direct pressure on, or constriction of, the umbilical vessels by knots, twists, or prolapse of the cord. (N.B.—Occasionally the asphyxia results when a cord twisted round the neck of the child gets pressed against the symphysis pubis while the child is being born. This cause is often overlooked, for the accoucheur has auscultated the fœtal heart and found it quite satisfactory before proceeding to deliver the child.) (*c*) In cases of prolonged labour after rupture of the membranes, accompanied by undue prolongation of the uterine contractions, thereby causing temporary interference of the placental circulation. (*d*) Grave diseases of the mother, in which, for various reasons,

[1] Trans. Lond. Obst. Soc., 1891, vol. xxxiii., p. 203.

her circulation is impeded or interfered with—*e.g.*, heart and lung diseases, anæmia, hæmorrhage, or the moribund state. (*e*) Poisons circulating in the maternal system—syphilis, uræmia, etc. (*f*) With undilated or rigid cervix, where the child makes premature attempts at respiration, or where the cervix is so closely applied to its neck as to obstruct the circulation altogether.

In this type of asphyxia the apnœa of the fœtus is usually preceded by intra-uterine attempts at respiration, the result of the accumulation of carbonic acid in the blood. The respiratory centre in the medulla is excited, and (except where the mouth of the child is closely applied to its own body or to the uterine wall), with the expansion of the chest, meconium, amniotic fluid, and mucus are aspirated. As a result of this, a condition of grave venous congestion occurs in the lungs, and the cardiac action is inhibited. As the carbonic acid accumulates, the medulla becomes more deeply poisoned, and death results. The heart cavities, especially on the right side, are found filled with venous blood, and hæmorrhage occurs into the cranium, liver, spleen, etc. This is the commcnest type of fœtal asphyxia, though, happily, in the great majority of cases the termination is not fatal.

3. *Interference with the Fœtal Pulmonary Circulation.*—Here the child is presumably born and has independently breathed and lived a separate existence. This is really true asphyxia, as we recognize it in suffocation, drowning, overlying—*e.g.*, where the child is born with a caul, or has its mouth or nasal passages obstructed by mucous or maternal secretions, or is placed in bed with its face downwards and is too weak to move.

It is customary to distinguish two forms of asphyxia neonatorum—(*a*) asphyxia livida; (*b*) asphyxia pallida. It is very questionable, however, if one should not distinguish an apnœa pallida, in which the respiratory centre is so injured that it is really never called into action.

Asphyxia Livida.—In asphyxia livida the skin is dusky red or purple, and the cutaneous vessels are turgid. The umbilical vessels are likewise overfilled with dark-coloured blood and are usually pulsating strongly. The cardiac action is good and not unduly slowed. Muscular tonicity is evidenced by the fact that the limbs are not limp, nor has the sphincter ani lost its power.

This is practically the normal condition, if one can so put it, of newly-born children. Children, on the other hand, delivered rapidly by Cæsarean section are of a paler hue, yet not resembling in the least the pallor of asphyxia pallida.

The prognosis in such a simple case of asphyxia livida is

invariably good. At first the child may not make any attempts at spontaneous respiration, but after a brief period feeble superficial respiratory efforts are observed, which are shortly followed by more active attempts, and finally reach a climax in a cry.

The combination of accumulated carbonic acid and the cutaneous stimulation of rubbing, slapping, or dashing cold water on chest, etc., result in the establishment of respiration.

This, as I have already indicated, is the normal type of asphyxia neonatorum, but a very fine line of demarcation exists between this type and the next to be considered.

Asphyxia Pallida.—Should the birth of the child be delayed further than the stage of stimulation, then the respiratory centre becomes depressed and finally paralyzed by the lack of oxygen and the accumulation of carbonic acid. The child then passes by degrees—not rapidly—into the state of asphyxia pallida as usually understood.

The most striking difference is the colour of the skin, which is of a dirty white colour and entirely without evidence of cutaneous blood-supply. Hardly less noteworthy is the absolute loss of muscular tone. The child when delivered is limp; the head, on account of the loss of muscular tonicity in the muscles of the back and neck, rolls about unhindered and the jaw drops. A finger introduced into the anus encounters no resistance, as the sphincter ani has lost its power.

Cardiac muscular paresis is also indicated in the enfeebled, and irregular cardiac action, and the lack of blood in the skin and umbilical vessels. Hence the child presents just that very appearance which one sees in a person stricken down in a faint. Peculiar gasping attempts are made at respiration, entirely diaphragmatic in character, unassisted by the ordinary and extraordinary muscles of respiration. These are futile efforts; very little air reaches the bronchioles.

Should success follow any of the means employed to resuscitate the child, the colour of the skin changes, the cardiac action becomes slower, more forcible, and regular, and tonicity returns to the muscular system.

In most cases in which a post-mortem examination is made the lungs are of a dark red colour, heavy, and present numerous sub-pleural hæmorrhages from the increased blood-pressure in the over-filled, delicate, and distended pulmonary vessels. If the child has made antenatal attempts at respiration, liquor amnii, meconium, etc., are found in the air-passages. The brain and its membranes likewise participate in this congestion; meningeal effusions and œdema,

especially over the cortex and base, are common. Hæmorrhages into the substance of the brain are comparatively rare. The right side of the heart has its cavities distended with dark venous blood, and subpericardial hæmorrhages are frequently noted. Hæmorrhages into the thoracic and abdominal viscera are very general.

Diagnosis.—As the labour progresses the modern accoucheur, instead of making frequent vaginal examination, now directs his attention to the mother's pulse-rate and temperature and to the fœtal heart-rate. As regards the last-mentioned—the fœtal heart-rate—a gradually and continually slowing heart-rate is an indication of the gradually increased irritation produced by the carbonic acid on the vagus centre, which inhibits cardiac action. Of course as labour progresses the fœtal heart-beats become slower during a uterine contraction; but if in the intervals they regain their wonted rate, and especially if they do so quickly after the uterine contractions cease, then there is no need for alarm.

It is frequently observed that in a case where there has been noted a continuously slowing heart-rate, there is increased accentuation of the heart-sounds. This is called by some the 'vagus heart.'

In presentations other than the breech the escape of meconium is another symptom of importance. It results from irritation of the ganglia in the submucous tissue of the intestines, and consequent increased peristalsis. Later there occurs a paralysis of the sphincter. It is quite certain that meconium is not infrequently expelled from the fœtal bowel during pregnancy, then it becomes mixed with the liquor amnii. That is of no consequence. It is the expulsion of meconium in quantity after a labour has been in progress for some time that leads one to be anxious about the child. I need not remind my readers that the escape of meconium is a natural feature of breech presentations.

Very frequently immediately before its death the child becomes very restless. The child also may make respiratory efforts, and if air happens to be carried into the uterus—as, for example, by the operator's hand—then the child may actually draw in this air, and the uterine cry (vagitus uterinus) may be heard. I heard this very distinctly in a case in which I introduced my hand into the uterus to perform version.

Prognosis.—Except in asphyxia livida, which in its mildest form is practically the normal condition of the child at birth, the prognosis is far from good.

Pulmonary and cerebral extravasations of blood kill a large number, and later pneumonia from inspired material carries off not a few. Even amongst those which are resuscitated a large proportion die within a

few days. Indeed, if resuscitation has been extremely difficult and has only succeeded after an hour or more, the mortality is very high indeed.

Treatment.—The treatment of this condition varies according to the degree of asphyxia. In the simple cases of suspended animation following delivery all that is required, as a rule, to excite respiratory efforts is to apply cutaneous stimulation by smartly slapping the

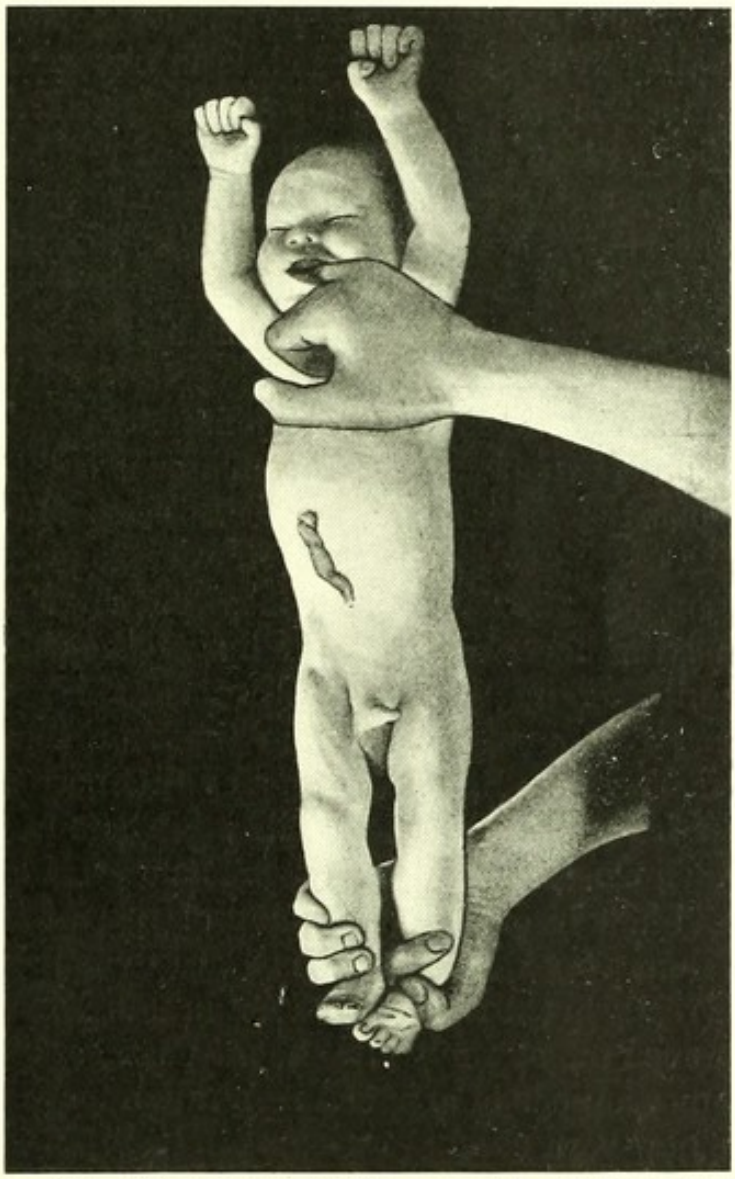


FIG. 291.—Clearing the Air-Passages of the Child at Birth.

child's buttocks, dashing cold water on its chest, and rubbing the child with brandy. If the child is extremely livid, it is well to allow a few drops of blood to escape from the umbilical cord.

