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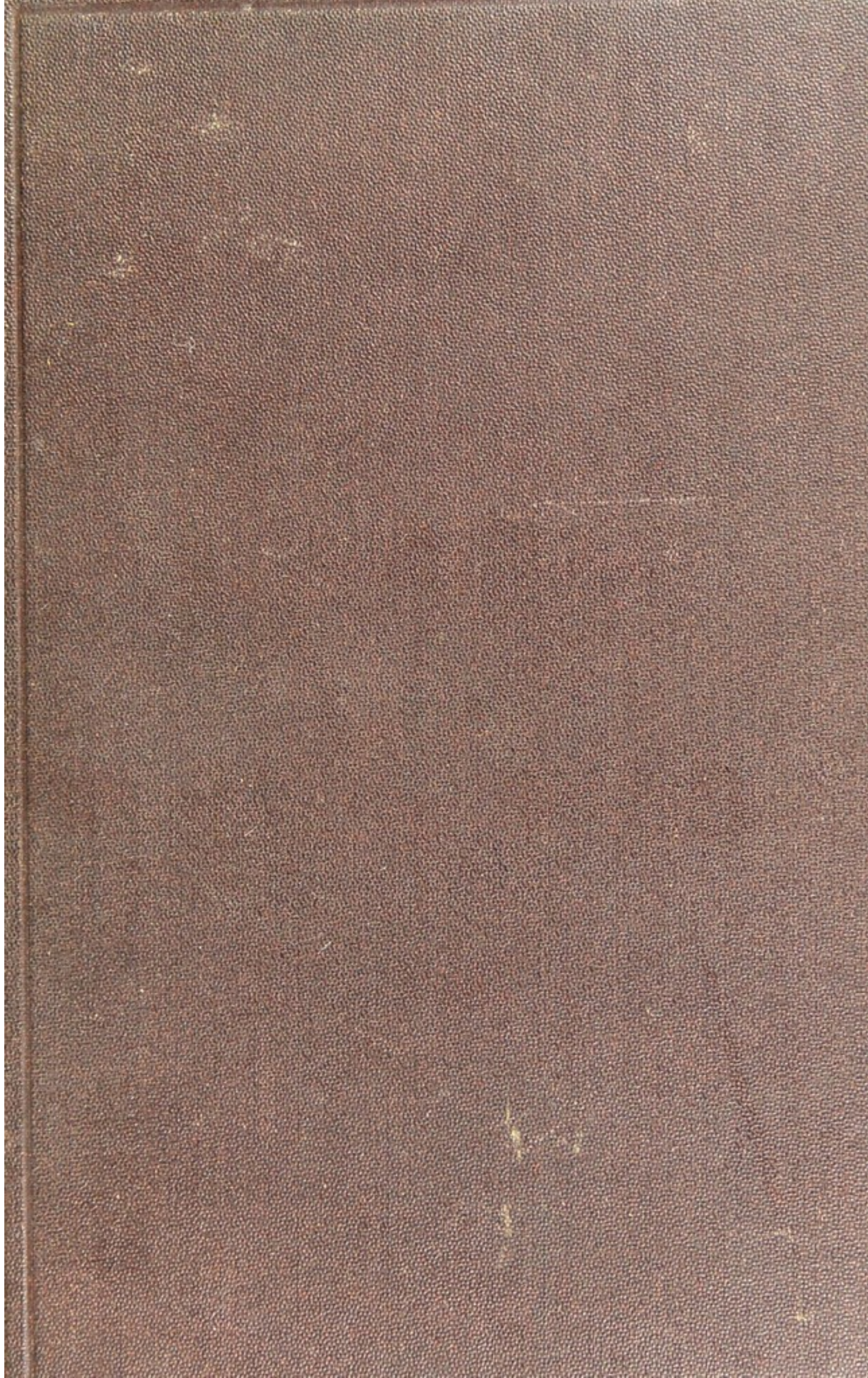
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A MANUAL OF OBSTETRIC PRACTICE.

By the same Author and Translators.

A MANUAL OF GYNÆCOLOGICAL PRACTICE
FOR STUDENTS AND PRACTITIONERS. With 120 Illustrations. Crown 8vo, 6s.

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“We congratulate the authors on their successful translation of this little book, whereby the English student has, at last, placed within his grasp a small but nevertheless excellent gynæcological work,—the best, we have no hesitation in saying, of its size in the language.”—*Dublin Journal of Medical Science*.

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LONDON: H. K. LEWIS, 136 GOWER STREET, W.C.

A MANUAL OF
OBSTETRIC PRACTICE

FOR STUDENTS AND PRACTITIONERS

BY

PROFESSOR A. DÜHRSEN, M.D.,

LATE FIRST ASSISTANT IN THE OBSTETRIC CLINIC OF THE
CHARITÉ HOSPITAL IN BERLIN

TRANSLATED AND EDITED

FROM THE SIXTH EMEDED AND ENLARGED EDITION

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WITH ILLUSTRATIONS

LONDON

H. K. LEWIS, 136 GOWER STREET, W.C.

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TO HIS
HIGHLY HONOURED TEACHER,
THE RIGHT HONOURABLE PROFESSOR DR. GUSSEROW,
THIS VOLUME IS
GRATEFULLY DEDICATED.

TRANSLATORS' PREFACE.

THE intrinsic value of this Manual and the extensive use which is made of it in Berlin and throughout Germany—for it has already passed through six editions—justify the translators in believing that an English edition will not only be acceptable to English students and practitioners, but will tend to improve that standard of sound reason and aseptic practice which is still but imperfectly maintained in the ordinary routine of midwifery work.

It is a practical book. Nothing essential is neglected or slurred over, and every direction for diagnosis or treatment has been carefully chosen and personally tested.

The book is remarkable for its absolute freedom from all irrelevant matter. For this reason, although small in size, it is not only a safe manual for the student, but contains a full notice of all the salient points which recommend the scientific practice of midwifery in Germany to the consideration of every experienced accoucheur.

August, 1897.

THE HISTORY OF THE
CITY OF BOSTON
FROM THE FIRST SETTLEMENT
TO THE PRESENT TIME
BY NATHANIEL BENTLEY
IN TWO VOLUMES
VOL. II
BOSTON: PUBLISHED BY T. B. BOSTON, 1822.

PREFACE.

THIS manual of obstetric practice is intended to fulfil two wants. First, it is intended as a guide to students in midwifery practice, and secondly, as a compressed reference book for the practitioner. Following these indications the theory is limited to bare necessities, while certain chapters relating to points important in practice, as for instance the chapters on obstetric examination and many chapters on operative methods, are given as fully as in the large text-books.

The methods of antisepsis are described to their smallest details, because I have been convinced from my operative course for practitioners and students that there are still grave misapprehensions in this direction. In my opinion the new era of obstetrics, the surgical one, at the threshold of which we yet stand, can only obtain its best results when antisepsis has become a matter of second nature to the student.

The practitioner is often forced in midwifery to operate at once. This fact has been the foundation on which I have built my little book.

Consequently the pathology and treatment of labour are given fully, whereas only those affections of the pathology of pregnancy are given which must either be treated without delay or in which the establishment of a diagnosis on the spot is of vital importance. In the same way the pathology of the puerperium is treated chiefly from the therapeutic standpoint.

The physiology of pregnancy, of labour, and of the puerperium, is given in its main features, in order to facilitate the study of the larger text-books. At all events it has been my endeavour not to give a mere skimming of the text-books.

A series of diagrammatic plates has been introduced to illustrate and complete the text.

For the preparation of a number of these I have to thank Herr Seeger.

In the description of the methods of operation I have only given those which have been fully tried in the obstetric polyclinic of the Charité.

Although these are in bulk the same methods as those which are used by my highly esteemed teacher and chief, the Right Honourable Professor Gusserow, yet I must express my deep thanks to him that he has so liberally permitted me to verify them all by personal experience in the clinical material of the obstetric department of the Charité.

DR. A. DÜHRSEN.

BERLIN, *March*, 1890.

PREFACE TO THE SECOND EDITION.

THAT a second edition of my little book has been called for within three months of the first edition is a proof that it has met with acceptance—not only from students, but, as numerous letters show, from men in actual practice. Although there have been no marked alterations, yet many small changes and improvements have been made.

DR. A. DÜHRSEN.

BERLIN, *August*, 1890.

PREFACE TO THE THIRD EDITION.

ANOTHER half year has passed and another edition has been demanded. This third edition has received many additions.

Perhaps I may draw attention to certain misapprehensions. I am by no means a supporter of meddlesome midwifery, and the only reasons I lay down for terminating a labour are the onset of danger to the life or health of mother and child.

Although I have pointed out the way to terminate a labour, with perhaps preservation of both child and

mother, when necessity calls for the intervention, yet I pointed out that these methods are to be used only by the experienced antiseptic obstetrician. He must have a full instrumentarium, and should be specially trained.

The introduction of antiseptics into general midwifery practice has not lowered the mortality after obstetric operations, as Hegar and Dohrn have pointed out, although this mortality has been reduced to a minimum in hospital practice.

This disparity is explained by two causes, namely, defective antiseptics and defective technical skill in general practice. For the present, therefore, operative interference should be limited as much as possible, so as to keep the mortality low. An improvement may be expected in the future, because strict antiseptics or asepsis—I do not mean a pretence at either—will be the commonwealth of all obstetricians, and beginners will perform severe obstetric operations only under the guidance of a practised and strict antiseptic obstetrician.

DR. A. DÜHRSEN.

BERLIN, *May*, 1891.

PREFACE TO THE FOURTH EDITION.

THE fourth edition has also received many additions, so that the book has become larger.

Of the advances in obstetrics, which are mentioned in this edition, I should like to draw special attention to two, namely, the introduction of lysol and of sterilised antiseptic dressings into obstetric practice.

Lysol is, with careful antiseptic management, a comparatively safe and uncommonly convenient agent for disinfection.

As to the second point I had long convinced myself that every practitioner should have at hand sterilised antiseptic material ready prepared for tamponading the vagina in the various ways.

This idea has been realised by Dr. Mylius in his chemical works by placing the prepared materials into tin cases, which are sterilised by steam, and then rendered air and water tight by soldering. Every physician should order Case 1, and perhaps Cases 2 and 3. If the material is not used for tamponading it can be utilised as antiseptic diapers in the lying-in. The introduction

of asepsis without antiseptis into midwifery is, in my opinion, a mistake, since the field of operation in midwifery is a germ-containing one.

DR. A. DÜHRSEN.

BERLIN, *October*, 1892.

PREFACE TO THE SIXTH EDITION.

THE sixth edition has been improved in many ways, and it has been enlarged by the insertion of six illustrations and a chapter on "Vaginal Cæsarean Section."

DR. A. DÜHRSEN.

BERLIN, *July*, 1896.

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A MANUAL OF OBSTETRIC PRACTICE.

ANATOMICAL INTRODUCTION.

THE part of the pelvis which is specially interesting to the obstetrician is the true pelvis, that is, the cavity lying below the ileo-pectineal line.

If the obstetrician therefore speaks loosely of the pelvis, he always means the true pelvis; the child must pass through this during birth. The false pelvis offers the accoucheur certain measurements from which he can deduce the length of the transverse diameter of the true pelvis.

These are the distances between the anterior superior iliac spines, 25 c.m. (9.9 inches), and between the iliac crests, 28 c.m. (11.0 inches). Michaelis gives these distances as 26.3 and 29.3 c.m. (10.4 and 11.5 inches). For birth to take place the pelvis must not be abnormally narrow, nor the head, which is the largest part of the child, abnormally large.

The normal measurements of the pelvic inlet at the plane of the ileo-pectineal line are as follows:—

1. The straight diameter, or *conjugata vera*, the distance from the promontory of the sacrum to the symphysis pubis, 11 c.m. (4.3 inches).

2. The transverse diameter, the line joining the most widely separated points of the ileo-pectineal line, 13.5 c.m. (5.3 inches).

3. The oblique diameter, 12.5 c.m. (4.9 inches).

The first, or right oblique diameter, runs from the right sacro-iliac synchondrosis to the left ileo-pubic eminence or tubercle; the second, or left oblique diameter, from the left synchondrosis to the right eminence or tubercle.

The measurements of the pelvic outlet, which is bounded by the coccyx, the sacro-sciatic ligaments, the ischial tuberosity, and the pubic arch, are:—

The antero-posterior diameter, from the tip of the coccyx to the lower border of the symphysis pubis, the coccyx being bent back, is 11·5 c.m. (4·5 inches); the transverse diameter, that is the distance between the ischial tuberosities, 11 c.m. (4·3 inches).

Two other planes of the pelvis have been established besides those mentioned, namely, the plane of greatest pelvic capacity and that of least pelvic capacity.

The plane of largest capacity runs through the middle of the symphysis pubis, the acetabular regions, and the line of union of the second and third sacral vertebræ. The plane of smallest capacity runs through the tip of the sacrum, the ischial spines, and the lower border of the symphysis pubis.

The antero-posterior diameters of these two planes are 12·75 and 11·5 c.m. respectively (5·0 and 4·5 inches); their transverse diameters are 12·5 (distance between acetabular floors) and 10·5 c.m. (distance between the ischial spines), or 4·9 and 4·1 inches respectively. The antero-posterior diameters increase towards the pelvic outlet, the transverse diameters decrease. This fact is of importance in the mechanism of labour.

For the same reason it is important to know that the posterior wall of the pelvis, which is formed by the sacrum, is much deeper than the anterior wall, which is formed by the symphysis pubis. The relative measurements are 13 and 4 c.m. (5·1 and 1·6 inches). The pelvic

planes are altered very little by the soft parts which are attached to the pelvis, excepting at the pelvic outlet. The pelvic outlet is almost closed by the pelvic floor, which is formed chiefly by the levator ani,* so that only the openings of the vagina and urethra and the anus, separated by the perinæum, remain. Both openings are surrounded by muscles, the constrictor cunni and sphincter ani respectively. (See Fig. 25).

The female pelvis differs from the male by its greater width and less depth. This is produced by the greater growth of the horizontal rami of the pubic arch and of the wings of the sacrum in the female. The pubic angle in the female is 90-100°. In the erect position the symphysis pubis lies at a much lower level than the sacral promontory ("pelvic inclination").

The true conjugate in this position of the woman forms an angle of 55-60° with the horizontal, while the antero-posterior diameter of the outlet makes only an angle of 11° under the same conditions (Naegele).

It is therefore necessary in examining the promontory of the sacrum, or the parts of the child lying near it, to lower the arm of the examining hand very much or to place the patient in such a position that the symphysis is at the level of or higher than the sacral promontory.

This is the case when the patient lies down.

* The levator ani muscle arises on each side from the arcus tendineus, which stretches over the obturator membrane and the spine of the ischium along the spino-sacral ligament to the coccyx. The ischio-coccygeus forms the posterior segment of the levator ani. The coccygo-anal ligament, which is behind the rectum, forms a commissure between the muscles of the two sides. The deep transversus perinæi springing from the descending rami of the pubic bone completes the closure of the pelvic outlet. It is therefore called the accessory diaphragm of the pelvis, and on account of its connection with the urethra and vagina it is called the urogenital diaphragm.

PHYSIOLOGY OF PREGNANCY.

The Development of the Impregnated Ovum.

By pregnancy we understand the condition of a woman who bears in her womb the human fruit of a conception.

Pregnancy commences with impregnation, that is, the entrance of the spermatozoon into the ovum, and lasts until delivery.

The egg (ovum) must be extruded from the Graafian follicle (ovulation) in order to enable impregnation to take place.

This takes place most commonly at the time of menstruation, so that impregnation is also most common just after menstruation.

When impregnation has taken place there is cessation of menstruation, because, as a rule, menstruation depends upon ovulation, and the latter ceases during pregnancy.

It has been found in practice that labour comes on most frequently 280 days, or 10 lunar months, or nine calendar months and seven days after the first day of the last menstruation: but the duration of pregnancy is only about 272 days. As a rule cohabitation is not practised during menstruation, and the semen also takes a certain time to reach the egg.

The spermatozoon and the egg may unite in the uterus, the tubes, or in the ovary, but most commonly this takes place in the uterus (Wyder).

The spermatozoa gain the fundus uteri by their own movement. The ovum has no intrinsic power of move-

ment, but is swept by the ciliated epithelium of the tubes first from the ovary into the tube and then into the uterus.*

The impregnated ovum imbeds itself in the mucous membrane of the uterus, which is loose and full of blood after menstruation. The ovum excites the mucous membrane to further development, so that this very soon grows completely round the ovum. The growing mucous membrane of the uterus, which is marked by the size of its cells, is called the decidua. That portion to which the ovum is attached, and which enters into the formation of the placenta, is called the decidua serotina; the part which grows round the ovum is the decidua reflexa, and the remaining portion, lining the uterus, the decidua vera.