If these simple procedures are not successful, the child should be seized by the feet and held head downwards (Fig. 291), so that any mucus or liquor amnii may be dislodged from the upper air-passages. At the same time the child's chest should be gently compressed. If

there is difficulty in clearing the air-passages, a gum-elastic catheter or insufflator should be passed into the trachea, and mucus, etc., removed by suction. Should such treatment fail and the child gradually tend to pass into the condition of asphyxia pallida, with slowly and feebly beating heart, then one must resort to other methods.

From what has been already said regarding asphyxia pallida, where one has to deal with a limp child, very cold, and almost pulseless, it is self-evident that heat must be applied to the child's body. Heat is best applied by immersing the child in hot water. Immersed in the warm water and with its head supported, artificial respiration should be carried out by alternately compressing and relaxing the chest. These movements are made about ten or twelve times per minute. At this stage rhythmic traction of the tongue will be found very useful. It is an old method of reflexly irritating the respiratory centre, and will usually succeed in establishing respiratory efforts. If it fails, the child is in extreme danger.

Personally, I am not in favour of insufflation of the lungs, for the air introduced, unless a mechanical insufflator is employed, contains a very large proportion of carbonic acid. Besides, there is very considerable danger of rupturing the finer air-vesicles. If it is deemed advisable to employ insufflation, it may be carried out by the accoucheur applying his own lips to the lips of the child, with a thin piece of gauze intervening; but this direct method is not sanitary, and the greater part of the air forced into the thorax passes into the stomach. It is, therefore, better to employ the indirect method and pass a gum-elastic catheter into the trachea. The nose and mouth of the child are then closed, and the accoucheur forces a certain amount of air into the child's lungs. This forcing of the air into the child's lungs must be done very cautiously. The accoucheur must take care that the tube is really in the trachea and not in the œsophagus, and that the air is not forced too strongly into the air-passages of the child.

The following methods of artificial respiration may be employed in the case of the new-born child :

Schultze's Method.—The child is held as indicated in the illustration. The thumbs lie over the child's shoulders, clavicles, and front of the chest; the fore and middle fingers are laid flat against the posterior and lateral walls of the thorax, while the ring and little finger support the head.

The accoucheur stands with the child grasped as described and hanging between his legs (Fig. 292). He then swings the child so that the trunk falls over into the position indicated in right-hand figure; at the same time the chest is compressed. This movement

simulates expiration. After pausing a second or two, he then swings the child back into the first position. That movement simulates inspiration. The two movements should be carried out about the rate of eight to twelve times per minute, and should not be continued for more than two minutes. The child should then be put back into the hot bath. The swinging is repeated as deemed advisable.

Byrd's Method.—This method is carried out by holding the child in the two hands, as indicated in the illustration (Fig. 293).

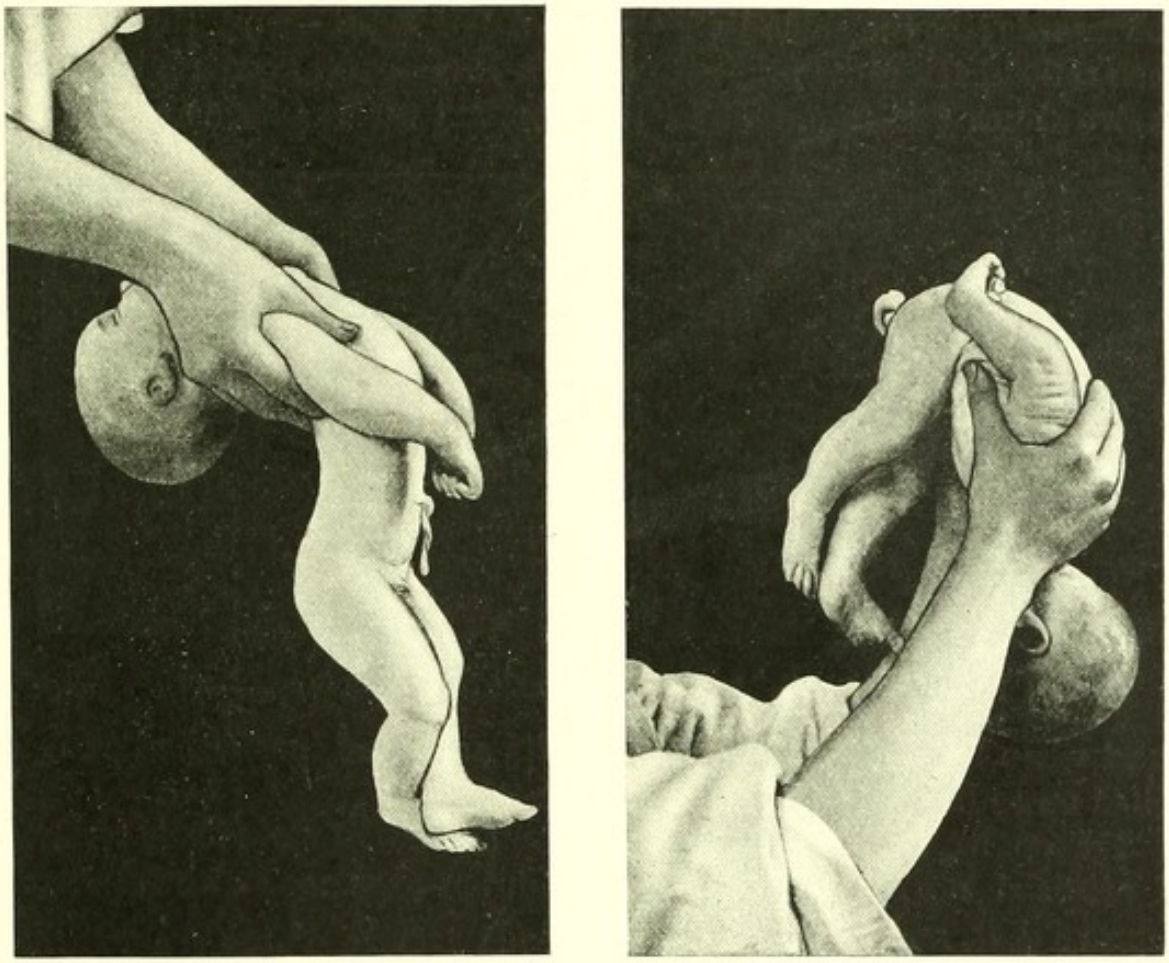


FIG. 292.—Schultze's Method of Performing Artificial Respiration.

By extending the back and allowing the head to become extended, expansion of the chest-wall is brought about; while by approximating the two ends of the trunk compression of the chest is produced (Fig. 293). These inspiratory and expiratory movements are carried out about ten times per minute. This method may be employed when the child is in a warm bath. (N.B.—If the child is not in a bath, it should be turned face downwards at the end of expiration, so that any mucus may be dislodged.)

Sylvester's Method.—In this method the child is placed on its back, with the shoulders slightly elevated and the head hanging

over the pillow. In order to carry out the manœuvres successfully, the legs must be fixed by an assistant, and the tongue must be pulled forward with a piece of gauze to ensure the free entrance of air. The child's arms are then grasped and pressed against the chest wall: expiration is thus imitated. The arms are then everted and carried upwards above the head: inspiration is thus imitated.

Marshall Hall's Method.—The child is laid on its back, with the head hanging over the knees of the doctor or nurse. It is then seized by an arm and thigh and rolled over until the chest looks a little downwards; at the same time the chest is compressed. The child is then rolled back to its original position. The movements are repeated twelve times per minute. In this method air is forced out of the

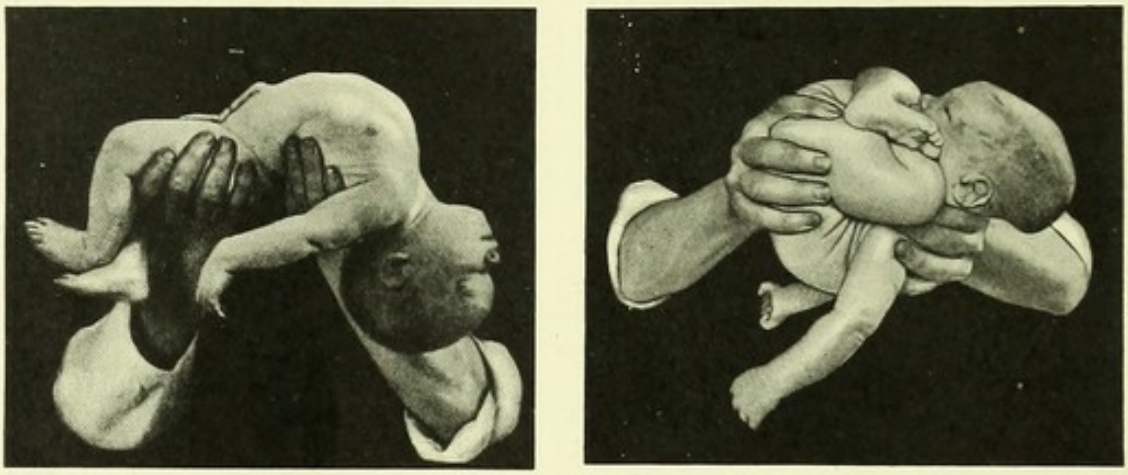


FIG. 293.—Byrd's Method of Performing Artificial Respiration.

chest when the child is rolled on to its side, and inspired when it is rolled on to its back.

Personally, I do not favour the employment of Schultze's method of artificial respiration. I am well aware that many obstetricians approve of it, and I have not the least doubt that air is drawn in and forced out very effectively by means of it. There is no doubt also that the heart is mechanically stimulated by it. In severe cases of asphyxia pallida, however, it has always appeared to me too violent. We have seen in those cases that hæmorrhages into the brain and abdominal viscera are very common; surely, therefore, violent mechanical movements are undesirable, as they will tend to increase the hæmorrhages already present. In the slighter forms of asphyxia it is quite unnecessary. It has been my custom, therefore, to remove all mucus from the air-passages, immerse the child in warm water, and employ rhythmic traction of the tongue and compression of the chest. I believe that by such quiet methods better results will be obtained than by the violent movements employed in Schultze's manœuvres.

APPENDIX

MEASUREMENT OF PELVIC DIAMETERS BY THE ROENTGEN RAYS

By J. R. RIDDELL, L.R.C.P.& S.(Edin.), L.F.P.S.(Glas.),
Medical Electrician, Royal Infirmary, Glasgow.

The main difficulties to the accurate measurement of the brim of the pelvis by means of the Roentgen rays are :

1. The picture is made by a shadow of the object.
2. The plane of the pelvic brim and the surface of the plate on which the shadow is cast are not parallel, but lie at a certain angle to each other.
3. The plate cannot be got close to the brim, nor can it be always placed at the same distance from it.

Of the various methods employed, none is more accurate and simple than that used by us—namely, to make a radiogram of the inlet under certain definite conditions and eliminate the error by calculation. In applying it, the following facts have to be borne in mind :

1. A plate can always be so placed as to rest on the most posterior part of the sacrum and on the tuberosities of the ischium at the same time.
2. The plane of this plate will be at a certain angle with that of the pelvic inlet, and this angle will be nearly the same in all cases.
3. The distance between the plate so placed and the centre of the plane of the pelvic brim is about $3\frac{3}{4}$ inches, and never exceeds $4\frac{1}{2}$ inches.

Technique.

Place the patient face downwards on a canvas-topped couch, with the tube underneath it in a movable carrier. Place a small air bladder between the patient's abdomen and the couch, just above the symphysis pubis. Place the screen on the patient's back, darken the room, and excite the tube. The outline of the pelvic brim will now be visible, and the tube can be moved

into such a position that the normal ray falls perpendicularly on the plane of the inlet. That the tube is in the correct position is judged by the appearance on the screen, and, more exactly, by arranging that the normal ray falls practically vertically on the plate when placed in position. The tube is brought to a point 24 inches distant from the screen ; a plate in its dark bag is now placed resting on the ischial tuberosities and sacrum, and a skiagram is made.

To find the correct position and direction of the tube easily, we have a flat piece of wood measuring about 6 inches by 4 inches ; from the centre of the longer edge of this a rod juts out just long enough to be free of the couch when the piece of wood is placed on the plate (about 14 inches). To the free end of this a second rod, exactly 24 inches in length, is attached at right angles to it, and vertical to the plane of the piece of wood. The end of this second rod is in line with the spot at which the anticathode must be, and the rod points the direction of the normal ray.

To secure that the normal ray falls perpendicularly to the plate, and that it passes through the centre of the pelvic inlet, a small metal rod, $\frac{1}{8}$ inch in diameter and $1\frac{1}{2}$ inches long, is attached vertically to the centre of a thin disc of vulcanite. The disc is $\frac{1}{2}$ inch in diameter. It is attached with sticking plaster to the glass of the tube opposite the anticathode, so that the length of rod lies in the normal ray. A small metal disc is attached by sticking plaster to the patient's back in the middle line half an inch from the tip of the coccyx, this being the spot found to correspond with the centre of the inlet. The patient is now examined, and the metal rod is seen as a round spot when the tube is properly directed, otherwise it appears more or less elongated. The tube is in proper position when the spot representing the metal rod is covered with the shadow made by the disc on the patient's back.

The radiogram thus obtained differs from the actual pelvis in two ways : It is enlarged generally on account of the rays producing it being divergent, and the antero-posterior diameter is slightly distorted because the plate and the plane of the pelvic brim are not parallel. As the angle between them is small, the distortion may be discounted.

The error due to enlargement is to be corrected by multiplying the diameter of the shadow of the pelvis by 0·84, and adding 0·16 inch. This formula is arrived at by experiment.

A dried pelvis, slightly larger than the average, was taken, and a radiogram made under the conditions given above—namely, the plate was made to rest on the most posterior part of the sacrum and on the ischial tuberosities, allowance being made for the thickness of the gluteal muscles. The tube was placed 24 inches distant, the normal ray falling through the pelvis vertically on the plate. The brim was found to lie practically parallel with the plate and 3·75 inches distant from it. The antero-posterior diameter of the actual pelvis was 4·37 inches, while that on the skiagram was 5·18 inches; thus $5{\cdot}18 \times 0{\cdot}84 = 4{\cdot}35$ inches. This is practically exact where the shadow

happens to measure 5·18 inches and the object casting it is 3·75 inches from the plate. Unfortunately the distance between the plane of the pelvic inlet and the plate varies, and cannot be accurately determined. When it is less than the standard given above, the application of the rule will give something less than the true diameter. It is therefore necessary to suppose an extreme case and calculate the error produced.

Taking as an extreme case one in which the distance between the plane of the inlet and the plate measures 2·75 inches, we find that on applying the rule the diameter obtained is 0·33 inch less than it should be. If, therefore, we take half that distance—namely, 0·16 inch—and add it to the result in every case, we shall overstate the true length by that distance (0·16 inch) in cases where the pelvis is actually as large as the standard, and understate it where it is as small as the extreme case supposed. The error in all cases between these extremes *will be something less than* 0·16 *inch.*

We have proved this actually to be the case by experiment on the dead subject; and in a number of cases, under the care of Dr. Munro Kerr, we have found our measurements corroborated by the usual clinical ones made by him.

This method has in its favour its great simplicity, and the objections to it can be equally urged against the other methods. These are:

1. The inability exactly to fix the distance between the centre of the plane of the inlet and the plate.
2. The uncertainty as to the exact angle between these.
3. The inability to secure that the normal ray falls quite perpendicularly on the plane of the inlet.

In conclusion: Measure the antero-posterior diameter of the radiogram taken under the above conditions; multiply that measurement by 0·84 and add 0·16 inch, and the result will be the correct pelvic measurement to within $\frac{1}{6}$ inch.

INDEX

Abdomen, fœtal, enlarged, cause of dystocia, 106
pendulous, cause of dystocia, 288
cause of rupture of vaginal vault, 630
in contracted pelvis, 176
Abdominal fixation of uterus, cause of dystocia, 291
in abortion, 519
pain in extra-uterine pregnancy, 554
palpation (see Palpation, abdominal), 15
pregnancy, 546
section. See Laparotomy
Abortion, 516
complete, 521
criminal, 518
curettage in, 529
diagnosis from extra-uterine pregnancy, 560
diagnosis of, 519
ergot in threatened, 525
etiology of, 517
frequency of, 516
habitual, 519
in retroflexion of gravid uterus, 273
incomplete, 521
indications for induction of, 450
induction of, 451
missed, 523
plugging in, 527
prophylaxis, 524
repeated, 518
rupture of vagina in removing, 527
septic, 530
symptoms, 519
threatened, 520
treatment of, 524
tubal, 538
varieties, 520
Abscess of Bartholin's gland, cause of infection, 260
Accidental hæmorrhage, 595
accouchement forcé for, 605
apparent, 597
Cæsarean section for, 605
concealed, 599
diagnosis of, 596
etiology, 595
plugging in, 602
Accidental hæmorrhage, prognosis in, 601
rupture of membranes in, 604
treatment, 601
varieties of, 596
Accidents, cause of abortion, 518
to child, 668
to mother, 617, 657
Accouchement forcé, 454
dilator, hydrostatic, 459
expanding metal (Bossi), 461
extraction of child, 476
incisions of cervix, 466
indications for, 454
manual dilatation in, 457
methods of operating, 456
metreurynter in, 459
tents, expanding, in, 458
Acute diseases in pregnancy, induction of labour for, 433
Adhesions after Cæsarean section, 427
amniotic bands, 141
Adipocere formation in ectopic fœtus, 565
After-coming head, craniotomy, 496
extraction of, 69
forceps to, 70, 360
moulding of, in contracted pelvis, 193
Age of fœtus, difficulty of calculating, 440
Air, embolism, 665
Albuminuria, cause of abortion, 518
accidental hæmorrhage, 596
induction of labour for, 434, 437
Albuminuric retinitis, induction of labour for, 435
Alcohol as antiseptic, 309
Amenorrhœa, significance of, in extra-uterine pregnancy, 555
Amnion, rupture of, chorion remaining intact, 149
Amniotic adhesions, 141
Ampullar pregnancy, 537
Amputation of leg, effect upon pelvis, 175
Anæmia, pernicious, induction of labour in, 435
Anæsthesia, advantages in performing version, 319, 640
effect on parturition, 314
general, 314
post-partum hæmorrhage following, 314, 609