The decidua consists of a superficial cellular and a deeper glandular layer. The big decidual cells take their origin from the connective tissue cells of the mucous membrane, the cavernous gland layer from the muchly increased lower section of the uterine glands, whose epithelium becomes markedly flattened and almost disappears in the later months of pregnancy.

At the commencement of the fourth month the decidua vera and reflexa coalesce, and the ovum fills the whole of the uterine cavity. Until this period menstruation is possible, and as a matter of fact does occasionally happen. Menstruation here means discharge of blood from the uterine mucous membrane, which has been altered to decidual tissue.

* Kehrer has brought weighty experimental evidence against the possibility of the cilia of the tubal epithelium causing a current in the serous fluid of the peritoneum in the neighbourhood of the open fimbriated ends which should carry the freshly expelled ovum into the tube.

The decidua forms the outermost coat of the ovum and at the same time unites the ovum with the uterine wall.

The chorion is the middle coat or envelope and the amnion is the internal one.

1. The *chorion* is simply the *zona pellucida*, which throws out small structureless growths. This *primitive* chorion, which serves to nourish the ovum by simple osmosis, is soon replaced by the definite or true chorion, which is composed of an epithelial and a vascular connective tissue layer. The epithelial layer arises from the amnion, the connective tissue layer from the allantois. The allantois grows out from the tail end of the foetus in a bladder shape, and carries the foetal vessels to the surface of the ovum about the fourth week. The foetal end of the allantois becomes the bladder, the remainder atrophies. Before the allantois has carried the foetal vessels to the periphery of the ovum, the omphalomesenteric vessels form upon the umbilical vesicle, which represents the segmented ovum minus the foetus, and carry off its store of nourishment. This takes place in the third week. Later on the omphalomesenteric vessels disappear, and with them the umbilical vesicle.*

The greater portion of the chorionic villi with their vessels also atrophy—false chorion. It is only at the decidua serotina that the chorionic villi grow stronger—chorion frondosum—and together with the decidua serotina they form the placenta, which is a definite structure from the end of the third month onwards. The more detailed nature of this is as follows:—The chorionic villi grow into the superfluously colossal cavernous blood spaces

* The umbilical vesicle can always be demonstrated upon the mature placenta as a lentil sized white body, which lies between the amnion and the chorion (B. S. Schultze). It is joined to the umbilical cord by a fine band, which represents the omphalomesenteric vessels.

of the decidua serotina which are only covered by an endothelium (Waldeyer) and a limiting membrane, while other villi end in the tissue of the decidua serotina itself, with bulbous terminations which act as stays (Langhaus). All the villi consist of connective tissue rich in nuclei, and are covered by a defective epithelium. A small branch of the umbilical arteries leads into each villus and breaks up at its apex into numerous twigs, which then reunite to form a branch of the umbilical vein.

2. The *amnion* arises from the outermost layers of the skin of the fœtus. These form elevations—the head, tail, and side divisions—which unite together. The embryo thus lies in a sac, which has formed itself from an extension of the yet widely open abdominal walls over the back of the fœtus. By the collection of fluid in the amniotic sac from the water of the fœtus the amnion comes in contact with the chorion and the vessels of the allantoic stalk. As it provides this stalk with a sheath it completes the umbilical cord. The cord is 50 c.m. long (20 inches), and as thick as a finger at the end of pregnancy. The amnion has no vessels in it, and is made up of a single layer of squamous epithelium and an external fibrous connective tissue layer of star-shaped cells. This connective tissue forms the jelly of the umbilical cord (Wharton's).

View of the Ovum as a whole.

At the fourth week of pregnancy we meet with the following structures in a transverse section of the uterus (See Fig. 14) :—

1. Peritoneum.
2. Uterine muscle tissue.

3. Decidua vera. } These form one continuous mem-
 4. Decidua reflexa. } brane after the 13th week.
 5. Chorion.

This forms the chief mass of the placenta by growing strongly at the site of the decidua serotina.

6. Amnion.

7. Fœtus.

This floats in the amniotic fluid, and is united to the placenta by the umbilical cord.

The ovum is made up of the structures given from 3 to 7, and it is only fully born when all these parts can be demonstrated in it. (See Fig. 13).

The deciduæ, chorion, and amnion are quite thin membranes at the end of pregnancy, which lie in close opposition and only give the impression of a single thin membrane. It is only at the placental site that the chorion becomes thicker. Towards the end of gestation the great bulk of the conception is made up of the amniotic fluid and the fœtus. The amniotic fluid and the fœtus are extruded first in birth, and the placenta with the membranes follows after—"afterbirth." The placenta or mother-cake forms a flat roundish disc, which weighs 500 grammes* (7,700 grains), is 3 c.m. thick (1.2 inches), and has a diameter of 15 c.m. (6 inches). The outer somewhat convex uterine surface is rough, and divided into separate masses—cotyledons—by furrows. It has a grey red colour, which results from the fact that some of the decidua serotina clings to the placenta. Small white chalk concretions are often seen on the uterine side of the placenta, lying partly in the D. serotina and partly in the villi. The decidua serotina also sends septa right through the whole thickness of the placenta. The placenta which

* With syphilis of the fœtus we find a large, pale œdematous placenta, which weighs up to one-third of the weight of the fœtus.

has come away consists chiefly of villi, which give it its red colour and soft consistence.

The foetal surface of the placenta is covered by the protective layer of chorion and by the smooth amnion, underneath which latter numerous foetal vessels are seen, which are all making for the main insertion of the umbilical cord. The placenta usually lies in the upper segment of the uterus, and from Gusserow's investigations it lies most commonly on the posterior wall and not in the fundus uteri. The membranes are attached to the placenta in such a way as to form with the placenta a perfect sac, which has only one opening.

This is almost opposite the placenta, and through it the foetus has been driven out. On the outer surface of this sac of the ovum grey red net-like adhesions are seen.

These are the decidua reflexa and that portion of the decidua vera which is thrown off with the membranes. The decidua thus attached to the chorion can be rarely separated off in one continuous membrane; as a rule one can only scrape off small fragments with the finger nail. The smooth white shining membrane left after scraping off the decidua can be separated, beginning at the seat of laceration, into two layers—the chorionic and the amniotic. The amnion can also be separated from the placenta on its foetal side up to the insertion of the umbilical cord.

Nutrition of the Ovum.

1. The ovum is nourished during the first two weeks by osmosis.
2. From the third week on the food store of the umbilical vesicle is also used, being taken up by the omphalomesenteric vessels which form upon the umbilical vesicle.

3. From the fourth week on the foetal vessels are in connection with the villi of the surface of the ovum, and through these with the maternal vessels of the decidua, thus receiving their materials of nutrition directly from the maternal vessels. Since the false chorion atrophies very quickly, the reception of the food-stuffs necessary for foetal growth soon becomes limited to the placenta. The placenta is at once the lungs and stomach of the foetus for the greater portion of its intrauterine existence. As a result of the direct contact of the foetal and maternal vessels nutritive stuffs and oxygen pass from the maternal into the foetal blood, while carbonic acid and other products of chemical action pass in the reverse way. The foetal blood circulates in the villi. The venous blood of the child is carried to the placenta from the foetal aorta, by the umbilical arteries, through the umbilical cord. It then flows by an arterial twig into every single villus, and loses itself in the capillaries of the villus.

These capillaries pass into a branch of the umbilical vein, which runs back in the umbilical cord and carries the blood, which has become arterialised and rich in nutritious matter while in the villi, back to the foetus. The umbilical vein sends one branch to the vena porta into the liver, but by the other—the ductus venosus Aurantii—the arterialised blood passes into the inferior vena cava, then into the right auricle through the foramen ovale into the left auricle, and then by the left ventricle into the aorta.

The superior vena cava pours its blood through the right auricle into the right ventricle, and then through the pulmonary artery and the ductus arteriosus Botalli into the aorta, at a spot lower than the origin of the vessels supplying the upper half of the body. The lower half of the body consequently receives a more venous blood supply. Towards the end of pregnancy the differ-

ence between the blood sent to the upper and lower halves of the body disappears. With the quicker growth of the liver and lungs the valve of the foramen ovale grows also, and thus allows less blood to pass from the inferior cava directly into the left auricle.*

Zweifel, by finding the absorption bands of oxyhæmoglobin in the umbilical blood before the first inspiration, proved that the foetus takes up oxygen in the placenta, and it appears to the author established from the experiments of Gusserow, Zweifel, Runge, Weiner, and from his own investigations, that the placenta is also the chief source of nourishment for the foetus. According to Ahlfeld, Preyer, and Ott the amniotic fluid must be reckoned as a source of nutriment to the foetus, for the foetus swallows amniotic fluid constantly. That the swallowing is frequent Ahlfeld has proved by the number of downy hairs (from the infant's skin) present in the meconium.

The amniotic fluid is, according to the authors named, a transudation from the maternal vessels of the decidua. According to the investigations of Gusserow and his school the amniotic fluid in the second half of pregnancy consists chiefly of foetal urine, while in the first half the amniotic fluid may come from the foetal vessels which run beneath the amnion upon the placenta (early blood-vessels).

* The first inspiration establishes the pulmonary circulation. All the blood of the right ventricle is sucked into the lungs. By the opening up of new channels the pressure in the right ventricle sinks (hence contraction and obliteration of the ductus Botalli), but it rises in the left heart. The same increase of pressure in the left heart and decrease in the right heart results from the fact that the right auricle no longer receives blood from the placenta. Since the right ventricle sends no more blood into the aorta the blood pressure in it falls, and no more blood passes into the umbilical arteries. Just as is the case with the umbilical vein, their walls contract and grow together without thrombosis.

The amniotic fluid weighs 500-1,000 grammes.* The specific gravity is 1,006-1,012. It is whitish in colour and alkaline in reaction. It contains epidermis, woolly hairs (lanugo), inorganic salts, albumen, and urea.

Development of the Fœtus.

This is practically denoted by the length of the fœtus as follows:—

At the end of the 1 month	$1 \times 1 = 1$	c.m.	$\frac{2}{5}$	inch.
“ “ 2	$2 \times 2 = 4$	“	1.6	“
“ “ 3	$3 \times 3 = 9$	“	3.5	“
“ “ 4	$4 \times 4 = 16$	“	6.3	“
“ “ 5	$5 \times 5 = 25$	“	9.8	“
“ “ 6	$6 \times 5 = 30$	“	11.8	“
“ “ 7	$7 \times 5 = 35$	“	13.7	“
“ “ 8	$8 \times 5 = 40$	“	15.7	“
“ “ 9	$9 \times 5 = 45$	“	17.7	“
“ “ 10	$10 \times 5 = 50$	“	19.7	“

Further points:—

In the first month the ovum is as big as a dove's egg, and is covered with villi. It is as big as a hen's egg in the second month. From the form of the head and the fully articulated limbs the embryo can be recognised as human, and the umbilical cord still contains a loop of bowel. In the third month the ovum is about as large as a goose egg; the head measures

* When there is more amniotic fluid than this it is pathological—hydramnios—and is injurious directly only to the mother by the great distension of the abdomen. But deficiency of amniotic fluid is injurious to the fœtus. For adhesions may thus arise between the fœtus and the inner surface of the membranes. The bands which are thus produced, called Simonart's, may cause miscarriage at non-viable stages, or lead to amputation or constriction of the extremities (intrauterine spontaneous amputation).

only a third of the body length; the fingers and toes are formed. Points of ossification are present in most of the bones. In the fourth month the sex is distinctly differentiated. In the fifth month down and true hairs appear, and meconium in the intestines. In the sixth month fat is found under the skin. At the seventh month children cry with a weak cry, they reach a weight of 1,400 gr. (3lbs. 1oz.) (200×7), and can live a few days after birth. The pupillary membrane disappears. At the eighth month children weigh 1,600 gr. (3lbs. 8oz.) (8×200), and it is possible to keep them alive by careful nursing.

At the ninth month they attain a weight of 2,000 gr. (4lbs. 6oz.) ($9 \times 200 + 200$) and more. The skin, which was as red as a crab, becomes paler owing to the growth of the panniculus. In the tenth month they gradually take on the characters of a full-grown child.

The full-term child is recognised (1) from its length, = 50 c.m. (19·7 inches); (2) from its weight, = 3,200 grammes (7lbs.); (3) from the head measurements.

The direct diameter from the glabella to the external occipital protuberance = 11·75 c.m. (4·6 inches).

The great oblique diameter from the chin to the external occipital protuberance = 13·5 c.m. (5·3 inches).

The great transverse diameter, biparietal, between the parietal eminences, = 9·5 c.m. (3·7 inches).

The short transverse diameter, bitemporal, between the temples, = 8 c.m. (3·1 inches).

The short oblique from the nape to the large fontanelle = 9·5 c.m. (3·7 inches).

Skull circumference = 34 c.m. (13 inches).

Boys weigh more than girls. There are 106 boys born to 100 girls (G. Veit). The mortality of boys during birth and the first two years of life is greater than that of girls.

The fontanelles and sutures are of importance in the diagnosis of the various head positions. Four sutures, the frontal, parietal, and both coronal sutures, meet in the great fontanelle; three, namely, the parietal and both limbs of the lambdoid suture, join in the small fontanelle.

More unimportant signs of maturity are as follows:—The newly-born child cries loudly, and moves its limbs strongly. The down (lanugo) is only found now about the shoulders. In boys the testicles are in the scrotum. In girls the labia majora cover in the labia minora.

The finger-nails project beyond the tips of the fingers. The aural and nasal cartilages are firm, the hair of the head is 3 c.m. (1·2 inches) long. The skull bones are firm and the sutures narrow.

Presentation, Position, and Attitude of the Fœtus.

We differentiate direct (head and breech) presentations and cross presentations.

By position we mean the relation of the child's back to the uterine wall. If the back is to the left, we call it the first position; if to the right, the second position. Instead, however, of saying head presentation first position, we say simply first head position.

By attitude we mean a certain relationship of the members of the child's body to one another. In the normal attitude the back is bent, the chin is on the chest, the knees are drawn up to the abdomen, the arms are crossed on the breast.

The presentation, position, and attitude may frequently change until the time of labour.

In 96 per cent. of all labours we find head presenta-

tions, in 3 per cent. breech presentations, and in about 0.5 per cent. face and cross presentations.

The overwhelming frequency of the head presentations depends upon the law of gravitation. The fœtus floats in a salt solution of the same specific gravity as the amniotic fluid, in the following way:—As a result of the volume of the liver the head sinks deeper than the breech, the fœtus lies upon its back, with, however, the right shoulder deeper than the left. Hence in the upright position of the mother the right shoulder and a part of the back of the child gravitate to the front (which is deeper than the back of the womb); in the lying down position of the mother they go to the back. In the first case the first head position arises with the smaller fontanelle directed forward and to the left, in the second case the second position arises with the small fontanelle directed backward and to the right. Since the upright position is maintained twice as long as the lying down position of sleep, we easily see how it is that the first position is twice as common as the second. The varieties of position of the small fontanelle in the first and second head positions also appear to result from the action of the law of gravitation.

Multiple Pregnancy.

According to G. Veit a twin birth takes place once in about 90, and triple birth once in about 8,000.

Multiple pregnancy is due to either several ova* being set free at one menstruation and becoming fertilised (by different coitus, superfecundation), or to the single

* These may arise from one or two follicles, and in the latter case the follicles may be in the same or in both ovaries, as is proved by the corpora lutea.

fertilised ovum containing more than one germ. Superfœtation, which is the fertilisation of a second ovum produced at a later period, is only possible in the first three months of pregnancy, so long as the decidua vera and reflexa have not coalesced. But even during this period superfœtation is negatived, since ovulation ceases during pregnancy. The acceptance of superfœtation has only taken place owing to the frequent observation of very marked difference in size between twins. These differences are, however, most marked in twins from the same ovum, where there can be no question of superfœtation (B. S. Schultze). These differences are due to unequal development of the twins, which Schatz explains in the case of twins from the same ovum by asymmetry of the third circulation. This third circulation of Schatz is the constant anastomosis of the vessels of the two placentæ in twins from the same ovum.

The twin which gives more blood to its co-twin than it receives in return often dies during pregnancy, it becomes dried up and flattened out by pressure of the other twin (Fœtus papyraceus—struggle for existence in the womb).