Anæsthesia, spinal, 315
Angular pregnancy, 563
Annular detachment of cervix, 202
Anteflexion, cause of dystocia after vaginal fixation, 290
cause of dystocia after ventral fixation, 292
in contracted pelvis, 176
of gravid uterus, 287
Ante-partum hæmorrhage. See Hæmorrhage
Anteversion. See Anteflexion
Anus, laceration of sphincter, 647
repair of sphincter, 654
Appendicitis during pregnancy and labour, 262
simulating extra-uterine pregnancy, 551, 560
Arm, diagnosis from leg, 89
diagnosis of particular, 91
dorsal displacement of, in head presentations, 48
in breech presentations, 67
fracture of, 674
prolapse of, in head presentations, 47
in transverse presentations, 89, 323
Artificial respiration. See Asphyxia neonatorum, 680
Ascites of fœtus, dystocia from, 108
Asphyxia neonatorum, 680
etiology of, 681
hæmorrhages in fœtus associated with, 675, 681
livida, 682
pallida, 683
prognosis, 684
treatment, 685
Assimilation pelvis, 158
Astringents in post-partum hæmorrhage, 614
Atony of uterus. See Uterine inertia
Atresia of cervix, cause of dystocia, 202
of vagina, 204
of vulva, 205
Attitude of fœtus, 15
Auscultation, diagnosis of presentation and position of child from, 24
fœtal heart, 23
importance of, during labour, 4, 23
in multiple pregnancy, 113
uterine souffle, 23
Axis of pelvis, variations in, 337
traction forceps. See Forceps, 333
Ayres' method of performing symphysiotomy, 392

Backward displacement of gravid uterus (see Retroflexion of gravid uterus), 265
Bacteriology of vaginal secretion, 312
Bag of membranes confused with caput succedaneum, macerated fœtal head, œdematous scrotum, cystocele, 149
premature rupture of, 147
Ballottement of head in diagnosis of breech presentations, 50
Bandl's ring. See Retraction ring
Barnes's hydrostatic dilator, 460
Bartholin's glands, abscess of, complicating labour, 260
Basilyst, 492
Baudelocque's cephalotribe, 492
diameter, measurement of, 178
Bichloride and biniodide of mercury as antiseptics, 308
Bicornuate uterus, cause of dystocia, 295
pregnancy in, 294
rupture of, 300
Binder, abdominal, in correcting malpresentations, 94, 328
in pendulous abdomen, 287
in plugging for accidental hæmorrhage, 604
Biparietal obliquity, 163
Bipolar version, 330
in placenta prævia, 589
Bladder, ectopia of, in split pelvis, 158
irritation of, in anteflexion of uterus, 287
in ectopic pregnancy, 557
in short umbilical cord, 144
rupture of, in backward displacement of gravid uterus, 272
in rupture of uterus, 629
stone in, 256
tumour of, complicating labour, 256
Blood, diseases of, induction of labour for, 435
mole, 523
Blunt hook, 491
Bougie for induction of premature labour (Krause's method), 446
Brain, injuries to fœtal, 675
Braun's decapitating hook, 501
cranioclast, 492
Braxton Hicks' method of version (see Bipolar version), 330
Breech presentations, 50
arms, difficulty in bringing down, 62
auscultation in, 24
cephalic version during pregnancy, 84
complicated by contracted pelvis, 51
extended legs, 78
fillet in, 81
foot, bringing down, 51
forceps in, 83
head, after-coming, extraction of, 69
impacted, extraction of, 78
in hydrocephalus, 100
liberation of arms in, 62
nuchal or dorsal displacement of arm, 69
treatment of, during labour, 50
during pregnancy, 84
Broad ligament, hæmatoma, 208, 211
simulating accidental hæmorrhage, 599
pregnancy, 540
rupture of uterus, 617
Brow presentations, 43
conversion of, into face or vertex, 39
frequency of, 43
moulding of head in, 45
prognosis in, 44
symphysiotomy in, 46, 375

Brow presentations, treatment of, 45
version in, 45
Byrd's method of resuscitation, 688

Cæsarean section for accidental hæmorrhage, 605
conservative, 421
contra-indications, 403
following vagino-fixation, 291
ventro-fixation, 292
for carcinoma of cervix, 217
of rectum, 258
for contracted pelvis, 192, 402
for eclampsia, 404
hypertrophied cervix, 199
for myasthenia gravis, 406
for myoma of uterus, 252
for ovarian tumour, 229
for placenta prævia, 405, 594
for vaginal cicatrices, 205
hysterectomy after, 417
indications for, 402
mortality from, 428
on the dead or dying, 430
Porro's operation, 417
post-mortem, 430
preparation for, 406
prognosis of, 428
repeated, 427
results to mother and child, 428
sterilization of patients after, 425
symphysiotomy contrasted, 379, 402
technique of, 409
time for operating, 408
vaginal. See Vaginal Cæsarean section, 469
Calcification of fœtus in extra-uterine pregnancy, 565
Cancer. See Carcinoma
Caput succedaneum, cause of, 668
diagnosis from bag of membranes, 149
Carbolic acid as antiseptic, 308
Carcinoma of cervix, complicating pregnancy and labour, 212
proportion of operable cases, 214
treatment, 216
Carcinoma of rectum complicating pregnancy and labour, 257
Cardiac disease. See Heart disease, maternal
Carneous mole, 523
Catgut, sterilization of, 306
Catheterization before operation, 313, 346
danger of infection, 314
Caul, danger to child born with, 682
Cephalic version, 316
in breech presentations, 84
methods of performing, 326
Cephalometer, 187
Cephalotribe, 492
combined cranioclast and cephalotribe, 493
Cervix, acute œdema of, 201
amputation of, for hypertrophy, 200
for carcinoma of cervix, 216
annular detachment of, 202
Cervix, atresia of, 202
carcinoma of (see Carcinoma of cervix), 212
changes in, during labour, 621
dilatation of, (see Dilatation of cervix), 456
hypertrophy of, complicating labour, 199
incision of (see Vaginal Cæsarean section), 466
laceration of, 645
œdema of, 201
rigidity of (see Rigidity of cervix), 199
stenosis of, 202
Child, relative claims of mother and child, 2
Chioid (thoracopagous) monster, 123
Chloroform in labour (see Anæsthesia), 314
Chorea, induction of labour for, 436
Chorion-epithelioma, 533
Chorion, disease of (see Hydatidiform mole), 531
retention of, 513
Circular sinus of placenta, rupture of, 147, 581
Clavicle, fracture of, 674
Cleidotomy, 505
Cocaine in spinal anæsthesia, 315
Cohen's method of inducing labour, 450
Collapse following hæmorrhage, treatment of, 614
Colpeurynter. See Metreurynter
Colporrhexis, 630
Concealed hæmorrhage (see Accidental hæmorrhage), 599
Conglutinatio orificii externi, 202
Conjugate diameter of brim (Conjugata vera), 179
Baudelocque's, 177
diagonal (oblique conjugate), 184
external, 177
measurements of, 179
of outlet, 178
true, 179
Constrictor vaginæ, importance of preserving, 652
Contracted pelvis, Cæsarean section in, 189, 192, 402
causes of, 153
classification of, 153
craniotomy in, 477
diagnosis of, 176
forceps in, 194, 363
induction of premature labour for, 192, 439
mechanism of labour in flat pelvis, 163
in generally contracted pelvis, 154
pelvimetry in, 179
prognosis of labour in, 189
size of fœtus in, 191
spontaneous delivery in, 190
symphysiotomy in, 192, 374
treatment of labour complicated by, 189
X rays in diagnosis of, 180. See Appendix

Contraction, uterine, 5
definition of uterine, 611
hour-glass uterine, 14
in dystocia, due to contracted pelvis, 192
in threatened rupture of uterus, 635
irregular uterine, 13
tetanic, 13, 635
Convulsions. See Eclampsia
of new-born child, 677
Cord. See Umbilical cord
Cornual pregnancy, 573
Corrosive sublimate and biniodide of mercury as antiseptics, 309
Cranioclast, 491
Craniotomy, 477
after-coming head, 496
in double monsters, 126
in hydrocephalus, 102, 478
in mento-posterior face presentations, 43, 360
in threatened rupture of uterus, 635
indications for, 478
limitations in contracted pelvis, 480
living child, 404, 478
prognosis of, 481
technique of, 482
Credé's method of expressing placenta, 512
rupture of uterus from, 627
Criminal abortion, 518
Crotchet, 491
Curettage in abortion, 529
diagnostic purposes in ectopic pregnancy, 563
Cystitis from catheterization, 314
Cystocele, complicating labour, 289
mistaken for membranes, 149
Cysts of ovary (see Ovarian tumour causing dystocia), 221
of vagina and vulva, causing dystocia, 206