This fœtus may be born prematurely while the other twin keeps growing. On the other hand the twin which sends most blood into the circulation of the other one may reverse its blood current so that the blood in the umbilical artery of this second one flows to the heart and the heart atrophies. Thus arises the *acardiac* fœtus.

If the origin of the membranes be considered it becomes evident that twins from a single ovum have a common chorion and decidua, while twins from separate ova have on the other hand only the decidua vera in common. A joint decidua reflexa is only possessed by twins from different ova in those rare cases where both ova are

imbedded close together in the uterine mucous membrane. The placentæ are originally distinct in both cases. Twins from a single ovum are always of the same sex. Labour is often premature in twin pregnancies, but twins even when carried to full term are beneath the average in size and weight. If the embryonal layers of single ovum twins coalesce double monsters are formed.

Changes in the Mother's System Produced by Pregnancy.

1. *Changes in the genital and adjacent organs.*

The pregnant uterus grows in the first half of pregnancy by eccentric hypertrophy; later on it distends mechanically. The wall thus becomes thinner in later stages, so that towards the end of pregnancy it is only 5-10 m.m. ($\frac{1}{5}$ - $\frac{2}{5}$ inch) thick. According to C. Ruge, at full time the muscle lamellæ are superimposed in layers which are bound together by muscle bands running obliquely and stretched out to a great length. The uterus increases from 7 c.m. (2.7 inches) to over 36 c.m. (14.4 inches) in length, and from 30 grammes (465 grs.) to 1,000 grammes (15,500 grs.) in weight; its form becomes ovoid, with the cervix as a small appendage. The uterine cavity sweeps high up above the mouths of the tubes. The normal anteflexion is increased by the weight of the uterine body. This causes frequent micturition in the earlier months of pregnancy, which recurs in the later months, but is then caused by pressure of the head of the child.

The viscera are pushed backwards and to the sides, and the diaphragm upwards by the pressure of the growing uterus. From this cause the shape of the thorax becomes

altered, the transverse diameter increasing, and the vertical one diminishing (Dohrn). In the ovary the corpus luteum verum is formed from the ruptured follicle by the combined growth of the vessels of the theca interna, and of the cells of the membrana granulosa (Waldeyer). This reaches the height of its development at the third month. After the termination of pregnancy the true corpus luteum undergoes fatty changes and the cells become absorbed, a scar resulting. The false corpus luteum which is produced every menstruation, when fertilisation does not take place, undergoes the same changes of degeneration and scar formation.

Analogous retrogressive changes are also passed through by the blood which is extravasated into the centre of the follicle. Secondary visible changes are the striæ gravidarum, reddish streaks arising from laceration of the deeper skin layers, occurring upon the distended abdominal wall, the breasts and thighs. After delivery they alter to white scars, the so-called scars of pregnancy. Yet they may be absolutely wanting. The navel pit disappears at the eighth month—flattening of the navel—and at the ninth month the navel is pushed forward like a small bladder.

The vaginal mucous membrane hypertrophies and becomes bluish. The breasts become turgid, and on pressure give out a watery or milky fluid; the linea alba and the areolæ of the nipples appear pigmented, of a brownish colour.* These signs are of little value for diagnosing pregnancy in multiparæ, since they have a tendency to persist more or less after the first pregnancy.

* The brown pigmentation of the face, especially the temples, in pregnant women is called *Chloasma uterina*.

2. *Changes in the general system.*

The number of red blood corpuscles and the amount of hæmoglobin are not normally lessened, but rather increased.

Physiological chloranæmia is therefore not now accepted.

The urine is more copious and watery. Disturbances take place of the digestive and circulatory apparatus, of the nervous system, and of the mental organs and character. To these belong nausea, vomiting, salivation, palpitation, fainting, varicose veins, hæmorrhoids, tooth-ache, disorders of taste and sight, and melancholy. Despite these several disturbances the weight of the mother increases monthly in the last three months by 1,500-2,500 grammes.

Diagnosis of Pregnancy.

A complete diagnosis should establish five points.

1. The question of pregnancy.
2. The period of gestation.
3. The life of the child.
4. The position of the child; and
5. Whether the mother is a primipara or a multipara.

1. Question of Pregnancy.

There are presumptive, probable, and certain signs of pregnancy. In the first half of pregnancy we trust to the first two kinds of signs. The presumptive signs are the disturbances in the condition of the woman (vomiting, &c.), which at first merely awake the suspicion of pregnancy.

The probable signs are the cessation of menstruation, the globular enlargement of the uterus with marked anteflexion and softness, striæ gravidarum, the various pigmentations, the changes in the breasts (expression of a watery fluid possible, prominence of Montgomery's glands in the areola of the nipple), and the uterine murmur.

These signs are only probable because they may be found under other conditions. In chlorosis, exhausting diseases, double-sided ovarian tumours, and great adiposity, the menses cease, the uterus may be enlarged by tumours, and the other signs also occur under various circumstances.

But it is a probability bordering on certainty that pregnancy exists when a perfectly healthy woman, who has menstruated regularly, ceases to menstruate, and on bimanual examination her uterus can be felt to be rounded, enlarged, markedly anteflexed, and yielding to pressure. With practice these characteristic changes of the uterus may be made out in the second month of pregnancy, while pigmentation, changes in the breasts, and the uterine souffle are still unrecognisable.

The certain signs appear for the first time about the eighteenth or twentieth week. These include :

- (a) Feeling and hearing the foetal movements.
- (b) Feeling the parts of the child.
- (c) Hearing the foetal heart sounds and the umbilical murmur.

2. Period of Gestation.

During the first month the uterus is but little enlarged and can only be made out by bimanual examination. In the second month it is as big as a goose egg. In the third month it is as big as a child's head. In the fourth

month it is as big as a man's head, and it is now perceptible on external examination above the symphysis. In the fifth month the uterus reaches midway between the navel and the symphysis pubis. In the sixth month it reaches to the navel. In the seventh month it reaches two fingers' breadth above the navel. In the eighth month it reaches a hand's breadth above the navel. In the ninth month it reaches to the xiphoid process. In the tenth month it reaches again to a hand's breadth above the navel.

From personal investigations of the author the fundus reaches to the margins of the ribs even in the tenth month if strong and frequent labour pains are present.*

For this reason one must always take the abdominal circumference, which at the eighth month measures about 90 c.m. and at the tenth over 100 c.m.

In primiparæ with normal pelvest† a deep position of the head in the pelvis points to the tenth month, so does complete effacement of the portio vaginalis. The cervical canal still retains a length of from 3-4 c.m., after effacement of the portio. Likewise when the head is right in the pelvis in multiparæ this points to the tenth month. But if the head be movable this does not, as in the case of primiparæ, point against the tenth month.

History.—After having come to an opinion, the woman

* Uterine pains or contractions take place during the whole of gestation (Braxton Hicks). They differ from labour pains in that they are not perceived at all or merely as a stretching of the abdomen. The contractions of pregnancy, during which the uterus feels hard, are usually overlooked by the student, although he always volunteers an opinion as to the uterine consistence in cases where this is quite secondary.

† In contracted pelvis, cross birth, and twins, the presenting part in primiparæ lies movable above the pelvis and the portio does not become effaced.

may be asked about the last menstruation and the first quickening of the child. The probable end of gestation is got by taking three months back from the first day of the last menstruation and adding seven days, or by adding four and a half calendar months to the first day on which the mother felt the foetal movements.

If the labour comes on several weeks later it may be due to a mistake of the woman, or to conception shortly before the last omitted menstruation, or to prolonged gestation, but this can only be the case when the child is unusually big.

3. The Life of the Child.

That the child lives is known from the foetal movements, which are often felt and heard, and from the heart sounds.

These form a double beat with a frequency of 120-150 in the minute. Instead of the heart sounds one often hears the umbilical murmur, which is synchronous with them and arises from pressure or tension on the cord and therefore frequently occurs when the cord is knotted.

The uterine murmur which arises in the uterine arteries is synchronous with the maternal pulse. When the heart sounds are heard below and to the left of the navel it indicates usually the first head position; if below and to the right of the navel, but nearer to the linea alba, it indicates a second head position.

4. The Position of the Child.

The position of the child is determined, apart from the situation of the heart sounds, by seeking with both hands

for the larger parts of the fœtus, the head and breech, first at the fundus and then at the pelvic inlet. The part which is harder and plays more freely between the hands to and fro (Ballottement) is the head. If this lies in or over the pelvis we have a head presentation.

In palpating the fundus the finger-tips must be directed upwards, and downwards when the palpation is over the pelvis. In the latter case the hands should be pressed gradually from the sides inwards into the pelvis and not entered above the symphysis and pressed outwards.

It is only in this way that one can feel the head when it lies deep in the pelvis, for otherwise one can very easily take the shoulder, which is to the front, for the head.

In the first head position one can feel the small parts, at the fundus, to the right of the breech. A distinct impulse cannot be communicated to the small parts, neither can ballottement be applied to them.

In the second head position the small parts lie to the left of the breech. If they are not to be felt one can frequently make out, in the first head position, for instance, that the child's back, offering greater resistance, lies more in the left side of the uterus; then one also hears the heart sounds on the left side of the uterus. This side may lie to the right of the linea alba in marked dextroversion of the uterus, so that one would then hear the heart sounds of a first head position to the right of the linea alba. Moreover this question as to whether it is the first or second head position is only of value when operative termination of the labour is required. The student always imagines that the examination of the mother ends with this diagnosis, "first head position."

5. Whether the Mother is a Primipara or a Multipara.

Two certain signs exist for the differentiation of primiparæ from multiparæ.

a. The consistence of the hymen.

This in primiparæ is only torn into, and still forms at its base a continuous seam.

In multiparæ only 2-4 small projections represent the hymen; these are found at the posterior commissure, under the meatus urethræ, and laterally—*carunculæ myrtiformes*.

b. The shape and size of the os uteri and the cervix.

The os uteri in women pregnant for the first time is of the size of a pin's head to a sixpenny bit, while in women who have borne children it is a broad transverse fold with incurved margins, into which one can place one or two fingers.*

Towards the internal os the cervical canal becomes narrower in multiparæ, but still a finger tip can be passed through it in the last two months and the apex of the ovum felt directly.

The cervix in first pregnancies runs to a sharp point below; it becomes shortened after the eighth month, and entirely disappears in the last weeks of pregnancy. In women who have borne children the cervix is mushroom-shaped, that is, it is smaller in circumference above than

* This easy accessibility of the cervical canal often induces the student to pass his finger further into it. This should be absolutely avoided. Wounds of the cervical mucous membrane and artificial rupture of the membranes may be thus caused, and injurious agents be carried through the amniotic bladder to the child (Dohrn). A finger not disinfected can give origin to fatal sepsis by wounding the mucous membrane of the cervix.

at the os uteri. If the cervix is lacerated on both sides one feels the two lips simply as two soft flaps. The cervix in these women seems somewhat shorter in the latter months of pregnancy. This is due to the slackness of the vaginal roof. The changes which the cervix suffers from the birth of a child may be of little account, and may disappear entirely. The chief weight is therefore to be placed upon the alterations in the hymen. In doubtful cases the other signs of a pre-existing pregnancy must also be taken into account. These are:—Loose abdominal walls, the scars of pregnancy, strong pigmentation of the linea alba and the areolæ of the nipples, flabby breasts, prominent nipples in women who have suckled, wide vaginal inlet, smooth vaginal wall, and scars after perinæal lacerations. All five points of the diagnosis can be established by means of external examination if inspection of the external genitals be included in this. The inspection is of advantage also because any diseases of the genitals, such as syphilis or gonorrhœa, are made out at the same time. The difficulty of examination for pregnancy is not in the internal examination—so-called digital touch—but in the external examination. The examination of the breasts for proof of death of the fœtus is included in the external examination. The consistence of the nipples, the prominence of these and of the gland itself are ascertained by this. Generally a small breast gives plenty of milk, whereas a larger one often gives very little.

The measurement of the pelvis cannot be neglected in giving the prognosis in a case of labour. The internal examination of a pregnant woman should only be undertaken after careful disinfection of the accoucheur, and, when possible, of the patient also. (See p. 53.)

After these precautions the finger is introduced under

guidance of the eye. The other hand presses the uterus and the presenting part against the finger in the vagina. To carry out this examination the patient is placed, after freeing all her clothes, upon her back on a firm mattress, the shoulders being slightly elevated and the thighs flexed.

A diagnosis of twin pregnancy is based upon the feeling of members which could not possibly belong to one foetus, *i.e.*, three limbs of one kind. When the uterine walls are very distended this diagnosis is often very difficult, and thus in great distension of the abdomen we may also think of hydramnion or of an abnormally big child. In hydramnion one feels fluctuation as a rule, unless the tension of the uterus is excessively great, the foetus is unusually mobile (marked ballottement), whereas the fluctuation and mobility are absent in twins; in the case of a large child the parts feel correspondingly large, whereas with twins they are strikingly small, so that a beginner often takes the large parts for the small. Great difficulty arises in diagnosis when the case is one of twins with hydramnion. Be careful about diagnosing twins. When no twin arrives the unnecessary anxiety caused by the diagnosis is not readily forgiven. The diagnosis of the death of the foetus is founded on the absence of the foetal heart sounds, after repeated examination, although they were perceived at an earlier stage, and upon the cessation of uterine growth. If the foetus is not thrown out at the time, the uterus continues to diminish in size.

If the amniotic fluid has escaped and the cervix is passable by the finger, this feels the wobbling of the skull bones when there is a head presentation. In one case it was possible to do this through the abdominal walls, and thus to establish the correct diagnosis of breech presentation. The death of the foetus is perceived by the mother

by various sensations, such as shiverings, dysæsthesiæ, and general discomfort. The breasts become flabby and the secretion stops. In one case the author noted fever immediately after the death of the fœtus.

Regimen during Pregnancy.

As a rule pregnant women continue their ordinary methods of living unless this is directly opposed to the universal principles of hygiene. Although circus riders follow their occupation until the seventh month and usually without injury, yet it is better to forbid riding, dancing, travelling over rough roads, and lifting weights.

Regular habits of the body as regards the bladder and bowels are very important. The bladder is often best emptied during the later weeks of pregnancy when lying down. (See Physiology of the Lying-in). The bowels are moved by mild aperients or enemata. When vomiting is severe the patient must be ordered to take her breakfast lying down in bed, and the meals must be small and frequent.

Every pregnant woman should wear a belly band or supporting corsets from the middle of pregnancy. Regular exercise out of doors and keeping the body clean with warm baths are important. The water must be luke-warm (not hot), and should there be much discharge some water may be used for douching the vagina, but no pressure must be used.

Cohabitation should be prohibited if abortion has taken place in previous pregnancies.

The nipples should be washed regularly with cold water, and, in the later weeks of pregnancy, with spirit, so as to harden them for suckling.

Flat or depressed nipples should be drawn out fre-

quently in the later weeks of pregnancy, and Auvar's apparatus may be used for this purpose. Kehrer has removed the areola in order to cure depressed nipples.

The physician has opportunity to favourably affect the mental condition of the patient by suitable consolation and advice.

PHYSIOLOGY OF LABOUR.

Definition of Labour.

By labour we mean the expulsion of the foetus and its membranes from the mother's body by the natural forces.

The expulsive forces are contraction of the uterus ("the pains") and abdominal pressure. The pains have first to dilate the cervical canal before they, together with the abdominal pressure, can drive the foetus out through the cervical canal and the vagina.

The Causation of Labour and the Labour Pains.

First Theory.—Labour sets in as soon as the uterus has become distended to a certain degree.

Evidence.—In twin pregnancy or hydramnion, where the uterus becomes distended at the seventh month to the degree which is usual at the tenth, premature labour is common.

Second Theory.—Labour comes on through loosening of the connection between the uterine wall and the foetal envelopes (fatty degeneration or necrobiosis [Klein] of the decidua).

Third and probably correct Theory.—The causation lies in the foetus itself. Labour comes on as soon as the foetus is ripe.

Evidence.—In extrauterine pregnancy, in which the uterus is empty and the two first theories cannot be

brought into consideration at all, attempts at labour, *i.e.*, contractions of the empty uterus and the foetal sac, set in at the end of the tenth month, unless the sac has burst previously and the foetus has died. The foetus at term excites pains, through the fact that at the end of the tenth month a deficiency of oxygen in the placenta becomes noticeable in connection with the growth of the foetus.

But diminution in the volume of oxygen induces pains (Runge). The stimulus causing the pains may affect the uterine muscle directly, or first affect the sensory nerves of the uterus. Through the latter the stimulus extends to one of the two centres, of which one lies in the medulla oblongata and the other in the lumbar part of the cord.

In these centres the stimulus is reflected to the cerebro-spinal motor nerves, which run only in the course of the sympathetic.

The Mode of Contraction and Abdominal Pressure.

The pains consist of involuntary peristaltic and rhythmic movements, that is, there is a constant change from contraction to relaxation. Permanent contraction would do no work, but merely produce heat (Tetanus uteri). A pain lasts about a minute, and recurs every five minutes. During it the uterus becomes gradually harder and harder, and after a stage of greater contraction it gradually becomes softer. The sensation is limited to the duration of the stage of greater contraction. During a pain the uterus elongates, and becomes more slender.

Every pain is accompanied by a radiating pain in the sacral region.

Towards the end of labour the abdominal pressure is

added on to the force of the pains, and the former now does the bigger share of the work (Schröder), but one must not forget that the abdominal pressure is only set in action reflexly by the uterine pains.

The Stages of Labour.

There are three stages of labour: dilatation stage, expulsion stage, and the stage of placental delivery.

As regards the two first stages: The lower section of the body of the uterus contains less muscular tissue, and this is more loosely united by connective tissue than in the upper section of the uterus.

Consequently at the onset of uterine contractions the lower section is stretched out, thus forming the lower uterine segment (Schröder, Hofmeier, Ruge).*

The drag which is exerted from above upon the lower segment by the uterine body contracting upon itself, pulls the lower segment upwards, separates the lower pole of the ovum from the uterine wall, and draws the internal os asunder (*i.e.*, dilates it).

The lower pole, consisting of the bag of membranes which has been loosened, is forced by the intrauterine pressure (which increases during the pains) into the internal os, then the cervical canal, and finally into the external os uteri, and it dilates these parts so that the head can pass through them.

Complete disappearance of the external os can only take

* From later investigations by Zweifel's method of frozen sections, made by Bayer and Küstner, many evidences arise pointing to the formation of the lower uterine segment from the upper dilated portion of the cervical canal, which is pulled into the uterine cavity even during pregnancy. This was the accepted view formerly. From these researches the contraction or Bandl's ring is identified with the internal os uteri.

place, according to the author's investigations, from the united action of the horizontal pressure of the membranes and of retraction caused from above, and not from action of the membranes alone as Schröder taught.

After dilatation of the external os uteri a further shortening and thickening of the uterine body (a hollow muscle) takes place, and still more marked stretching and thinning out of the lower uterine segment, which is usually limited by the strong attachment of the round ligaments. The pains now exert pressure upon the ovum from above downwards, cause the bag of membranes to burst, and with the help of the abdominal pressure drive the head, as the deepest part of the fœtus, through the parturient canal, *i.e.*, the lower uterine segment, the cervix and vagina.

In multiparæ, in whom the resistance of the outer mouth of the womb has been previously overcome, the bag of membranes dilates the whole of the cervical canal, *i.e.*, the cervix becomes effaced late when the os uteri has become already somewhat widened (Fig. 22).

On the other hand, in primiparæ the internal os, then the cervical canal, and finally the external os, are dilated, *i.e.*, the external os only opens out when the cervix has become completely effaced (Figs. 21 and 20).

The separating line between the contractile section of the uterus (the hollow muscle) and the lower uterine segment is called the contraction ring. It is often to be felt and seen as a furrow. If this passes above the navel there is very great danger of rupture of the uterus.

The separation of the placenta is effected owing to the broad surface of the placenta being unable to diminish itself in extent so as to keep pace with the diminution of its site caused by the strong uterine contraction after the expression of the child. This contraction is continuous as opposed to the temporary contractions of labour.

Separation is prevented during the earlier stages by the general pressure of the contents, which holds the placenta in position on its site. With the last pain which expels the child the placenta is separated, and generally about its centre. The space thus formed is distended with blood, and this, "retroplacental hæmatoma of Schultze," aids the further separation. Owing to its gravity the placenta then falls downwards with its foetal surface forwards, while at the same time it mechanically strips off and inverts the membranes. When situated deeply and after excessive handling of the uterus the placenta is born with its border forwards and without inversion of the membranes (Duncan). The placenta usually rests in the lax lower uterine segment or in the vagina, and is only expelled by abdominal pressure or on the standing up of the woman. Hence Credé's method of expressing the freed placenta by the hand is in general use.

Clinical Course of Labour in Head Positions.

At the beginning of labour one can recognise good progress by the fact that the os uteri dilates more and more with the regular uterine pains.

This is accompanied by slight bleeding from the separation of the lower part of the membranes and from slight lacerations about the os uteri ("a show").

During a pain the membranes are separated from the head by the amniotic fluid which is forced between them ("the bag of waters present").

Since the presenting part is now gradually driven down, the fluid in front of it (the so-called forewaters) cannot return, and thus the bag of membranes remains distended even between the pains. (The bag of membranes is ready for bursting.)

If now a little more water is driven past the head, during a pain, the membranes rupture, the bag is burst, and the "forewaters" flow away. The rupture of the bag takes place under normal conditions at the time of complete, or nearly complete, dilatation of the os uteri.

In the latter case the os uteri is quickly dilated to the full extent by the already partly engaged head.

If the head does not enter the pelvis during labour the whole force of the pain is exerted upon the bag of membranes, so that this latter bursts readily before its time, that is before the os uteri is fully dilated. The head has thus to dilate the os uteri afterwards, and the labour is more painful and may become tedious. The delay may cause real danger to the mother and to the child. On the other hand the bag of membranes may delay labour if it does not burst—from toughness of the membranes—even when the os uteri is fully dilated. If the presenting part is engaged in the pelvis under these conditions the bag may be ruptured. (When this cannot be managed with the finger the best instrument is a volsellum or a knitting needle, which of course must have been boiled for five minutes before use.) If the membranes are not ruptured in a case like this the whole ovum may be born entire, "the child is born with a caul." The outlook is grave, for the child suffocates unless the membranes are ruptured at once. After the membranes have ruptured at the due time the head passes out of the os uteri (Crowning) into the vagina. The lower the head comes the stronger and more severe are the pains (expression pains) and the more energetic becomes the assistance of abdominal pressure. The head soon becomes visible in the vulva, during a pain, and recedes during the interval. As a result of the pressure caused by the pains the pelvic floor, the perinæum especially, is driven downwards, and at the same time stretched.

From this downward driving and stretching of the perinæum an elongation of the vulval opening results. The perinæum now forms merely an elongation of the bony pelvic canal (perinæal groove). While the lowest part of this perinæal groove simply presses the head upwards, that part of the pelvic floor immediately adjoining the bony pelvis behind directs the head forwards, *i.e.*, out through the elongated vulval slit.

With the increasing stretching of the perinæum and the elongation of the vulval opening the head finally remains fixed with its most advanced part in the vulval outlet ("first appearance") even during the pause between the pains. (The head is coming through.) Gradually with each pain more and more of the head is born, first the occiput and then the parietal region, until the greatest diameter of the head, which passes the vaginal outlet in the first and second head positions, the small oblique one, is engaged. At this moment the perinæum has reached its maximum of stretching. Now smaller diameters of the head pass out, and thus the perinæum can retract backwards and the brow and face are rapidly born over the perinæum. Since the neck of the child is applied to the symphysis pubis the head cannot possibly be driven (directly) out of the vaginal outlet, but must rotate on the symphysis (as a centre), and in this action the chin is withdrawn from the chest (3. Rotation of the head, see p. 38). After the birth of the head the face turns to that thigh of the mother towards which it was directed when labour began (this happens in all positions of the head). Thus in the first position it turns to the right, in the second to the left. This rotation is due to the shoulders rotating from that oblique diameter of the pelvic inlet into which the sagittal suture did not enter, to the conjugate at the outlet.

Hyper-rotation of the shoulders leads to the rotation

of the face in the first position to the left thigh of the mother, and in the second to the right thigh.

Generally one thinks that the diagnosis has been a mistaken one, and that the position was the second and not the first, and *vice versâ*. As an additional means of diagnosing the position the caput succedaneum on the anterior parietal bone and the flattening and often depression of the posterior parietal are of value. (See p. 39.) In the first head position the right side of the child lies to the front, and hence the caput succedaneum must be on the right parietal bone, and the left bone must be depressed or even pushed under the right bone.

After the birth of the child a period of quiet peaceful rest is enjoyed by the mother.

After about a quarter of an hour pains come on again (after-birth pains) and expel the placenta, which has been already separated by the later pains of the second stage, into the lower uterine segment, the vagina, or the vulva.

The placenta appears as a rule in the vulva with its convex foetal surface in front (Schultze's method), and only rarely with its border forward (Duncan's method). In the first case there is a large collection of blood on the uterine side of the placenta, the retro-placental hæmatoma, and owing to the traction of the descending placenta the foetal membranes are inverted, so that the amnion becomes the most external membrane.

The Duration of Labour.

In primiparæ labour lasts twenty hours, in multiparæ twelve hours, of which only 1-2 hours are occupied by the period of expulsion.

An elevation of the temperature to 38° C. (100·4° F.),

or more, with a pulse of 100 or more, coming on some time after rupture of the membranes, is generally pathological, and it is good practice to always consider this as pathological.

That as a rule in these conditions we have to do with sapræmic or septicæmic fever is evident from the observation of Ahlfeld, that these feverish states are either entirely avoided or lessened by disinfection of the genital canal. The vagina and cervix, when possible, should in these cases be washed out with a 1 per cent. lysol solution. If the temperature does not come down and the labour does not advance, then operative interference is indicated.

Mere faintness, on the other hand, of which the attendants always make so much, is of little importance.

The Mechanism of Labour in the First and Second Head Positions.

Towards the end of pregnancy the head, surrounded by the lower uterine segment, lies, as a rule, well in the pelvis.

The large and small fontanelles are at the same level. The sagittal suture runs transversely or obliquely in the middle between the symphysis and the promontory.

With the commencement of true uterine contractions the head makes certain rotations as it descends.

(1.) Rotation on its transverse diameter; depression of the smaller fontanelle (more marked flexion of the head).

(2.) Rotation on its vertical diameter; turning forward of smaller fontanelle.

(3.) Repeated rotation on its transverse axis. Rotation of the head round the symphysis (extension or deflection movement).

The first rotation is explained most simply as follows. The uterine pressure is placed upon the base of the skull. This pressure is, however, transmitted by the spine to two unequal arms of a lever. The shorter arm is towards the occiput. Since the resistance of the pelvis is the same to each arm of the lever, the shorter one must descend lower. Olshausen says that the second (rotation) is caused by the rotation of the back of the child to the front. This latter is due to the flattening of the uterus.

Against this hypothesis there are exact investigations by Frommel, Zweifel, and von Maydell, which show that the rotation of the head takes place before that of the back. Our view is that this second rotation is due to the configuration of the pelvis.

The pelvis is greatest in the transverse diameter at its inlet, but at all other levels the conjugate is the largest diameter. Now since the head always engages with its largest diameter (antero-posterior) in the largest diameter of the pelvis, it must rotate out of the transverse or oblique diameter of the pelvic inlet into the conjugate of the mid part of the pelvis and of the pelvic outlet. According to J. Veit it is the inclined plane of the internal obturator muscle which turns the lesser fontanelle forwards, while Ahlfeld says the levator ani does this.

The third rotation of the foetal head results from the resistance of the pelvic floor (see p. 35).

In flat pelvises especially, the cranium rotates on its long axis in such a manner that the sagittal suture approaches the promontory of the sacrum—Naegele's obliquity, "anterior-parietal bone presentation." This rotation is due to the fact that the parietal which is behind is held back by the projecting promontory of the sacrum. Many authors consider this rotation to take place regularly, and thus make the number of rotations to be four.

The shoulders are born as follows, according to Auvard. The neck and anterior shoulder (the right in the first position of the head) are applied to the symphysis, the posterior shoulder then slips over the perinæum, and finally the anterior shoulder is born. According to Löhlein and Zweifel the anterior shoulder is born first in most cases; this arm then impinges on the symphysis and the posterior shoulder slips over the perinæum. The breech then follows without trouble.

Alterations in the Shape of the Head from Labour in the First and Second Head Positions.

The originally rounded head changes to a dolichocephalic one by the elongation of its antero-posterior and its long oblique diameters. The posterior parietal bone is pushed forwards under the anterior one (Dohrn). A serous gelatinous exudation is formed under the scalp upon the presenting part of the head which lies free in the os uteri or the vulva, and which is exposed to no pressure.

This is due to venous obstruction. The swelling is called the caput succedaneum. In many cases a blood tumour forms under the periosteum after birth—cephalhæmatoma. This never spreads over a suture line as the caput succedaneum may. The blood comes from torn blood-vessels between the periosteum and the bone. Laceration of the blood-vessels takes place from fractures of the skull after spontaneous and operative delivery, and after asphyxia as seen by Spiegelberg, and confirmed by Merttens in Ahlfeld's clinic. In asphyxia the circulatory disturbance leads to similar ecchymoses in other places (pleura, pericardium). If extravasations of this kind become so extensive as to simulate cephalhæmatoma there must exist as a predisposing cause a condition of easy separation of the periosteum.

OTHER PRESENTATIONS.

Treatment of Labour Generally, and the Treatment of Labour in the Various Presentations.

ÆTIOLOGY, MECHANISM, AND PROGNOSIS OF VERTEX, BROW, AND FACE POSITIONS.*

GUSSEROW differentiates four head positions. In the first position the lesser fontanelle is in front and to the left, in the second in front and to the right, in the third behind and to the right, in the fourth behind and to the left. The head positions, named by even numbers, two and four, lie with the sagittal suture in the oblique diameter denoted by an even number, two. A similar relation exists between the first and third positions and the first oblique diameter. According as the lesser fontanelle lies to the left or right we reckon the position as the first or second respectively. Other authors allow only two positions with two varieties, according as the lesser fontanelle lies to the front or behind. It is very common to find the lesser fontanelle in the first position to the front even at the commencement of labour, whereas in the second position it is then directed backwards (first and third head positions according to Gusserow). These conditions are due to the action of gravity, which is the chief agent in producing head presentations, and which

* The author has preferred to give this and the following chapters a separate place and not to throw them under the section of "The Physiology of Labour," because they often encroach on the province of the pathology of labour.

brings the smaller fontanelle to the left and in front when the woman is erect, and to the right and behind when the woman is lying down (see p. 15). As a rule the lesser fontanelle, when backward at the onset, rotates forwards in the course of labour. Now and then, however, it rotates more backwards, and the greater fontanelle sinks lower and to the front (vertex and frontal position). A frontal presentation is nothing more or less than a third or fourth head position, which runs its course as such. In this case, since the forehead is applied to the symphysis, the larger fontanelle is born first, then the crown and occiput sweep over the perinæum and finally the brow and face are driven out under the pubic arch.

In brow presentations the brow, which at the beginning lies to the side, descends and comes forward. It is then born while the upper maxilla is applied to the symphysis; the skull slips over the perinæum, while the upper jaw, mouth, and chin come out under the pubic arch. In face presentations the chin descends and comes to the front even when it was directed backwards at the commencement of labour. Anteriorly the mouth and chin become visible in the vaginal outlet, and while the neck becomes applied to the symphysis, the nose, eyes, brow, and skull slip out over the perinæum.

According as the back of the foetus is directed to the left or to the right, we distinguish a first and second position in frontal, brow, and face presentations. These three presentations have the same ætiology, which comes into action at the commencement of labour, with the exception of the cause mentioned in paragraph 5 (see p. 42). In all, for instance, the occiput is retarded on entering the pelvis, and it depends chiefly upon secondary conditions whether the frontal region, the brow, or the face comes

lowest. The occiput is held back because it is pressed against the side of the pelvis (p. 42 see 3rd and 4th paragraphs), or because the arms of the lever, into which the spinal column divides the base of the skull (see p. 38), are equal (p. 42 under 1 and 2). In the latter case the sinciput will be able to descend just as easily as the occiput.

As soon as a condition of extension of the head (deflexion) occurs, the shorter arm of the lever lies towards the frontal region, the brow or the chin, and these parts then descend lower in analogy with the first rotation in the first and second head positions. The part also which descends lowest is the first to rotate forwards (second rotation). The third rotation is due to the brow or upper jaw or chin or neck becoming applied to the symphysis, and the pressure of the pelvic floor working in a forward direction now forces the skull over the perinæum.