Death of fœtus during pregnancy, 438
repeated induction of labour for, 438
of mother during labour, 663
Decapitation, 499
in locked twins, 119
in transverse presentations, 95, 500
Decapitating instruments, 500
Decidua in ovary in ovarian pregnancy, 544
in tube in tubal pregnancy, 537
retention of, in abortion, 521
shedding of, a sign of ectopic pregnancy, 549, 556
uterine, in ectopic pregnancy, 548
Deciduoma malignum (see Chorion-epithelioma), 533
Deformed pelvis. See Contracted pelvis
Dermoid cysts of ovary. See Ovarian tumours, 221
Diameters of pelvis, measurements of, 177
of fœtal head, alterations result of compression, 193, 341
Dicephalous monster, 126
Dilatation of cervix, artificial, 456
manual, 457
with forceps, 344
with metal dilators, 461
with metreurynter, 459
with tents, 458
Disinfection of abdominal wall before laparotomy, 313
of hands, 307
of instruments, etc., 304
of vagina, 312
of vulva, 311
Displacement of arms in head presentations, 46
of uterus. See Uterus, displacements of, 265
Dolichocephalic head, cause of face presentation, 35
Double monsters, dystocia from, 121
Double uterus and vagina, 294
Douche, intra-uterine, for post-partum hæmorrhage, 611
for retained membranes and placenta, 509, 529
routine post-partum, 313
vaginal, before labour, 312
before Cæsarean section, 407
Douglas's cul-de-sac, drainage through, 573
incising, in ectopic pregnancy, 573
perforation of, in expressing ovum in abortion, 526
Drainage, abdominal, disadvantages of, 567
vaginal, in extra-uterine pregnancy, 570, 573
in rupture of uterus, 641, 643, 645
Dropsy, general fœtal, 97
Dry labour, 147
Duchenne's paralysis (birth paralysis), 679
Dwarf pelvis, 155
Dyspnœa during pregnancy, induction of labour for, 435, 437
after delivery, 663
Dystocia, classification of, 3
definition of, 1
result of different abnormal conditions of forces, fœtus, and parturient canal. See Contents
Dysuria in extra-uterine pregnancy, 276, 557, 571
from retrodisplaced gravid uterus, 270

Écarteur of Tarnier, 464
Eclampsia, accouchement forcé in, 455
bleeding in, 405
Cæsarean section in, 404
saline infusion in, 405
Ectopic pregnancy. See Extra-uterine pregnancy, 536
Embolism, air, 665
pulmonary, immediately after labour, 663
Embryotomy, 477
Emphysema, subcutaneous, in labour, 665
of abdominal walls, following rupture of uterus, 667

Encephalocele, cause of dystocia, 104
Endometritis, cause of abortion, 517
cause of placenta prævia, 577
cause of premature separation of placenta, 596
Enteroptosis. See Pendulous abdomen
Episiotomy, 652
Ergotin. See Ergot
Ergot in abortion (threatened), 525
in post-partum hæmorrhage, 611
in uterine inertia, 11
rupture of uterus following employment of, 623
Estimation of age of child, difficulty of, in induction of labour, 440
Eucaine in spinal anæsthesia, 315
Evisceration, 504
Evolution, spontaneous, 87
Examination, abdominal, 15
bimanual, in estimating relative size of pelvis and fœtal head, 187
rectal, 25
vaginal, few weeks before labour, importance of, 23, 176
infection from, 21
limitating number of, 20
Exostosis, causing injuries to fœtal head, 667
producing pelvic deformities, 168
Expression of ovum in abortion, 526
of placenta (Credé method), 512
External version (see Version, external), 525
Extraction of after-coming head, 69
of breech, 56
Extra-uterine pregnancy, 536
abdominal (primary), 546
adipocerous change in fœtus, 565
advanced, 563
ampulla, implantation in, 537
associated with intra-uterine, 576
classification of, 536
clinical features, 549
decidua tubal, 537
uterine, 548
differential diagnosis, 551, 558
dysuria in, 276, 557, 571
hæmatocele following, 570
interstitial, 542
isthmic, 541
lithopædion formation in, 565
ovarian, 544
pain in, 554
pathological anatomy of, 536
repeated, 576
rupture of, 538, 550, 555
symptoms of, 549
terminations of, 536
treatment of, 566
tube wall, changes in, 537
vaginal hæmorrhage in, 556
varieties of, 536
Face presentations, causes of dystocia, 35
causation of, 35
complicated by contracted pelvis, 39
conversion of, into vertex, 39
Face presentations, craniotomy in, 486
diagnosis of, 36
forceps in, 359
frequency of, 37
injuries to child, 37
mento-posterior position of, 42
prognosis, 37
symphysiotomy in, 46, 375
treatment of, 38
version in, 38
Facial paralysis following forceps delivery, 678
Factors influencing labour, 3
Faraboeuf's prehenseur-levier-mensurateur, 373
Fascia, pelvic, limiting effusion of blood, 207
Fatty degeneration of uterine wall cause of rupture of uterus, 619
Fevers, specific, causes of abortion, 518
induction of labour in, 433
Fibro-myomata causing dystocia (see Myoma), 234
Fillet in impacted breech, 80
Flat non-rachitic pelvis, 156
rachitic pelvis, 159
diagnosis of, 177
factors influencing birth, 191
features of, 159
forceps in, 194, 363
mechanism of labour in, 163
prognosis, 188
treatment (see Contracted pelvis), 189
Fœtus, abdomen, enlargement of, 106
abnormalities of, obstructing labour, 96
ascites of, cause of dystocia, 108
attitude of, *in utero*, 15
in face presentation, 35
bladder, distension of, 106
calcification of, in advanced extra-uterine pregnancy, 565
circulation of, disturbances of. See Fœtus, heart-sounds
cystic kidneys of, 109
death, signs of impending, 4, 23, 437, 684
estimation of age of, difficulty of, 440
excessive size, 96, 438
fracture of bones of, *in utero*, 669
general dropsy of, 97
habitual death of, induction of labour for, 438
head. See Head, fœtal
heart-sounds, auscultation, importance of, 23
in prolonged labour, 4, 684
in twin pregnancy, 113
hydrocephalus of, 98
injuries to, during labour, 668
length of, measurement *in utero*, 440
malformations of, cause of dystocia, 96
movements, excessive, before death, 4, 684
mummification of, in extra-uterine pregnancy, 565

Fœtus, over-development of, induction of labour for, 439
position of, alterations in cause of dystocia, 26
pressure marks on, 670
size of, in contracted pelvis, 191
tumours of body of, cause of dystocia, 105
Fontanelle presentations, 32, 33
Foot, bringing down, in breech cases, 51
choice of, to bring down, 52, 321
diagnosis from hand, 89
Forceps, 333
action of, 339
adjustable axis-traction forceps of Milne Murray, 338
antero-posterior, 372
application of, 347
as dilator of cervix, 344
axis-traction, 336
Cameron's forceps, 372
cephalic application of, 347
choice of, 336
compression, amount of, exercised by forceps, 340
conditions necessary before application of, 344
facial paralysis following, 678
fœtal mortality in contracted pelvis, 194, 366
head movable above brim, 345, 364
high in cavity, 354
condemnation of, with head movable, 363
history of axis-traction, 333
indications for, 341
in after-coming head, 70, 360
in breech, impacted, 82, 362
in brow presentations, 45, 360
in contracted pelvis, 194, 363
in face presentations, 43, 359
in flat pelvis, 194, 363
in generally contracted pelvis, 194, 372
in mento-posterior position of face, 360
in occipito-posterior presentations, 32, 357
in posterior parietal presentations, 164, 194, 368
in prolapse of cord, 137
in protracted second stage of labour, 12, 342
limitations in contracted pelvis, 194, 338, 366
low, 350
mechanics of axis-traction, 336
Milne Murray's forceps, 337
Neville's forceps, 337
operation, ordinary, 349
ovum, 527
Pajot's manœuvre, 334
pelvic application of, 348
perineal tears, prevention of, with forceps, 353, 648
position of patient, 346
preparations for operation, 345
Forceps, prognosis of, in contracted pelvis, 190, 194, 373
Tarnier's, 333
traction, amount to be employed, 195, 339, 390
version contrasted, 193
Walcher position in forceps delivery, 346, 371
Forces concerned in labour, 3, 5
dystocia due to faults in, 5
Fornix, rupture of, during labour (colporrhexis), 630
rupture in manual removal of ovum, 526
Fractures of fœtal bones *in utero*, 669
of fœtal skull during labour, 669
of pelvis, 169
Fundus incision in Cæsarean section, 411
Funic souffle with short cord, 144
Funis. See Umbilical cord

Generally contracted pelvis (justo-minor pelvis), 154
mechanism of labour in, 32, 154
prognosis and treatment. See Contracted pelvis
Glycerine, inducing labour by injection of, 450
Graves' disease in pregnancy, induction of labour for, 436
Grossesse extramembraneuse, 149