The special causes of the three extension (deflexion) presentations are as follows:—

- | | |
|---|-------------------|
| 1. Congenital dolichocephaly. | } Equality of the |
| 2. Round shape of head with a small head. | |
| 3. Flat pelvis (the broader occipital section of the head finds no room in the contracted conjugate diameter, and consequently retreats to the side). | |
| 4. Dextro- or sinistroversion of the uterus. | |

This causes the occiput to give way to the opposite side; for instance, in dextroversion and the first position of the head the occiput goes towards the left iliac crest. With dextroversion and the second position of the head the mode of origin of one of the three extension (deflexion) presentations has been explained by the pains driving down the previously upward-directed face.

5. Congenital swellings of the neck (Struma).

These bring the neck into the position of face presentation previous to labour. But the thyroid glands may become swollen secondary to face presentation.

These three presentations are also alike in the fact that in them larger diameters than normally of the foetal skull must pass through the pelvis and the vaginal outlet, and that the broader occiput must pass down the larger posterior pelvic wall and slip over the perinæum.

According to Kaltenbach the mobility of the foetal vertebral column, which is necessary for the third rotation, is limited. From this it usually happens that the labour is lengthened (not in small heads), a circumstance dangerous to the mother and child in many ways, and especially dangerous to the perinæum.

The prognosis in these three presentations is generally less favourable than in normal head presentations.

Since the first face position arises from the first head position, and in the latter the occiput is usually directed to the left and anteriorly, the chin, at the commencement of labour in the first face position, looks to the right and back. If the chin remains posterior, as happens in extremely rare cases, spontaneous delivery is impossible, because, as Kaltenbach points out, the spinal column, which is already extended to its utmost degree, is not capable of the additional extension necessary for delivery.

Brow presentations change easily into face or frontal presentations. The caput succedaneum is situated on that part which comes first, in the region of the larger fontanelle in frontal presentations, upon the brow in brow presentations, and at the anterior angle of the mouth in face presentations.

The shape of the head, and in face presentations the bodily bearing (extension of the cervical part of the

spine), lead to such typical changes that one can diagnose such presentations from these peculiarities quite apart from other factors (Olshausen).

Diagnosis of the different Head Presentations.

Diagnosis.—Head presentation may be made out, when the abdominal and uterine walls are not too thick and tense, by external examination (see p. 56); the latter should therefore be always carried out before internal examination.

1. Diagnosis of Vertex Presentations.

By the internal examination, which is done through the anterior vaginal fornix when the os uteri is closed, the skull is recognised by the suture lines.

The best plan is to begin with the examining finger behind the symphysis and work backwards as far as possible.

In this way one reaches a suture, unless the head is still above the pelvis; this suture in the first and second positions is a branch of the lambdoid suture, and in the third and fourth positions it is a branch of the coronal suture or the sagittal suture itself. The two first-named sutures lead to the smaller and larger fontanelles respectively, the sagittal suture leads on the right and left to both fontanelles, and one can easily distinguish which fontanelle has been reached from the fact that three sutures run into the posterior and four into the anterior or greater fontanelle.

The beginner should only decide definitely on a certain vertex position after he has felt both fontanelles distinctly.

For this it is often of assistance to examine the left half of the pelvis with the right finger and *vice versa*.

When the fontanelles have been found, one should determine which is lower, and what position the lower fontanelle has to the other, whether before, behind, right, left, before on right, behind on right, before on left, behind on left.

If the head is already at the pelvic outlet, the finger, carried from the symphysis backwards, often comes directly on the lesser fontanelle, and if carried further back along the sagittal suture the finger reaches the larger fontanelle.

2. Diagnosis of Brow Presentations.

The finger carried from the symphysis backwards meets a broad bony surface; on the right or left of this (in first brow position on the right), and generally to the front, the finger finds the sharp supraorbital ridge and the bridge of the nose, and on the other side it meets the larger fontanelle.

3. Diagnosis of Face Presentations.

The external examination points already to a face presentation when, for instance, in the first vertex position the heart sounds are heard with striking distinctness wide to the right of the linea alba, and the skull (cranium) projects to a marked degree over the left pubic ramus.

On *internal examination* the finger carried backwards feels no sutures, but instead irregular depressions and elevations. The finger carried to the side of the pelvis feels on the one side (in first face position in front on

left) the broad bony surface of the brow, which at the commencement of labour often stands deeper than the chin, and on the other side the finger feels the bridge of the nose, the nostrils, the transverse groove of the mouth (with the margins of the jaws in it), and the chin.

The mouth can only be mistaken for the anus when it has taken a round protuberant shape owing to severe facial swelling. Even then no error of judgment should arise, *because the diagnosis of a certain position should never be based on one sign only.*

Ætiology, Mechanism, and Prognosis of Pelvic Presentations.

Ætiology.—Pelvic presentations occur with striking frequency in cases where the fœtus is free to move about in the uterus. This is normally the case, firstly in the early months of pregnancy—and this explains the frequency of breech presentations in premature labours and with dead children—and, secondly, in twins after birth of the first twin. Abnormally this free mobility of the fœtus is present in hydramnion and placenta previa, and is then caused by the great distension of the uterus by the amniotic fluid and by the globular shape of the uterus; the latter condition explains the association of breech presentation with placenta previa.

All cases where the head cannot be fixed upon the pelvis predispose to pelvic presentation; for instance hydrocephalus, contracted pelvis, abnormal mobility, abnormal laxity, and formation of the uterus (myomata, uterus bicornis, and unicornis—Von Winckel).

Finally we find pelvic presentation frequently in those abnormal growths of the fœtus where the centre of gravity is thrown nearer the pelvis, for instance in hemicephalus

and the various tumour formations in the peritoneal cavity and on the sacrum of the foetus.

Since the necessary conditions often persist in the mother it is not to be wondered at that repeated pelvic presentation occurs in the same woman.

The author saw three pelvic presentations one after another in the same mother.

The pelvic presentations form 2 to 3 per cent. of all births:

Pelvic presentations are subdivided into breech, foot, and knee presentations.

If a foot is felt with the breech we speak of a breech-foot or mixed-breech birth. According as the back of the child looks to the left or right, we distinguish first and second breech, foot, and knee positions.

The foot positions are divided into complete or incomplete according as both or only the anterior foot has come down.

In foot and knee presentations these parts are born without special mechanism. It is only in incomplete foot presentations, when the posterior foot presents, that this rotates forwards, while the leg and the hip of the opposite side find more room in the hollow of the sacrum. Here-with naturally the back rotates to the other side, and thus a first foot position becomes a second.

Rotation always takes place in the direction from the back toward the limb which has descended. If the accoucheur should be compelled to bring about this rotation operatively—a condition necessitating this may arise after version—he must rotate the descended foot inwards.

In the first breech position the left hip, which is anterior, becomes lower, and moves from the right side to the front; the hips of the child move out of the second

oblique diameter of the pelvic inlet into, or nearly into, the conjugate diameter of the pelvic outlet.

(The cause of the rotation is the same as for vertex presentation.)

The anterior hip is born first, and is applied at the same time to the symphysis; the posterior hip slips over the perinæum by means of strong lateral flexion of the spine.

The breech usually enters and comes out in the second oblique pelvic diameter, consequently the foetal back is directed forwards and to the left. The shoulders on the other hand enter in the second oblique, and come out in the antero-posterior diameter.

With the breech the arms are born in their normal relation. After the birth of the breech the back rotates forwards, whilst the head (as in vertex cases) passes from the first oblique diameter of the pelvic inlet into the antero-posterior of the pelvic outlet.

The occiput becomes fixed at the symphysis, and the head is born over the perinæum in its normal attitude, that is with the chin touching the breast; when the forehead is born over the perinæum the occiput slips out under the symphysis.

Abnormal Mechanism of Labour.—In a few cases of spontaneous birth, but more generally in operative extraction, the belly of the child rotates forward. The delivery of the head then causes much trouble if, after birth of the shoulders, the chin remains pointed forwards, and as a rule it requires artificial aid.

In a few cases the head may be born without assistance, when the face, as far as the brow, is driven under the symphysis, or when the chin becomes fixed over the symphysis, and the occiput slips over the perinæum.

Clinical Remarks upon the Course of Labour.—When the foetus is at term and the mother is a primipara

the labour lasts longer in breech cases than in head cases, and this longer duration affects chiefly the period of expression.

Untimely rupture of the membranes is also liable to take place in true foot presentations, and owing to this the labour is much protracted.

The cord is apt to prolapse under these conditions; the feet and hips dilate the os uteri very imperfectly, so that the head is prone to stick. Double foot presentation is, therefore, prognostically unfavourable for the child.

When the breech reaches the lower section of the pelvis meconium escapes freely.

When the rump is born there is often a short pause in the uterine contraction. The next pain, then, with a little external aid, will often expel the whole child if there is only slight resistance. If there is obstruction, so that in favourable cases five to ten minutes is required for the complete expulsion of the child, then the child dies through pressure on the cord. The asphyxia which occurs before its death is shown by the peculiar movements of the trunk (premature respiratory efforts), the pulse of the cord becomes weak, or is not to be felt. Dohrn has pointed out that in pelvic contraction the heart may be stopped entirely from pressure on the brain and irritation of the vagus, and the child may still live if the head is successfully got through the narrow pelvis.

Since the head passes comparatively quickly through the normal pelvis there are no mouldings of the head as in head presentations. The "birth swelling" or caput succedaneum is in breech cases upon the anterior buttock, thus in the first breech position it is on the left buttock.

DIAGNOSIS OF PELVIC PRESENTATIONS.

Diagnosis of Breech Presentation.

ON external examination one can feel the firmer and more easily mobile (ballottement) portion in the fundus, the heart sounds are audible at the level of the umbilicus, and one can feel, from before backward, the arms, then the spinous processes of the sacrum, and near these the tubera ischii—sometimes only the more anterior is felt. The genitalia are often not to be felt at all.

Diagnosis of a Foot Presentation.

Externally a foot presentation often poses as a transverse presentation, since the breech is found on the iliac crest. On internal examination this suspicion is still more increased, for with unruptured membranes the feet are not always to be felt. This error in diagnosis which is often made has no importance, for the accoucheur ruptures the membranes as soon as the os is fully dilated, seizes a foot at once, and turning quickly he is master of the situation. The foot is recognised on internal examination by the heel and is known from the hand by the absence of a thumb and the shortness of the toes. The side to which the foot belongs is told by drawing the toes forwards. With the *right* foot in order to get from the internal border of the foot to the external border one must work towards the *right* side of the mother, with the left foot to the left side.

Diagnosis of Knee Presentation.

The knee can be mistaken for the elbow. But from the knee one can reach either the foot or breech, and from the elbow one can reach the hand or shoulder.

Ætiology, Mechanism, and Prognosis of Transverse Presentation (Cross Birth).

Ætiology.—The following conditions predispose:—

(1.) Pendulous abdomen. The fundus falls altogether forwards and as a result the head is displaced from the pelvis.

(2.) Contracted pelvis. The head recedes from the pelvic inlet because it finds no room in it.

(3.) Globular shape or laxity of the uterus. The foetus can, without any opposition from the uterine walls, take any position it likes. (Hence the frequency of cross births in twin pregnancies, hydramnion, and placenta previa, all of which tend to render the uterus globular.)

(4.) Disproportion between the foetus and the uterus. (Frequency of cross births in premature labour.)

Since laxity of the uterus and pendulous abdomen are mostly found in multiparæ, we find cross births much commoner in them also. Cross birth in a primipara points to contraction of the pelvis, unless twin pregnancy, hydramnion, or placenta previa be present.

Mechanism of Labour in Cross Birth.

A living foetus at full term presenting transversely cannot be spontaneously born.

Spontaneous birth by *spontaneous evolution*, or by the

evolution with doubled body, can only take place with immature children or dead children carried to term.

Spontaneous evolution consists in the expulsion of the breech past the shoulder through the pelvis; delivery with the doubled body consists in the birth of the shoulder and then the simultaneous birth of the head and belly.

In the latter condition the mother is to a great extent relieved of her liability to rupture of the uterus, which is inseparable as a rule from every cross birth, if she have not previously succumbed to sepsis.

It is only in abortions that the accoucheur may calmly await the termination of cross birth by one of the methods just described, and in these cases he may hasten it by tugging now and then upon the parts.

“Spontaneous version” is, strictly speaking, not to be counted in the mechanism of labour of cross presentations. It consists in the formation of a long axis (either vertex or breech) birth out of a cross birth. It can only be counted upon so long as the membranes remain unruptured.

Diagnosis of Cross Births.

Externally one feels both to the right and left large members of the body, the pelvic inlet is empty, the heart sounds are audible in the umbilical region. On internal examination the shoulder is felt and is recognised by the triangular scapula and the long thin clavicle. From the relationship of these two bones to the anterior pelvic wall the accoucheur learns whether the belly or back is to the front. The pit of the axilla gives the direction of the head.

Before one expresses a distinct diagnosis both the clavicle and the scapula should have been felt.

A full diagnosis would be as follows:—

Cross birth, head to left, back to the front (1st cross birth, 1st variety), or head to right, belly to the front (2nd cross birth, 2nd variety).

In cross births the lower arm often prolapses; but the prolapse of an arm is no certain evidence of a cross birth since it also happens in vertex presentations.

For the differential diagnosis the arm must be followed upwards.

Either the shoulder or the head is then met. If one is doubtful whether one has to do with a cross birth or a breech presentation, the presenting extremity should be drawn down.

The Obstetrical Examination and the Management of Normal Labour in the first and second Vertex Positions.

By examining a woman in her confinement per vaginum with an unclean finger or instrument one can infect any recent wounds present on the os uteri and cause the death of the patient, whereas the patient would have remained assured of her life had the internal examination not taken place. It is therefore necessary to make the motto *nil nocere* the first and chief law in obstetrics.

This can only be fulfilled by the most painstaking antiseptics and cleanliness.

The physician or accoucheur must take with him the following reagents to each confinement:—As antiseptics, a large amount of pure carbolic acid (200 grs.) (7 oz.), tabloids of corrosive sublimate containing 15 grs. each, and a 5 per cent. carbolic vaseline or boroglycerin lanolin mixture.

The use of a 1 per cent. solution of lysol for the disinfection of the hands, instruments, and the patient in labour is more practical, cheaper, and more convenient. Lysol affects the hands less and makes them slippery, so that all further lubrication of them is superfluous.

In addition one requires a nail brush, a siphon tube with a glass tube as used by Zweifel, a case containing 30 grammes of salicylic wool and of 10-20 per cent. iodoform gauze,* a male silver catheter, and a tracheal catheter, a thermometer, and a stethoscope.

The practitioner carries these in a linen bag which can be thoroughly boiled. The consultant usually brings his bag in which these, with other instruments, should have a place (see *Obstetric Instrumentarium*). Nothing is more distressing than to find oneself at the labour with some indispensable instrument not at hand.

The accoucheur should never use the midwife's apparatus; he should certainly replace the irrigator, when not quite new, by a 2 litre (3.6 pints) jar into which Zweifel's siphon tube is inserted. The physician must be able to guarantee the innocent condition of his own apparatus; he cannot guarantee that of the midwife. In addition one should not use the antiseptic solutions of midwives, since they have to pay for these themselves even in pauper practice. It may be here mentioned that

* The dressings required for a confinement were formerly prepared for every kind of tamponade and then sterilised before use, but the author now has them prepared in soldered cases. They can be obtained directly or through any chemist. When not used for tamponading the materials can be used as plugs and diapers in the labour and confinement. Case No. 1 is used for tamponading the uterus; Case No. 2 for the vagina. The author takes both cases with him, but only as a reserve, as he recommends for general labours Cases 1 and 3. Case 3 contains salicylic wool plugs for the midwife to use for vaginal tamponade, or to form pledgets or diapers.

the Prussian midwives are only allowed to use a 3 per cent. solution of carbolic acid.

The first thing the physician should do is to use the thermometer.*

The commonest and most serious disorders of labour—true septic infection, decomposition of the uterine contents, threatening rupture of the uterus—all show themselves first by elevation of the temperature.

The taking of the temperature is of special importance in cases where labour has become tedious after rupture of the membranes, where perhaps already attempts at delivery have taken place, and in abortions. Should the patient die of puerperal fever the blame cannot fall upon the physician if the patient was already feverish before he made his first examination.

It is not possible in these days to quietly throw the blame on the midwife for a fatal septic case if she has been trained in one of the strongly antiseptic schools.

Well-trained midwives disinfect themselves more strictly than many a practitioner, and on this account they will not allow themselves to be burdened with the discredit of an unfortunate case without protesting.

The pulse is better counted a little later, when the patient's excitement at the doctor's arrival has subsided.

If one does not learn the following points on the way to the confinement, one inquires respecting the age of the patient, the duration of labour, the time of rupture of the membranes, the condition of the pains, the last men-

* If the patient is in full labour the bedclothes should be turned back to see whether the presenting part may not be visible. If so the accoucheur must at once disinfect himself so as to undertake the support of the perinæum. When there is no time Leopold's suggestion may be adopted of wrapping the hands in two towels dipped in antiseptic solution.

stration, the number of labours and their results, and whether skilled assistance was necessary.

If the labour is going on badly, inquire about rickets, and measure the pelvis. Of the hereditary diseases and affections phthisis only need be noted, since it prohibits suckling.

Special lung and heart diseases produce dyspnœa of such a nature that the attention is at once drawn to the organs concerned.

In Bright's disease œdema may be present. The question of syphilis or gonorrhœa is only to be raised as a consequence of some local discovery.

Since, as a rule, the wife has been infected by her own husband, and generally has no suspicion of anything, the practitioner should be very guarded in his procedure lest he destroy domestic happiness.

The *external examination* should, before everything else, be directed to the position of the child and the frequency of its heart beats. Both of these points can only be ascertained between the pains, and if the patient is restless a few drops of chloroform are necessary. During the pains, however, the contraction ring becomes more clearly felt. Great distension of the bladder, which shows itself above the symphysis as a rounded tense swelling, should not be overlooked, and since it may seriously impede the progress of labour, it should be at once relieved if necessary with the catheter. Spontaneous emptying often does not take place because the foetal head strongly compresses the urethra against the symphysis. On commencing the external examination the physician orders the midwife to get ready two or three bowls and a 1-2 litre mug filled with warm water, a clean apron, clean towels, clean undersheets, a basin and a clean pail, and washes and brushes his hands with soap and warm water only.

Disinfection of the Accoucheur.

After the external examination has been finished the accoucheur takes off his coat and puts on a clean apron, or still better an operation cloak. He rolls his sleeves up above his elbows, takes off all rings, cleans his shortened *nails* from all visible dirt and then brushes his nails, hands (each finger separately), and arms for five minutes with soap and warm water. The subungual spaces are again scraped out with a nail cleaner. The soap lather is washed off the hands and brush in fresh water (soap and sublimate combine, and the antiseptic power of the sublimate is destroyed) and the nails, hands, and arms are brushed in a warm 0.1 per cent. solution of sublimate or 3 per cent. solution of carbolic acid for two minutes. If there is about a pint of methylated spirit at hand the disinfection can be made in three minutes according to Fürbringer's method. The hands are brushed for one minute each in soap and warm water, in spirit, and in 0.2 per cent. solution of sublimate, or 3 per cent. solution of carbolic acid. With lysol also three minutes' brushing in a 1 per cent. solution will suffice without previous washing with soap and warm water. Ahlfeld after the mechanical cleaning uses nothing but a 96 per cent. solution of alcohol for five minutes.

Disinfection of Instruments.

The catheter and glass tube (if the delivery is known to be operative then the necessary instruments are included) are tied in a towel and boiled for five to fifteen minutes in a pan with a closable lid (washing kettle) and then laid into a basin with 3 per cent. carbolic or 1 per cent. lysol solution. With a measure glass of 30 grammes

(ounce) one can measure off the necessary quantities to form a litre of the solutions named. The carbolic lotion must be stirred carefully until no droplets of the acid are visible.

The siphon tube is kept until used in the sublimate or lysol solution.

If the instruments have been used at a case where there is a suspicion of infection, they are washed with warm water, brush, and soap, and boiled at once. When this cannot be done they should not be put back into the case, but should be placed in paper by themselves and boiled separately. If one has a dry steriliser the disinfection of the instruments is much simplified by sterilising the suspected instruments by dry heat in an aluminium, nickle, or asbestos case.

Disinfection of the Patient.

As a matter of principle the physician should disinfect the external genitalia of every woman in labour.

This is only really possible when the patient lies across the bed. This position is most quickly obtained by passing one's forearms under the knees of the patient and drawing her buttocks to the edge of the bed, her feet are placed on a stool, while her upper body with a pillow underneath the head is so pulled round that she now lies across the bed and not obliquely. The accoucheur, having previously brushed his own hands again in the disinfecting solution, sits down between the patient's thighs, which are supported upon two stools, and he soaps the outer genitalia with his left hand, at the same time douching these parts with 3 per cent. carbolic lotion from his right hand. When lysol is used this soaping is not done, since lysol contains soap.

The fluid runs down the clean draw sheet into a pail placed near the bed.

The passage of the catheter, which may be necessary, is now carried out in the proper way.

The disinfection of the external genitals is to be accompanied by *irrigating the vagina* so that any infection introduced by an examination or previously present may be rendered sufficiently innocuous.* For this purpose the accoucheur once more brushes his hands with the disinfecting solution, passes the index and middle fingers of his left hand into the vagina, and directs with these fingers the tube, which is held in the right hand, into all the folds of the vagina, and, if the os uteri be opened, into that as well. Both fingers are used to rub the vaginal walls gently so as to remove the secretion adhering to them. For this douching a litre (1·8 pints) of 3 per cent. carbolic, or 1 per cent. lysol solution, suffices. Steffeck says that in this way the vagina is rendered absolutely germ-free.

Once more the hands are brushed, and then the accoucheur makes an internal examination with the patient still across the bed; this facilitates the examination very much.

It is especially with regard to the position of the foetal head in the pelvis that one obtains, by this position, quite different ideas to those obtained with the patient lying lengthwise.

* It is Ahlfeld's merit to have placed the question of autoinfection upon a firm scientific basis, for it cannot, after his exact investigations, again be doubted that puerperal fever does occur in cases where there has been no previous examination. These fevers are chiefly of a secondary importance, but odd cases of severity and even of fatal issue do occur. Ahlfeld's researches have found further support in the work of Walthard. (See Puerperal Fever.)

Before the examination the disinfected hand should touch nothing but the genitalia without being reinfected. Neither should the hands be allowed to touch one's clothes, or a chair, or to grasp the bedclothes.

In the "praxis pauperum" this procedure meets no difficulties, and in the "praxis elegans" it is at any rate to be carried out *whenever chloroform is given*. Chloroform facilitates the examination very much. Under anæsthesia the tight perinæum of primiparæ can be pushed up, and the finger then can reach higher. Many an unfortunate forceps case would have been avoided if an internal *examination under anæsthesia, with the patient across the bed, had been undertaken previous to operation*. If, on account of circumstances, one has to do without anæsthesia and the cross-bed position of the patient, it is in any case possible to satisfy oneself by simple rinsing of the outer genitals and douching of the vagina (with 3 per cent. carbolic or 1 per cent. lysol solution), while the patient, who, before or in the beginning of labour, has had a rectal injection and a warm bath, lies lengthwise in the bed.

A bed pan is pushed under the patient during the douching.

By *simple vaginal examination* one finds at once whether the vaginal inlet and the vagina itself are wide or narrow. The vagina may be narrowed by a soft, or often lumpy, hard protrusion of the posterior wall, which is usually due to marked distension of the rectum.

In this case the rectum must be emptied by an injection, or else the head coming down will drive the fæces out upon the bed clothes, the perinæum, and the supporting hand.

Next, one estimates the size of the os uteri.

This is spoken of as :—

5	}	Pfennig	}	piece	}	size.	Threepenny bit	}	size.
10							Sixpenny piece		
20							Shilling „		
1	}	Mark	}	Palm of hand, completely dilated.	}	size.	Half-crown „	}	size.
3							Crown „		
5							Palm of hand, fully dilated.		

In multiparæ, in whom the external os keeps its transverse form at the beginning of labour, we gauge the size of the os by the number of fingers which can be passed through it.

Still more exact is the measurement of the os uteri if the breadth of the cervical margin is given in finger-breadths.

The thickness of this rim is estimated, that is, one feels whether the cervical canal is still retained above the insertion of the vagina. (Fig. 20.) In this way striking softness (in placenta previa) or rigidity, or a cancerous degeneration of the cervical wall, cannot escape the examiner.

The midwife's statement, or that of the patient, that waters have come away, is no proof *that the membranes have ruptured.*

It may have been a discharge of maternal urine, or of the so-called false waters which collect between the chorion and the amnion. Or the membranes may have already ruptured, but in a higher place, and they may appear intact in front of the head.

If there is no fluid in front of the head the membranes lie close to the scalp. This can be diagnosed from their smoothness, and from the fact that one cannot feel the foetal hair.

A further point is as to the *entrance* and *position* of the

head in the pelvis. If the head stands above the pelvic inlet the accoucheur can reach the sacral promontory with extended fingers, and measure the diagonal conjugate, but if the head has its greatest circumference in the inlet the promontory can only be reached by bending the fingers, and the diagonal conjugate cannot now be measured; if the greatest circumference is in the pelvic cavity the presenting part lies in the spinal line which joins the spines of the ischia. If the spina ischii are not reachable, or only with difficulty, the head is lying within the pelvis, and it is in the outlet when the finger can only be pushed a small distance upwards between the head and the posterior vaginal wall.

If the head remains above the pelvic inlet, in spite of strong pains and long duration of the labour, the possibility, first of *contracted pelvis* and then of *abnormal size* of the child's head (hydrocephalus) or of an abnormal position must be thought of.

Of abnormal head positions only anterior and posterior parietal positions need be considered. They are also called anterior and posterior ear positions. In the first the sagittal suture is right at the promontory of the sacrum, in the second over or at the symphysis.

The anterior parietal position with descent of the large fontanelle is very suggestive of a flat pelvis.

In order to diagnose the latter one must examine the pelvis; in a flat pelvis one can reach the sacral promontory easily with the finger, whereas in a normal pelvis one can only just do so with two fingers. In a *generally contracted pelvis* the sacral promontory can be reached with one finger, and the lateral walls of the pelvis are easily made out all round with the finger.

For the treatment and prognosis of a labour one should, however, make sufficient *pelvic measurements*.

The diagonal conjugate (13) should first be measured, then the interspinal diameter (25), the intercrestal (28), and the external conjugate (20). The figures are in centimetres, and represent the normal distances. If the head remains for an abnormal length of time at the outlet in spite of strong pains this is usually due to *resistance from the soft parts* and more rarely to a low transverse position (the sagittal suture lying in the transverse pelvic diameter), more seldom still it may be due to a pelvic outlet contracted transversely and even antero-posteriorly, or to a *kyphotic* or a *funnel-shaped pelvis*.

The diagnosis of the latter is at first only made by exclusion. If the pains are strong, the soft parts of the pelvic floor not abnormally rigid, and if a low lying transverse position is not present, then the obstacle must lie in the pelvis. The transverse diameter at the outlet must be measured. If these measurements are made by Breisky's or by Schröder's methods, fairly accurate results will be obtained.

By the first method one presses the points of the pelvimeter (which are directed outwards) directly against the inner surface of the tubera ischii. To the measurement thus obtained one must add $\frac{1}{2}$ to $1\frac{1}{2}$ centimetres.

Schröder projects the inner surfaces of the tubera ischii upon the external skin, and marks the spots by means of a blue pencil, or failing this with the nails of his thumbs, and measures the distance between them.

If the head is in a good position in the pelvis, *i.e.*, the sagittal suture lies midway between the symphysis and the promontory, and the lesser fontanelle is lower, and if the mother and child are well, the accoucheur may wait quietly, but should keep watching the course of labour carefully so as to diagnose any complications at an early stage.

One should make out and note the influence of the pains, how often they come on, whether the individual pains are strong and evoke a corresponding sensation, and whether and when the abdominal pressure comes into action.

From time to time, after careful disinfection of the hands and the vaginal douching of the patient, the internal examination is repeated in order to find out whether the os uteri is more dilated, the head lower, and the small fontanelle turned more to the front.

After rupture of the membranes an internal examination should be made in every case, so as to decide once for all the position of the head. This is often hazardous before rupture of the membranes, because of the danger of causing rupture, and difficult after the rupture, on account of the caput succedaneum. The examination also enables one to feel *whether the cord or arm has prolapsed by the side of the head.*

For a normal labour two vaginal examinations are sufficient, and if the surgeon arrives after the membranes have ruptured one is enough.

The entire abandonment of internal examinations in cases apparently normal is not considered advisable by the author, nor is it practicable.

The nurse, however, should be restricted in her examinations, and in this direction the author considers the work of J. Veit and Leopold worthy of every commendation.

If the patient is anxious and nervous, reassure her. For thirst give water, milk, or in very protracted cases wine. Most women prefer to be in bed from the onset of labour.

If the pains are weak, the patient, even after rupture of the membranes, may get up and walk about, pro-

vided that the head has already become engaged in the pelvis.

The pains now become gradually stronger. Voluntary pressure may only be permitted when the head lies deep in the vagina and the os uteri is fully dilated, that is, at the end of the expulsive stage.

It is comforting to many patients if they can then place their feet against a footstool in the bed and get a firm hold of something with the hands.

At this time a great desire for defæcation comes on. If the rectum has been previously emptied this desire of the patient should not be gratified.

Preservation of the Perinæum.

If the perinæum is rather severely stretched during delivery of the head, the patient should be laid on her side at the edge of the bed, all grasping of towels, etc., and auxiliary pressure should be prohibited, and the patient should be made to breathe in and out rapidly. The hand, carried from the abdomen, between the patient's thighs, is placed on the advancing portion of the child's head, and is used to repress the head during the pains, should the perinæum be too much elongated and stretched at these times.

The index finger and thumb of the other hand should at the same time be placed near the posterior commissure of the labia, and, by dragging in the side tissues of the perinæum concentrically, attempts should be made to relax the commissure.

Pressure with the hollow hand upon the perinæum should be avoided because it often directly causes rupture of the perinæum. If the head is born up to the great fontanelle then the perinæum should be slipped back

during the interval, or the patient told to express the head in the absence of a pain, or finally the "Ritgen" manipulation may be used. This is very convenient, and was introduced into practice by Olshausen; it consists in expressing the forehead and then the face by means of two fingers placed in the rectum.

This procedure has only one disadvantage, namely, that after its use thorough disinfection is necessary.

It is often possible to express the brow from the postanal region (Ritgen, Fehling). If the perinæum becomes whitish it is in danger of laceration. In order to prevent this accident the perinæum is incised as follows:—

While the midwife keeps back the head, the practitioner, under guidance of the index and middle fingers of the left hand, makes an incision 1-3 centimetres (0.4-1.2 inches) long, in the lateral portion of the commissure in a direction which tends slightly inwards from the tuber ischii.

The incision divides first the skin, the sharp edge of the fascia now appears in the wound and is cut into with a second snip of the scissors. The perinæum is now drawn cautiously backwards during an interval. If this is difficult it is better that the incision be deepened rather than a second incision should be made (Credé, Fehling, Author). One may finally cut into the constrictor cunni. By equable retraction of both wound margins a rhombic wound surface ensues (Fig. 29). The wound must always be united again, as otherwise a lengthening of the vulva by about double the original length of the incision (5 centimetres) takes place.

A single stitch carried from *c* to *b* is often sufficient (Fig. 26).

After the head is born the accoucheur feels whether the

cord is coiled round the neck. If it is then it should be freed and slipped back over the head and shoulders.

The child's eyes are now cleaned carefully with a strip of linen, dipped in boiled water. The trunk is expressed by strong pressure upon the fundus of the uterus, directed downwards. If the delivery lingers in spite of this the child is carefully extracted by passing an index finger into that axilla which is easier to reach (this is more commonly the posterior one, p. 35), and by grasping the head with the palms of both hands. If the posterior shoulder is already born the anterior one is delivered by carrying the head back or placing the forefinger in the axilla. When the anterior shoulder has been delivered the posterior is guided out by raising the head.

If the child is not asphyxiated, but both cries and breathes strongly, the accoucheur delays the tying of the cord until it is only just pulsating feebly.

The child lies with its face upward across the genitalia of the mother. The midwife should tie off the cord with linen thread. The cord should be tied with only a slip-knot at first. Between the ligature and the navel sufficient space must be left to allow of a second ligature in case of secondary hæmorrhage, that is about four centimetres of cord are left.

Another ligature is placed on the placental side, firstly for cleanliness, secondly because the placenta when engorged with blood becomes detached more easily, and thirdly because the second twin of uni-oval twins might bleed to death through the umbilical cord of the first one if it were left untied. The cord is then cut with scissors between the two ligatures. After the bath the slip-knot is loosed, and the knot tightened and tied firmly. The bath is 35° C. (95 F°.). The midwife should inspect the child carefully for any malformations.

Management of the Period of the After-Birth.