Habit of abortion, 519
Habitual death of fœtus, 438, 519
induction of labour for, 438
Hæmatocele, pelvic, 570
treatment of, 572
Hæmatoma of broad ligament, in extra-uterine pregnancy, 540, 567
of sterno-mastoid muscle of new-born 674
of vagina and vulva, 207
subperitoneal, 209, 599
Hæmatosalpinx (see Mole, tubal), 540
Hæmorrhage, accidental (see Accidental hæmorrhage), 595
of placenta prævia (see Placenta prævia), 577
in abortion, 519
intracranial (fœtus), 675
intraperitoneal in extra-uterine pregnancy, 538
in rupture of uterus, 636
post-partum (see Post-partum hæmorrhage), 608
secondary post-partum, 616
transfusion in, 614
unavoidable (see Placenta prævia), 577
vaginal, in extra-uterine pregnancy, 556
Hand disinfection, 307
fœtal, diagnosis of, 89, 91
Head, after-coming. See After-coming head
consistency of influencing labour, 186, 191
diameters, alterations, from compression, 193, 341

Head, fœtal changes in shape of, in brow presentations, 45
in face presentations, 38
in occipito-posterior position of vertex, 29
injuries to, during labour, 668
measuring fœtal head *in utero*, 186
size influencing labour, 96, 191
size relative to maternal pelvis, importance of estimating, 187
Heart, diseases maternal, induction of labour for, 435
fœtal, alterations in protracted labour, 4, 344, 684
auscultation of, 23
face presentation, 37
in twin pregnancy, 24, 113
situation of maximum intensity indicating position of child, 24
Hebotomy (hebosteotomy), 398
Hegar's sign of pregnancy, 244
Herman's method of symphysiotomy, 392
Hermann's forceps, 335
Hernia of pregnant uterus, 288
High forceps (see Forceps, high), 354
Hook, blunt, 491
use of, for bringing down impacted breech, 83
Hour-glass contraction of uterus, 14
Hydatidiform mole, 531
benign, 533
destructive, 534
malignant, 533
pathology of, 532
relation of, to chorion-epithelioma, 533
rupture of uterus from, 534, 619
symptoms of, 534
treatment of, 535
Hydramnios, induction of labour for, 437
malpresentations resulting from, 85
Hydrocephalus, cause of dystocia, 98
cause of rupture of uterus, 101, 627
craniotomy in, 102, 478
diagnosis of, 98
presentations in, 100
prognosis, 101
spinal tapping, 102
treatment, 102
Hydrorrhœa gravidarum, diagnosis of, from rupture of membranes, 149
caused by grossesse extramembraneuse, 148
Hymen, atresia of, cause of dystocia, 205
Hyperemesis gravidarum, accouchement forcé in, 455
induction of labour in, 436
vaginal Cæsarean section in, 475
Hypertrophy of cervix, cause of dystocia, 199
Cæsarean section for, 199
Hypsiloid (dicephalous) monster, 127
Hysterectomy for accidental hæmorrhage, 606
for carcinoma, 216
for myomata, 249
Hysterectomy, for rupture of uterus, 642
supravaginal, after Cæsarean section, 417
total, after Cæsarean section, 420
vaginal, in carcinoma of cervix, 219
in accidental hæmorrhage, 607
Hysteropexy cause of dystocia, 292

Icterus gravidarum, induction of labour for, 438
Incarceration of prolapsed gravid uterus, 290
of retroflexed gravid uterus, 270
Inclination of pelvis, variations of, 337
Incomplete abortion, 521
Induction of abortion (see Abortion, induction of), 450
of premature labour (see Premature labour, induction of), 432
Inertia uteri (see Uterine inertia), 3, 8
Inevitable abortion, 520
Infant. See New-born child
Infantile paralysis, effect upon pelvis, 174
pelvis, 155
Infundibulum, implantation of ovum on, 541
Injuries to birth canal, 617
following forceps delivery, 195
to child *in utero*, 669
during parturition, 668
Insufflation of lungs in asphyxia neonatorum, 686
Internal version, 318
Interstitial pregnancy, 542
Intracranial hæmorrhage (fœtal), 675
Intra-uterine douche. See Douche
Inversion of uterus, causes of, 657
hysterectomy for, 662
repositor for, 663
spontaneous reposition, 662
symptoms, diagnosis, and prognosis, 660
treatment, 661
Ischio-pubiotomy, 401
Isthmic, pregnancy in, 541

Jardine's decapitating hook, 500
Jaundice of mother. See Icterus
Joint, pubic, anatomy of, 381
Johnson's method of measuring conjugata vera, 186
Justo-major pelvis, 154
Justo-minor pelvis, 154

Kerr, method of estimating relative size of fœtal head and maternal pelvis, 188
Kidney, changes in, induction of labour for. See Albuminuria
cystic, of fœtus, cause of dystocia, 109
Knee presentation. See Breech presentation
Knots of umbilical cord, 145
Krause's method of inducing labour, 446
Kyphotic pelvis, 170
symphysiotomy in, 172

Labium majus, œdema of, 202
Labour, anæsthesia during, 314
asepsis and antisepsis, 308, 311

Labour, auxiliary forces of, 9
complicated. See Dystocia
death during, 663
dry, 147
ergot during, 11
examination in, limiting of, 21
factors influencing, 3
flat pelvis, 163
force exerted, 7
forces, 5
generally contracted pelvis, 154
hæmorrhage during. See Hæmorrhage
in elderly primiparæ, 201
obstructed. See Dystocia
pains of. See Forces
precipitate, 7
premature, induction of (see Induction of labour), 432
preparations of patient for, 311
of room, bed, etc., 303
prolonged, cause for interference, 12, 342
spinal anæsthesia, 315
third stage, management of, 510
uterine contractions. See Forces
vaginal examination during, 21
Lambdoid (syncephalous) monster, 129
Langhan's layer of chorion in hydatidiform mole, 532
in chorion-epithelioma, 533
Laparotomy during pregnancy, safety of, 226
for extra-uterine pregnancy, 566
for fibro-myomata, 247
for ovarian tumours, 226
for rupture of uterus, 642
for retroflexed gravid uterus, 283
for suppurative conditions in pelvis, 261
preparation for, 304
Lateral curvature of spine (see Pelvis, scoliotic), 172
displacement of gravid uterus, 265
simulating extra-uterine pregnancy, 563
simulating fibro-myoma, 245
placenta prævia, 579
position of patient in parturition (see Sims' position), 137
disadvantage in high forceps, 346, 347
Lead-poisoning, cause of abortion, 518
Leucocytosis in diagnosis of appendicitis, 263
Leukæmia, cause for induction of labour, 435
Levator ani, injuries to, during labour, 647
Life, prospect of, for fœtus, 2, 404, 440, 455
Limitations, general remarks on, limitations of different operative procedures, 1
Lithopædion, 565
Litzmann's obliquity, 163
contra-indication to forceps, 368
Liver, acute yellow atrophy of, cause for induction of labour, 438
Lochiometra (retention of lochia), 288
Locked twins, 116
Loops in umbilical cord. See Umbilical cord
Lower uterine segment, 621
injury of, in vaginal Cæsarean section, 476
rupture of, 621

Malformations of fœtus causing dystocia, 96
of uterus and vagina causing dystocia, 294
Manual dilatation of cervix, 457
removal of placenta, 507
Masculine pelvis, 155
Mauriceau's method of delivering the after-coming head, 74
Meconium, escape of, sign of fœtus in danger, 4, 684
Membranes, adhesion to lower part of uterus cause of dystocia, 151
bag of, resistance to bursting force, 148
fœtal, premature rupture of, 147
retention of, 513
rupture of, method of inducing labour, 446
delayed rupture of, 149
premature rupture, 147
Meningocele cause of dystocia, 103
Menses, persistence of, in pregnancy, 297, 520, 556
Menstrual molimen during pregnancy, 517
Mercurial poisoning, cause of abortion, 518
Metreurynter in accidental hæmorrhage, 605
in accouchement forcé, 459
in induction of labour, 448
in placenta prævia, 592
in prolapse of funis, 140
in rigidity of cervix, 201
method of inserting, 460
of Champetier de Ribes, 462
of Pomeroy, 461
rupture of, 460
rupture of uterus, 593
Metritis, cause of post-partum hæmorrhage, 609
rupture of uterus, 620
Michaelis' rhomboid in contracted pelvis, 179
Miscarriage. See Abortion
Missed abortion, 523
labour in extra-uterine pregnancy, 565
Mole, blood, carneous, fleshy, tuberose, 523
hydatidiform, 531
tubal, 540
Mollities ossium (see Osteomalacic pelvis), 166
Monsters, double, cause of dystocia, 121
Morning sickness in extra-uterine pregnancy, 557
Moulding of head, importance of, 366
Movements, fœtal, excessive sign of danger to child, 4, 684
Müller's method of estimating size of head and pelvis, 187
Multiple pregnancy, 112
complications, 116
course of labour in, 114
diagnosis of, 113
management of, 115
position of each child, 114

Myoma of uterus, Cæsarean section in, 252
complicating labour and pregnancy, 234
puerperium, 254
diagnosis of, 243
effect of, 234
treatment, 246
of vagina, 206
Myomectomy during pregnancy, 248
Myxoma chorii (see Hydatidiform mole), 531

Naegele's obliquity, 163
Naegele's pelvis, 156
Natural delivery, variations in, 1
Neck, tumours of, in fœtus causing dystocia, 106
Nephritis, induction of labour for, 434, 437
New-born child, accidents to the, 668
asphyxia neonatorum, 680
birth paralysis, 679
bones, injuries to, 669
cephalo-hæmatoma of, 668
cerebral hæmorrhage, 675
convulsions, 678
Duchenne's paralysis, 679
facial paralysis, 678
head of, injuries to, 668
muscles, injury to, 674
skull, fractures of, 669
indentations of, 670
Nuchal or dorsal displacement of arm, 48, 67