In Germany *the placenta is always delivered* by Credé's manipulation. It is only as to the time of applying this method that differences exist. It is best during cessation of uterine action to wait for the spontaneous separation of the placenta and membranes. This is caused by the after-birth pains within half an hour of birth, and shows itself by the advance of the cord (Ahlfeld) and by the firm continuous contraction and retraction of the uterus, which frequently rises above the umbilicus after the expulsion of the placenta into the canal of delivery (Schröder, F. Cohn).

While it is owing to Credé that the old method of removing the placenta by pulling on the cord has been superseded by manipulation, it is due to Dohrn and Ahlfeld that Credé's method has been modified by omitting the rubbing of the uterus, to hasten the separation of the placenta, and by delaying the use of expression until a somewhat later stage.

By causing the mother to bear down at each after-pain the placenta will generally be spontaneously completely delivered within two hours, and expression be rendered quite superfluous.

Expression by Credé's manipulation should only be performed from half an hour to one hour after birth during a pain, and with the bladder empty. The fundus is grasped with the whole hand (four fingers behind and the thumb in front), and pressed downwards and backwards to the hollow of the sacrum. The other hand seizes the placenta which is visible in the vulva, and turns it round several times in order to twist the membranes into a rope and thus avoid tearing them. If expression does not succeed

at once the next pain is awaited, and both hands are used externally.

(A midwife should in this case prevent a too precipitate delivery of the placenta, as otherwise the membranes may easily be torn away).

The after-birth must then be examined to see if it is whole. This examination is carried out as given below.

The membranes are turned back and the placenta is placed with the foetal side on the palms of the hands.

The cotyledons of the placenta should now lie in close apposition.

If, however, there are real defects on the uterine face beyond the furrows limiting the cotyledons, or at the margin of the placenta, or if the grey white coating of decidua serotina is wanting, or the red placental villous tissue is exposed, then a piece of placenta has been left in the uterus. This suspicion is strengthened if the uterus is badly contracted and bleeding is going on.

Finally the margin of the placenta is examined, and if it shows vessels which have been torn through this proves the retention of a secondary placenta, the so-called placenta succenturiata.

These placental remnants should be removed by the hand at once, as if left they cause severe hæmorrhage or decompose, producing sapræmic fever (see below).

If the membranes have been torn off they are at once seized with dressing forceps where they project into the vagina, and are slowly extracted by torsion.

Management of Tears of the Clitoris and Perinæum.

After delivery the accoucheur cleans the external genitals with a pledget of salicylic wool dipped in 3 per

cent. carbolic or 1 per cent. lysol solution, and looks for any lacerations.

Lacerations must be stitched; those about the clitoris, because they bleed severely, and perinæal lacerations to avoid a future prolapse of the anterior vaginal wall, or incontinence of fæces.

Lacerations of the perinæum are divided into first, second (incomplete ruptures), and third stage (complete rupture).

In the first degree the anterior half of the perinæum is torn; in the second the whole perinæum is torn as far as the sphincter ani; and in the third the sphincter ani is also torn through.

It is correct practice to close with sutures every tear of from one centimetre (half inch) upwards (Fig. 1).

Until the preparations for this have been made it is often necessary to plug the laceration with a strip of iodoform gauze on account of bleeding (the material for this is contained in Case 2, Fig. 18).

One must not forget that the perinæal laceration is frequently prolonged into one or two vaginal lacerations laterally at the sides of the posterior columna rugarum (Freund, see Figs. 3-6).

These tears must be carefully stitched up at the same time (Fig. 2) by drawing out their apices with volsella.

Suture of a perinæal laceration in the lateral position leaves the vaginal tears ununited. The suturing may be put off for 12-24 hours. Hence it should not be done at night with a bad light, but the wound should be temporarily tamponaded with iodoform gauze.

Anæsthesia is to be strongly recommended for exact suturing. Unless the author has conducted the labour

himself he always douches the vagina and uterus, before suturing, with 1 per cent. lysol solution in order to destroy any infectious germs which may have been carried in, and which would prevent (Fig. 3) union by first intention.

The external genitals are shaved, and the wound is irrigated with a 1 per cent. solution of lysol during the suturing. Whether one uses silk or silk-worm gut (which does not, like silk, act as a seton) it should be sterilised before use by boiling for five minutes.

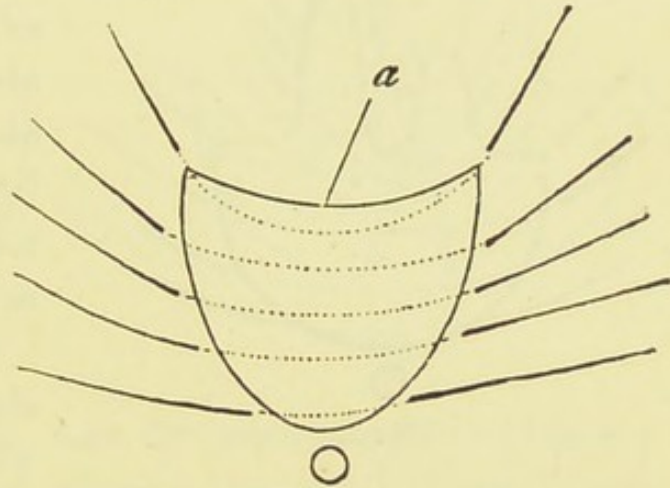


Fig. 1.

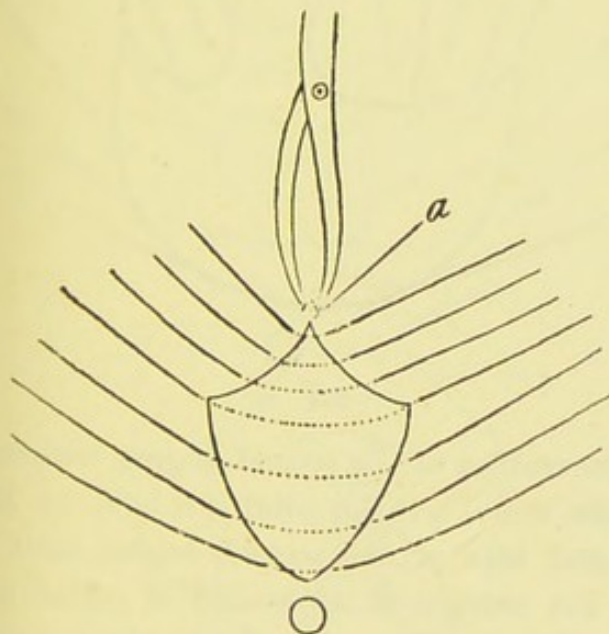


Fig. 2.

By means of buried catgut sutures which are passed from the side of the wound, and which do not include the rectal mucous membrane, a perinæal tear of the third stage is converted into one of the second stage (Fig. 6), which is then closed as shown in Figs. 1-4.

If the operator has experience in the use of the continuous catgut suture he will prefer this (Fig. 7-9).

When the laceration is of the third degree at least two and possibly three rows of suture are necessary.*

The after treatment of all sutured wounds of the external genitals consists in the practice, which Fritsch advised as the most suitable, of applying pads of absorbent wool or of boiled linen soaked in 1 per cent. solution of lysol; these are changed frequently.

When there is a nurse she should cover the parts with iodoform gauze, and

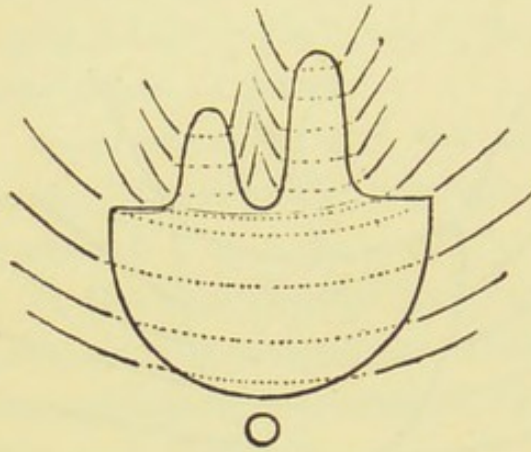


Fig. 3.

wash them with 1 per cent. lysol solution after the passage of water.

On the third or fourth day a soft motion should be obtained. The diet must be chiefly fluid. If the laceration does not heal by primary union secondary suturing is carried out from the eighth day,

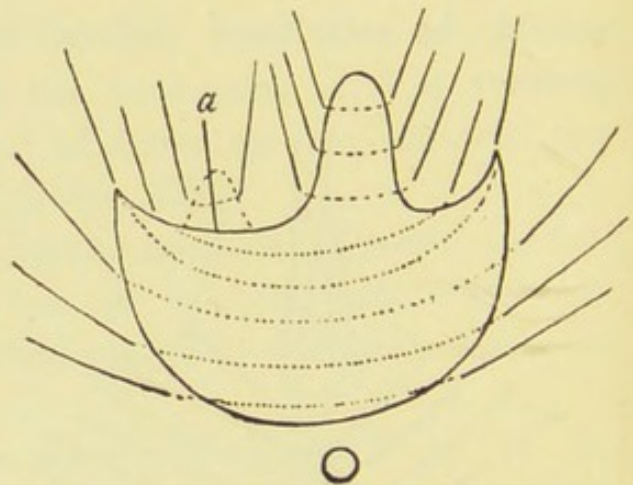


Fig. 4.

* Fig. 1 shows a perineal laceration of the second degree without a vaginal tear; Fig. 2 shows the same, but the point *a* is held up by volsella; Fig. 4 shows a perineal tear of the second degree with a one-sided vaginal tear. At *a* the margin of the wound is pulled up into a fold and fixed with a stitch for the sake of exact suturing. Fig. 5 is a perineal tear of the third degree with double-sided vaginal tears. It shows the method of passing the sutures from the rectum. This method should be chosen in case silk or silkworm gut sutures are used.

after freshening the surface of the wound and scraping off the granulations. [This removal of granulation tissue is superfluous.] The results of these repairs, which

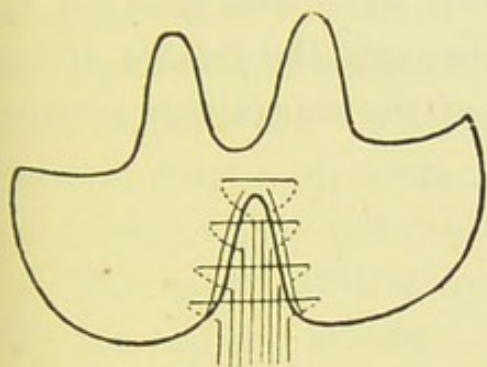


Fig. 5.

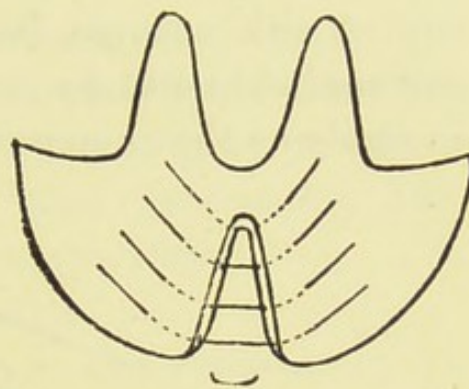


Fig. 6.

when carried out in this way are equivalent to primary plastic operations, must always be good if antiseptic precautions are taken and the proper material for the sutures is selected.*

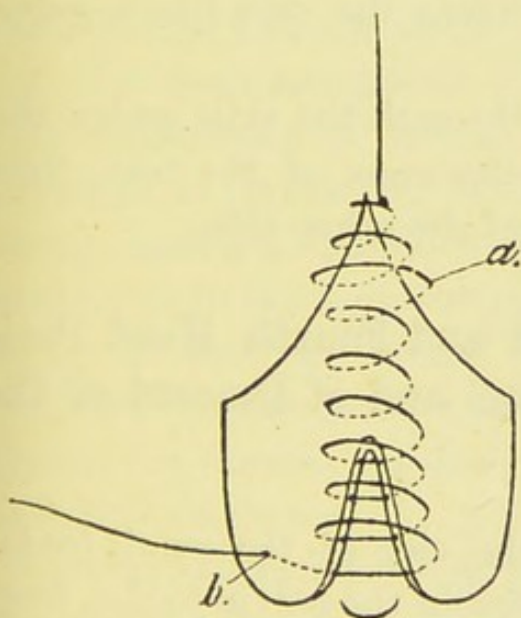


Fig. 7.

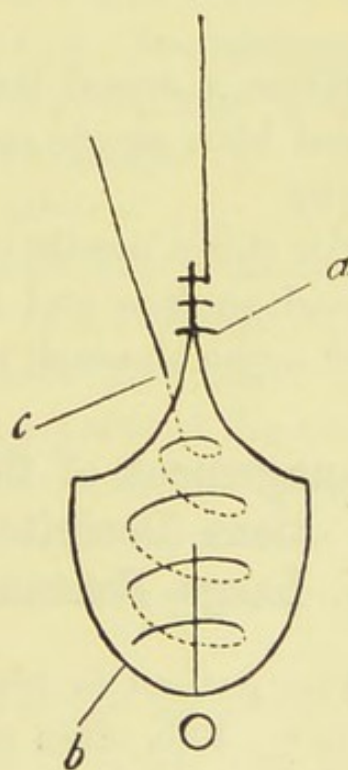


Fig. 8.

* The loop is cut at *d*, the two lower threads tied, and then one end of these is tied with the upper thread.

It is only in lacerations of the third degree that the author recommends the closure of the rectal tear with buried continuous catgut suture in small loops. For tears of the first and second degree he recommends interrupted silk sutures, because they have firm hold on the external skin and do not cut through the friable tissues so easily as the numerous loops of the continuous suture.

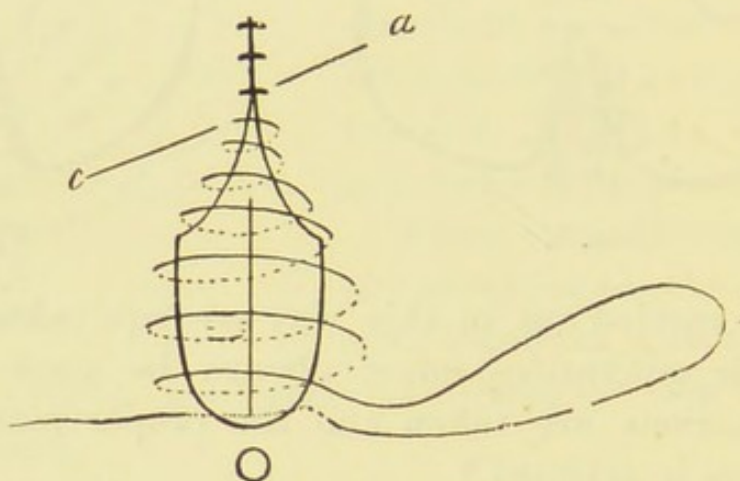


Fig. 9.

When a rectal laceration is not too deep it may be closed by a single suture including the skin like a purse string.

For this a needle is passed through the skin under the wound surface and beneath the apex of the tear, then back again through the skin on the other side.

Management of the Third and Fourth Head Positions (Occipito-Posterior) and of Descent of the Large Fontanelle.

The patient is placed on the side of the small fontanelle.* This often rotates, even in the pelvic outlet, from behind forwards.

* The patient is always laid on that side on which the part lies which we wish to bring down.

If labour tends to terminate while the large fontanelle is to the front, forceps should be so applied that the large fontanelle is brought down in front. All artificial attempts at rotation of the head with forceps so as to bring the small fontanelle to the front are obsolete. If the large fontanelle is placed laterally, but lower than the small fontanelle (this is not called an occipito-posterior position, but a descent of the large fontanelle), the accoucheur must differentiate two conditions:—

1. The head is still above the pelvis.

If the sagittal suture lies close to the promontory he has to deal with a case of flat pelvis; here he should choose version as a prophylactic measure.

If on the other hand he treats the case expectantly, the patient should be placed on the side of the large fontanelle until the contracted pelvic inlet has been passed (the narrower frontal part of the head thus passes the narrowed conjugate diameter). When this has happened he places the patient on the other side to assist the descent and rotation forward of the smaller fontanelle.

2. The head has passed the pelvic inlet.

If termination of labour is indicated the accoucheur attempts to press the head deeper into the pelvis by strong pressure applied with both hands just above the symphysis to the anterior and posterior poles of the head. As a rule this causes the smaller fontanelle to descend and turn to the front. If this does not take place he applies the forceps obliquely, and so that the great fontanelle turns forward.

Careful relaxation of the perinæum is just as necessary in occipito-posterior presentations as in brow and face presentations.

Management of Brow and Face Presentations.