Obliquely contracted pelvis, 156
Obstructed labour. See Dystocia
Occipito-posterior presentations, diagnosis of, 26
forceps in, 357
rectification of, 30
treatment of, 28
Œdema, acute, of cervix, 201
of fœtus, 97
of labium, 202
of lungs, cause of death, 665
Oligo-hydramnios, cause of amniotic bands, 141
Operations. See Particular operations
Limitations of, general remarks regarding, 1
Os externum, backward displacement of, 203
occlusion of, 202
Osteomalacia, pelvis, 166
deformities resulting from, 167
ovariotomy for, 167
pathology of, 166
Ovarian pregnancy, 544
tumours, Cæsarean section in, 229
complicating labour and pregnancy, 221
the puerperium, 233
Ovariotomy during labour, 228
pregnancy, 226
for osteomalacia, 167
Ovum, Füth tubal, 537
site of, in ectopic pregnancy, 536
trophoblast of, in ectopic pregnancy, 537, 539

Oxytocics, in criminal abortion, 518
for bringing on labour, 445
for uterine inertia, 11

Pajot's manœuvre, 334
Palpation, abdominal importance of, 15
breech presentations, 50
brow presentations, 44
contraction ring in threatened rupture of uterus, 635
face presentations, 35
fœtal heart-beat in face presentations, 37
occiput, indicating position, 20
occipito-posterior positions, 27
placenta in placenta prævia, 583
position and attitude, diagnosis of, by, 19
round ligaments in diagnosis of position of placenta, 415
transverse presentations, 89
twins, 112
Paralysis, birth (Duchenne's), 679
facial, following forceps, 678
obstetrical (Duchenne's paralysis), 679
Parturition. See Labour
Partus conduplicato corpore, 89
Pawlik grip, 18
Pelvic abscess, complicating labour, 260
floor, importance of preserving, 647
Pelvigraph, 180
Pelvimeters, forms of, 179
Pelvimetry, by use of X ray. See Appendix
external, 177
internal, 179
Pelvis assimilation, 158
axis, variations of, Milne Murray's forceps for, 338
classification of deformities, 153
contracted. See Contracted pelvis
coxalgic, 175
deformities, classification of, 153
etiology of, 153
frequency of, 152
development, arrestment of, cause of deformity, 154
diameters, alteration of, in flat pelvis, 159
dislocation of femora, 175
double Naegele (see Roberts), 157
dwarf, 155
etiology of deformities, 153
exostosis of, 168
figure of right, 161
flat non-rachitic, 156
flat rachitic, 159
fractures of, 169
funnel-shaped, 155
generally contracted, 154
rachitic, 159
enlarged, 154
infantile, 155
paralysis, cause of deformity, 174
joints of, injury of, after symphysiotomy, 394

Pelvis, justo-major, 154
justo-minor, 154
kyphoscoliotic, 172
kyphotic, 170
masculine, 155
measurements, alterations in contraction, 177
movements of, in connexion with symphysiotomy, 375
Naegele, 156
obliquely contracted (Naegele), 156
obtecta, 172
ossification of, faults of, cause of deformity, 158
osteomalacic, 166
outlet of, measurement of, 180
pseudo-osteomalacic, pseudo-malacosteon, 166
reniform, 161
rachitic, 161
Roberts', 157
rostrate (see Osteomalacia), 166
scolio-rachitic, 162
scoliotic, 172
spinosa, 168
split, 158
spondylolisthetic, 173
transversely contracted, 157
trifoliate (see Osteomalacia), 166
tumours of, 168
Pendulous abdomen, cause of dystocia, 288
malposition of fœtus, 85
rupture of uterus, 630
Perforators, cranial, 482
Perineum, lacerations of, 647
central, 206
prevention of, 648
repair of, 651
rigidity of, 205
Pernicious anæmia, cause for induction of labour, 436
vomiting of pregnancy (see Hyperemesis gravidarum), 616
Pessary in treatment of retroflexed gravid uterus, 279
Phantom tumour of uterus 243
Phlebitis following hæmorrhage, 616
Placenta, abnormalities of, 147
adherent, 506
battledore, 145
bipartita, 147
circular sinus, rupture of, 147, 581
diagnosis of position by palpation, 583
expression of, by Credé's method, 512
in extra-uterine pregnancy, 568
in multiple pregnancy, 115, 146
manual removal of, 507
mechanism of, separation of, 510
œdema of, 147
prævia, 577
accouchement forcé in, 455, 593
Cæsarean section in, 402, 594
central and complete, 580
clinical features, 581
developed from decidua reflexa, 579
Placenta prævia, diagnosis of, 583
etiology of, 577
frequency of, 579
induction of labour for, 586
lateral, 579
marginal, 579
metreurynter in, 591
plugging in, 586
prognosis of, 584
symptoms of, 581
treatment of, 585
varieties, 579
version in, 589
premature separation of (see Accidental hæmorrhage from short cord), 142
prolapse of, 577
removal of, 512
retention of, cause of hæmorrhage, 611
site of, as shown by Cæsarean sections, 412
succenturiata, 147, 514
velamentous, 146
vessels of, abnormalities of, 145
Placental forceps, 527
polypus, 521
Plugging. See Tampon
Plural pregnancy. See Multiple pregnancy
Podalic version, 318
dangers in impacted shoulder, 95, 323
foot to seize, 320
position of patient, 318
technique of, 318
Pomeroy's metreurynter, 461
Porro's operation, 417
Position of fœtus, diagnosis by palpation, 17
Post-mortem Cæsarean section, 430
Post-partum hæmorrhage, 608
diagnosis of, 609
etiology of, 608
primary, 608
secondary, 616
treatment of, 610
Postural treatment of malposition, 93, 329
Prague method of delivering after-coming head, 77
Precipitate labour, 7
Pregnancy, abdominal, primary, 546
accidents during. See Abortion, Accidental hæmorrhage, Rupture of Uterus
examination, preliminary, during, 23, 176
extra-uterine (see Extra-uterine pregnancy, 536
multiple (see Multiple pregnancy), 112
ovarian, 544
protracted, danger to child from, 151, 439
induction of labour for, 439
signs of, 151
rudimentary horn, 295, 573
rupture of uterus during, 617
surgical operations during, 199, 213, 221, 234, 256, 261
tubal. See Extra-uterine pregnancy

Prehenseur-levier-mensurateur of Farabœuf, 373
Premature labour, indications for inducing, 433
for carcinoma of cervix, 216
for chorea, 436
for contracted pelvis, 439
fœtal prognosis in, 442
indications for, 440
limitations, 443
maternal prognosis, 441
methods, 445
for excessive size of child, 439
for habitual death of fœtus, 438
for heart disease, 435
for hydramnios, 437
for hyperemesis gravidarum, 436
for icterus gravidarum, 438
for nephritis, 435, 437
for pernicious anæmia, 435
for placenta prævia, 586
for protraction of pregnancy, 439
methods of, 445
Premature rupture of membranes, 147
separation of placenta (see Accidental hæmorrhage), 595
Preparations for operations (patient, accoucheur, etc.), 303
Presentation: breech, knee, foot, 50
brow, 43
definition of, 15
diagnosis of, by palpation, 15
ear, diagnosis of position from, 23
face, 35
fontanelle, anterior and posterior, 32, 33
funic, 131
occipito-posterior, 26
oblique, shoulder, transverse, 85
parietal, anterior and posterior, 33, 164
Prolapse of gravid uterus, 289
of placenta, 577
of umbilical cord, 131
Promontory, false, 162
injury to, in craniotomy, 485
Protracted labour, forceps in, 342
pregnancy, induction of labour, 439
Pseudo-osteomalacic pelvis, 166
Pubiotomy, 398
Puerperium, appendicitis, 263
myomatous tumours in, 254
ovarian tumours in, 233
salpingitis, 261
Pulmonary embolism, 663

Quinine as an oxytocic, 11

Rachitic pelvis, 159
diagnosis of, 176
mode of production of pelvic deformity in, 159
treatment of labour in, 188
varieties of, 159
Rectum, carcinoma of, complicating pregnancy and labour, 257
simple tumours of, 257
Repositor for inverted uterus, 663
for prolapsed umbilical cord, 139
Reposition of prolapsed arm in transverse presentations, 323
funis, 136
limbs in head presentations, 47
Respiration, artificial, of child, 686
Retained lochia, 288
membranes, 513
placenta, 509
removal of, 512
Retinitis, albuminuric, 435
Retraction ring. See Bandl's ring
Retroflexion, cause of abortion, 517
of bicornuate uterus, 299
of gravid uterus, 265
diagnosis of, 275
differential, from extra-uterine pregnancy, 277
features and progress, 270–
laparotomy for, 283
treatment, 278
varieties of, 268
Retroplacental hæmatoma, 510
Rhomboid of Michaelis, 179
Rigidity of cervix, 199
treatment of, 200
varieties of, 199
of perineum, 205, 648
Roberts' pelvis, 157
Roentgen ray in determining size of pelvis. See Appendix
Rotation with forceps in mento-posterior positions, 43, 360
in occipito-posterior positions, 32, 357
Round ligaments, indicating position of placenta, 415
Rubber gloves, use of, 310
Rubber instruments and gloves, sterilization of, 305
Rudimentary horn, pregnancy in, 295, 573
Rupture of cervix, 645
of perineum, 647
of symphysis pubis, 656
of tube in extra-uterine pregnancy, 538
of umbilical cord, 142
of uterus, 617
diagnosis of, 635
during pregnancy, 617
etiology of, 618
early in labour, 628
in contracted pelvis, 623
in infantile uterus, 619
in hydatidiform mole, 534
in hydrocephalus, 627
in neglected transverse presentations, 624
in protracted labour, 620
in pregnancy in bicornuate uterus, 301, 618
in removing placenta, 627
in scar of Cæsarean section wound, 617
plugging in, 641, 645

Rupture of uterus, prognosis, 638
prophylaxis, 639
repeated, 618
spontaneous, 618, 628
symptoms of, 630
threatened rupture, 634
treatment of, 639
varieties of, 629

Sacculation of uterus, 269
Sacro-iliac synchondrosis, injury in symphysiotomy, 394
Sacrum, tumour of fœtal, cause of dystocia, 110
Saline transfusion (see Transfusion), 614
Salpingitis, diagnosis from extra-uterine pregnancy, 559
in puerperium, 261
Schäfer's pelotte, 7
Schatz's tokodynamometer, 6
Scheel's method of inducing labour, 446
Schultze's method of separation and extrusion of placenta, 510
method of resuscitation, 686
Scolio-rachitic pelvis, 162
Scoliotic pelvis, 172
Secondary post-partum hæmorrhage, 616
uterine inertia, 9, 609
Septum, vaginal, cause of dystocia, 298
Shoulder presentation (see Transverse presentation), 85
diagnosis of, 89
large shoulder girdle, cause of dystocia, 105
cause of rupture of perineum, 650
Simpson's basilyst, 492
cephalotribe, 493
forceps, 336
perforator, 483
Sims' position, 137
advantage in impacted breech, 83
in difficult version, 319
in replacing umbilical cord, 136
Skull, fœtal, injuries (see New-born child), 669
Skutsch's pelvimeter, 181
Smellie's scissors perforator, 482
Souffle, funic, 23, 144
uterine, 23
Sphincter ani, laceration of, 647
repair of, 654
vaginæ, importance of preserving, 652
Spinal anæsthesia, 315
Spinal tapping in hydrocephalus, 102
Split pelvis, 158
Spondylolisthetic pelvis, 173
Spondylotomy, 504
Sponges, preparation of, 305
Spontaneous delivery in contracted pelvis, 190
evolution, 87
rupture of uterus, 617, 628
version, 87
Spurious labour in extra-uterine pregnancy, 565

Sterilization of hands, instruments, etc., 304
of patient after Cæsarean section, 425
Sterno-mastoid, hæmatoma of, in new-born, 674
Streptococcus in vagina of pregnant, 312
Stovaine for spinal anæsthesia, 315
Subinvolution of uterus from retention of membranes, 515
Succenturiate placenta, 147, 514
Sudden death during labour, 663
Suppurative conditions in pelvis and abdomen, complicating pregnancy and labour, 260
Sutures, method of sterilizing, 306
Symphysiotomy, after-treatment, 390
anatomy of parts concerned in, 381
forceps and, relative position of, 192, 367, 378, 379
history of, 374
Cæsarean section contrasted, 379, 402
dangers and injuries resulting from, 394
drainage after, 390
delivery after, 388
enlargement of pelvis, 376
permanent, 397
general considerations regarding, 375
in face and brow presentations, 46, 375
in kyphotic pelvis, 172
indications for, 377
pelvic measurements, effect on, 375
prognosis of, 393
pubiotomy contrasted, 398
repeated, 396
results, 394
subcutaneous, 391
technique of, 384
Symphysis pubis, rupture of, in labour, 656
Syncephalous monster, 128
Synchondrosis, sacro-iliac, injury to, by symphysiotomy, 394
Synclitism, 163
Syphilis, cause of abortion, 518

Tampon in abortion, 527
accidental hæmorrhage, 602
in placenta prævia, 587
in post-partum hæmorrhage, 612
in rupture of uterus, 641, 645
Tarnier's basiotribe, 492
écarteur utérin, 464
forceps, 333
Tetanic contraction of uterus, 13
prior to rupture, 635
Third stage of labour, physiology of, 510
Thoracopagous monster, 123
Threatened abortion, 520
Thrombosis after hæmorrhage, 616
Thyroid, tumours of, cause of dystocia, 107
Tokodynamometer, 6
Transfusion of salt solution in eclampsia, 405, 455
for hæmorrhage, 614
intracellular, 615
rectal, 615
venous, 615

Transverse presentations, dystocia in, 85
cephalic version in, 93
course of labour in, 86
decapitation in, 95, 499
diagnosis of, 89
impacted, 95
podalic version in, 94
rupture of uterus in, 624
treatment of, 92
Transversely contracted pelvis, 157
Trephining skull for intracranial hæmorrhage, indentations of skull, 674, 675, 677
Tubal abortion, 538
pregnancy (see Extra-uterine pregnancy), 536
Tuberose mole, 523
Tumours, abdominal, diagnosis of, in pregnancy, 223, 243
of bladder, complicating pregnancy and labour, 256
of fœtus, 98, 104, 106, 108, 109, 110
of ovary, 221
of pelvis, 168
of rectum, 257
of uterus, 234
of vagina, 206
Turning (see Version), 316
Twin pregnancy (see Multiple pregnancy), 112
Twins, locked, 116

Umbilical cord, causing dystocia, 131
abnormalities of, 144
coils of, about neck and body of child, 143
knots of, 145
long, 144
loops of, about neck and body, 143
marginal insertion of, 145
prolapse of, 131
reposition of, 136, 138
rupture of, 142
short, cause of dystocia, 140, 659
treatment of, 144
shortness of, cause of inversion of uterus, 659
souffle in short cord, 144
strangulation of, by amniotic adhesions, 141
torsion of, 144
variations in insertion of, 145
in length of, 144
velamentous, insertion of, 145
Unavoidable hæmorrhage (see Placenta prævia), 577
Urine. See Dysuria
Uterine inertia, 8
cause of post-partum hæmorrhage, 609
diagnosis of, 10
reason for interfering, 12, 342
treatment of, 10
souffle, auscultation of, 23
Uterus, anteflexion of, cause of dystocia, 287, 291
Uterus, atony of, cause of post-partum hæmorrhage, 609
bicornis, 297, 300
bipartite, 297
carcinoma of, 212
cordiformis, 297
causing transverse presentation, 86
resembling rupture of uterus, 636
contractions, irregular, 9, 14
displacements of, 265
double complications of, 298
diagnosis of, 300
rupture of, 300
treatment, 302
varieties, 296
with rudimentary horn, 294, 573
didelphys, 297, 298
hour-glass contractions of, 14
incarceration of retroflexed, 270
inertia, cause of dystocia, 3, 8
inversion of, 657
lateral displacements of, 245, 265, 563
malformations of, 294
myoma of, 234
perforation of, 529, 535
prolapse of, 289
retroflexion of, 265
retroversion of, 268
rupture of, 617
sacculation of, 268, 279
septus, 296, 298
subseptus, 296
tumours of, complicating pregnancy, 234
unicornis, 296

Vagina, atresia of, 204
bands and cicatrices, 204
diaphragm in, 205
double, 298
fornix, laceration of, 526, 630
hæmatoma of, 207
laceration of, during labour, 653
malformation of, 298
septa in, 204, 298
sphincter, preservation of, 652
stenosis of, 204
tumours of, 206
Vaginal Cæsarean section, 469
douche, 312
drainage, 573
examination during pregnancy, limitation of, 21
fixation, cause of dystocia, 290
hysterectomy for carcinoma of cervix, 219
in accidental hæmorrhage, 607
septum, cause of dystocia, 204, 298
Vagitus uterinus, 684
Velamentous insertion of cord, 145
Venous transfusion, 615
Ventro-fixation, cause of dystocia, 292
Version, 316
after symphysiotomy, 389
bipolar, 330
in placenta prævia, 589

Version, Braxton Hicks (see Bipolar version), 330
cephalic, 84, 316, 326
dangers of, in impacted shoulder presentation, 95, 325, 500
external, 325
history of, 316
indications for, 317
in breech presentation during pregnancy, 84
in brow presentations, 45
in contracted pelvis, 192
in face presentation, 38
in posterior parietal presentation, 193
in transverse presentations, 92
indications for, 317
podalic (see Podalic version), 318
spontaneous, 87
Vertex presentations, abnormalities of, causing dystocia, 26
Vesical calculus complicating labour, 256
Vesicular mole, 531
Vestibular bulbs, injury to, in symphysiotomy, 383
Vestibule, laceration of, 384, 609
Vomiting, excessive, of pregnancy. See Hyperemesis gravidarum
Vulva, abscess of Bartholin's gland, 207, 260
hæmatoma of, 207
injuries of, during labour, 608, 647
œdema of, 202
tumours of, 206

Walcher's position, 155, 197, 370
association with forceps, 371
symphysiotomy, 389

X ray in determining size of pelvis. See Appendix

Zweifel's pelvimeter, 183
symphysiotomy, method of performing, 388 393

THE END

BAILLIÈRE, TINDALL AND COX, 8, HENRIETTA STREET, COVENT GARDEN