It is only when these cases are complicated by flat pelvis, or prolapse of the umbilical cord or of an arm, that podalic version is undertaken. As a rule the case should be treated expectantly, and attempts made by placing the patient on the side of the small fontanelle to establish a vertex presentation.

If the head nevertheless enters the pelvis in one of these positions the patient should be placed on the side of the chin, so that a brow presentation may become a face presentation, and that in the face presentation the chin may descend and come forwards.

The cases are very rare in which even at the pelvic outlet the chin looks backward or to the side.

If danger threatens the mother when the chin looks back perforation is the only procedure. The use of the forceps here is bad practice.

When the chin is directed to the side an attempt to deliver with the forceps is advisable. This has failed entirely in those cases of the author's in which the heads were very large and extremely dolichocephalic.

Out of 18 cases of this kind which Salomon has collected in only one case after the use of forceps was the child born alive.

These very infrequent cases do not give any support to the practice of turning in face and brow presentations. It should not be forgotten that as a result of version (unless carried out by a very experienced hand) a much greater number of children are lost than by the expectant treatment.

As to the manual turning of these presentations into vertex cases by combined action of the hands, internally

and externally, the author has never seen it succeed in big dolichocephalic skulls, and never found it indicated in any other conditions.

Management of Labour in Pelvic Presentations.

In pelvic presentations the child is suffocated if it is not born within a few minutes of the birth of the umbilicus, because the cord becomes compressed between the pelvis and the child's trunk or head.

This disaster of birth takes place very easily in primiparæ with tight narrow vaginas, in narrow pelves, when the child is large, in complete foot presentation (since the feet and small hips do not dilate the soft parts sufficiently for the quick passage of the head), and, lastly, when the accoucheur has pulled on the parts born before the birth of the navel.

With the exception of those breech cases which are complicated by prolapse of the umbilical cord, and in which the accoucheur has drawn down a foot to make sure of easy extraction of the child, should danger threaten its life, the accoucheur should practise masterly inactivity until the birth of the navel, unless danger threatens mother or child.

If the parts outside are pulled upon at an early period the arms may be driven up and the chin removed from the chest—conditions which render quick delivery of the arms and head more difficult or even impossible.

Note.—These disadvantages must, of course, be reckoned with when there is, before birth of the breech, danger threatening the life of the mother or child and demanding rapid delivery. (See under Extraction by the Foot.) Auscultation must be repeated, and in prolapse of the cord its pulsation must be constantly watched, so

as not to overlook any danger to the child. If the cord runs between the legs of the child—if the foetus “rides” the cord—the end of the loop which runs to the back should be taken and the loop worked over one hip.

The patient should be forbidden to bear down until the breech is born, and then she should, at a given signal, bear down with all her might. The midwife should also be shown (later on there is no time for distinctions) how to press, at a given signal, after the birth of the breech, upon the fundus uteri, grasping it with both hands and pressing strongly downwards. She must leave off as soon as the arms are free, and then place both her hands just above the symphysis upon the head and press this downwards into the pelvis with all her might.

All preparations for restoring suspended animation should be made beforehand, and the water for a bath should be ordered into the room on the engagement of the trunk in the outlet.

The patient is placed across the bed, as in this way alone can proper assistance be rendered; this is done in multiparæ when the breech enters the vagina, and in primiparæ when it is on the point of delivery.

The rest of the child is often born immediately after the birth of the breech if the patient bears down, and the mode of expression just described (Kristeller) is applied. If this does not take place the accoucheur, who has of course disinfected himself thoroughly beforehand, proceeds to free the arms and head.

Freeing of the Arms and the Head.

For this the tense umbilical cord is somewhat freed, then the breech is covered with a warm napkin and grasped with both hands in such a way that the thumbs

lie on the back, the forefingers on the iliac crests, and the other fingers upon the thighs.

If the feet are high up the thumbs are placed on the buttocks as before, and both forefingers are passed into the folds of the groins and the trunk is pulled strongly downwards, with alternate raisings and lowerings until the angle of the scapula appears, when the back should remain directed to one side.

Then the feet are grasped with one hand and placed in that groin of the mother to which the child's belly is directed. The forefinger and middle finger of the other hand are carried from the back of the child over the posterior arm until the elbow joint is reached; the arm of the child is then pressed downwards over the abdominal surface of the child. The trunk is then grasped as high up as possible, so that the thumbs rest on the back and the other fingers lie on the thorax. The child is now rotated, so that the back comes to lie forwards against the symphysis. The other arm is now directed backwards, and is delivered in the same way as the first arm was.

With the fore* and middle fingers of that hand toward which the child's belly was last directed, the accoucheur opens the child's mouth (when the head is high up the mouth is more lateral, when the head is low down the mouth is backwards); he places the fingers on the gums and pulls the chin downwards and then backwards, while with the external hand he grasps the head from outside and forces it into the pelvis (Weigand, Martin, Winckel).

If this mode of expression does not succeed, the accoucheur should, with the fore and middle fingers of the external hand, draw upon the neck of the child (Veit's

* The forefinger may be introduced by itself. The tip of the finger should then reach the root of the tongue.

method), while the midwife carries out the supra-pubic expression.

If this also fails, then the physician himself carries out the expression from above with both hands. By this means alone I have often delivered the head through a flat pelvis after the other methods had failed.

In pelvic contraction the extension of the thighs by Walcher's position gives an increase in the conjugate of about 1 centimetre.

If after all these methods the head remains still undelivered it is well for a few minutes to desist from further attempts.

Under these circumstances when the os is fully dilated and the pelvis is large, we can only have to deal with either an abnormally large head or a case of hydrocephalus. *The aftercoming head must be perforated* under these conditions.

Zweifel remarks with great truth that it is a failure of our art if the previously viable child dies at the hand of the accoucheur, provided that there has been no previous traction, that no contraction of the pelvis is present, that the os uteri is not incompletely dilated, and that the child is not abnormally large.

And yet how often this accident happens! The operation described is altogether, in my opinion, of the most difficult nature, since a whole series of manipulations must be made with the hands one after another.

Diligent practice with the phantom is a necessity for success.

The perinæum in breech cases only requires supervision while the head is passing. Ostermann recommends the nurse to hold the child forward by the feet while the surgeon passes the forefinger of one hand into the mouth and supports the perinæum with the other hand. When

there is trouble in getting the arms the perinæum is often freely torn beforehand. This accident may be avoided by incisions, but as a rule there is not time to make them.

The *prognosis* of breech presentations, in case no forcible attempts are made to save the child, is no worse for the mother than in head presentations. The prognosis as regards the child is, apart from suitable care, much more unfavourable than in head presentations, and when extraction is necessary depends entirely on the skill of the accoucheur.

Not only is the life of the child endangered, but the soundness of its limbs is also threatened by unskilled manipulation.

Injuries, however, to the child easily take place in pelvic presentations ending spontaneously (Küstner, Witzel, Kœttnitz), such as laceration and hæmatoma of the sterno-cleido-mastoid muscle, which may lead to shortening of the muscle and to traumatic, myogenic torticollis, unless the neck is at once fixed with a cravat splint.

Küstner explains this injury (which, moreover, may occur after spontaneous head deliveries) by the severe torsion of the neck which takes place in pelvic presentations as soon as the shoulders pass out of the conjugate diameter, when the head at the same moment turns into this diameter.

Kœttnitz gives the practical advice that the accoucheur should mention to the friends beforehand in every pelvic case the possibility of the occurrence of this laceration of the muscle.

The laceration is of course caused more frequently by forced rotation of the shoulders when the head is already fixed in the conjugate diameter, but one can never

conclude that the birth has been artificially ended because this hæmatoma happens to be present; medical jurists have often made this mistake.

Management of Cross Births.

In these cases podalic version should be carried out at once after rupture of the membranes, after which the first danger of stretching of the cervix comes on. If version is no longer possible, or too dangerous for the mother, destruction of the fœtus [embryotomy] should be at once performed (see Version).

One can only use expectant treatment when dealing with miscarriages. If delivery is long retarded in these cases the progress of auto-evolution or delivery "con-duplicato corpore" may be hastened by pulling on the arm.

Multiple Labour.

In multiple pregnancy premature labour is very common, and in the labour itself there is primary feebleness of the pains. After the birth of the first child there is a cessation of pains for at least half an hour.* If the pains come on again the second child is born quickly, unless, as frequently happens, it lies transversely. Moreover, the second child is often in danger, since, on account of the great lessening of the uterus, its placenta becomes partially separated.

If bleeding, therefore, takes place after the birth of the first child, the heart sounds of the second child should be carefully watched. If the bleeding is severe, or the heart-beats fail, delivery must be undertaken at once.

* These pauses may last for even days and weeks. In a case of Fordyce Barker where the birth of the second twin took place 74 days after the first, there was a uterus bicornis unicollis.

Eclampsia and atony of the uterus often come on after twin labour.

The diagnosis of twin pregnancy is made by feeling members of a child to be present which cannot possibly belong to one child, for instance, three large extremities of the same kind (see p. 26).

When the first child is born a grasp of the uterus decides whether a second foetus is present or not.

If the twins are from the same egg, and the cord of the first child is tied in one place only, then the second child may bleed to death through the placenta and cord of the first one.

The prognosis of multiple pregnancy on these grounds is worse for both mother and child than that of single pregnancy. Artificial aid is frequently necessary, and midwives are therefore ordered to send for the surgeon in case of twins.

PHYSIOLOGY OF THE LYING-IN.

State of the Mother.

THE lying-in consists of two chief processes:—

1. The involution of the genitalia.
2. The formation of milk.

1. The involution of the genital organs is completed in from four to six weeks. Menstruation and possibility of conception come on again at this time in patients who do not suckle.

The process of involution is mainly seen in a continuous decrease of the size of the uterus and in the modification of the lochia. When the bladder is empty the uterus on the first day reaches up to the navel; by the tenth day it has disappeared behind the symphysis; at the fifth day it is about half-way between these two points. The internal os is generally passable to the finger until the tenth day, and the rough placental site is to be felt. Marked autoflexion of the uterus is very striking during this period. The uterus diminishes partly through contractions—after-pains; these are only painful in multiparæ—and partly through fatty degeneration and absorption of the muscle protoplasm (Sänger).

The lochia are the product of the wounded endometrium. For the first three days they are chiefly blood (lochia cruenta seu rubra), from the fourth to the tenth, blood and pus or leucocytes, mucous bodies, decidual cells, squamous epithelium and micro-organisms (lochia

sanguinolenta vel serosa—with the look of flesh washings), the blood now gradually disappears* (lochia alba), the lochial discharge ceases altogether four to six weeks after labour.

Normal lochia smell musty, but they do not stink. In primiparæ the involution is often slow, so that the uterus can be felt above the symphysis, and the lochia continue bloody for a longer time.

The new endometrium is formed from the ends of the glands lying between the muscles and from the surrounding connective tissue. The gland crypts retain their epithelium.

2. The true secretion of milk comes on about the third or fourth day, the breasts swelling strongly, becoming painful and excreting good milk freely. This milk is distinguished morphologically from colostrum by the disintegration of the gland cells into the finest fat particles, chemically by the predominance of casein over albumin. It is more and more doubted whether the onset of milk, which is a physiological function, can excite a feverish rising of the temperature which disappears again after 24 hours, so-called milk fever, *and hence all elevations of the temperature over 38° C. (100·4° F.) should be looked upon as signs of disease.*

The secretion of milk takes place quite independently of the application of the child to the breast, but is only maintained by suckling, which causes a flow of milk each time (reflex secretion stimulus). Spontaneous milkflow, apart from suckling, is responsible for the loss of 15 per cent. of the milk in some cases.

* In most cases there is a fresh onset of slight bleeding on the patient's first getting up from tearing open of small wounds, and then fever may arise from infection of, or absorption by, these recent wounds.

Specially Striking Symptoms in the Puerperal Period.

1. Slowing of the pulse (50-70 beats).

Olshausen says this is due to the increased amount of fat in the blood as a result of fat absorption from the uterus. Traube and Riegel say it is due to the sudden removal of a long-continued irritation.

2. A rigor and perspiration immediately after the labour. (These cannot be produced artificially.)

3. Inaction of the bladder and bowels.

The inaction of the bowels is explained by defective abdominal pressure.

Retention of urine depends upon swelling of the neck of the bladder or bruising of the urethra. The patient also often retains her urine because the latter excites a burning pain in small fissures in the vestibule. Many patients cannot pass water when lying down. If the patient be practised in passing her water while lying down before the labour, or if the vulva be douched with boiled water while the attempt at micturition is made, cases of retention of urine will become much rarer.

Generally the patient does not notice retention of urine for 12 to 24 hours, because the bladder (otherwise than in pregnancy) can now freely expand and can hold much more urine before any pressure is felt.

Note.—Temporary dribbling of urine in the first few days depends upon paralysis of the sphincter vesicæ as a result of severe crushing; from the fifth day onwards it points to a vesicovaginal fistula.

4. The presence of peptone and sugar in the urine (absorbed from the uterus and the mammary glands).

The author knows a case where a general practitioner

declared a wet nurse to be diabetic and unfit for suckling on account of the above condition.

5. The physiological lactation atrophy of the uterus, a diminution of the uterus to 5-6 c.m. (2 to 2.3"), which comes on after prolonged suckling, and which gradually disappears after weaning the child.

The Progress of the New-born Child.

The caput succedaneum disappears quickly, whereas cephalhæmatomata only come on after birth. These consist of hæmorrhage beneath the periosteum, therefore they cannot pass the suture lines. No treatment is required as the blood is reabsorbed. The child should pass water and meconium within the first 24 hours. When this does not take place, there may be atresia of the urethra or the bowel.

Meconium gives the stools a brownish tinge during the first few days, but when this has all been passed, the stools are yellow, pappy like buttered eggs, and are passed three to four times in the 24 hours.

Since the child starves in the first few days it loses weight (200 grammes), but by the tenth day it ought to regain its weight at birth.

In 80 per cent. of children jaundice supervenes about the second or third day (icterus neonatorum).

Severe icterus indicates bad conditions of nutrition (Runge). Very intense icterus neonatorum is a symptom of various diseases, as of septicæmia, syphilis, etc. Icterus neonatorum is hepatogenic in origin. This is proved by the presence of bile acids in the pericardial fluids of icteric children.

The remnant of the navel usually falls off about the fifth day, and the navel scar is healed on the twelfth day.

The navel may be the seat of origin of fatal septicæmia. The midwife should therefore be ordered in nursing to tend the child and then the mother afterwards. An inflammation of the breasts in the new born only arises from the physiological milk secretion when there is some injury also.

REGIMEN OF THE LYING-IN.

Nursing of the Mother.

THE patient may keep her bed with perfect mental and bodily rest as long as the uterus can be felt from outside (9-14 days). Earlier rising from bed predisposes to prolapse of the uterus.

Lying on the side is forbidden during the first few days to prevent the possibility of air entering the uterus. The patient should only sit up in the second week. Local treatment, after emptying the bladder, is limited to sponging down the external genitals with $\frac{1}{2}$ -1 per cent. solution of lysol, or 1 in 5,000 of sublimate, at least twice a day. A pad of salicylic wool or iodoform gauze is laid on the genitalia and renewed frequently. (The material is in cases 1-3.)

The draw-sheets must be changed at least twice a day. The use of sterilised and antiseptic dressings (which, owing to their preparation and preservation in cases, prevent all infection if a little care be taken) is of great value in the lying-in, in order to avoid the decomposition of the lochia and the inflammatory disorders arising therefrom. Simple aseptic materials cannot be applied to this region full of germs, and if used for tamponading the uterus, may cause grave trouble.

A stomach binder or a towel applied not too tightly is very agreeable to most lying-in women, and it leads to good involution of the belly walls. English women ascribe the preservation of their good figures to the general practice of using binders after labour.

The catheter must be used twice daily if the water cannot be passed. For this the hands should be disinfected and the genitals washed. The mouth of the urethra should then be wiped with a pledget of salicylic wool dipped in 1 per cent. lysol or 3 per cent. carbolic solution. The new silver or glass catheter must be boiled before use. When the physician is not certain whether the nurse carries out these regulations he should pass the catheter himself. Cystitis during the lying-in may become so severe as to cause death.

If no action of the bowels has taken place by the third day a tablespoonful of castor oil is given.

The food should be easily digestible but nourishing, especially when the mother is suckling the child. No puerperal fever arises from diet as was thought formerly. Every sound mother, who does not come from phthisical parents, should endeavour to suckle her child.

The child should be put to the breast 12 to 24 hours after birth. This assists the secretion of milk. The colostrum owing to its large proportion of saline matter has a slightly laxative effect, and aids the expulsion of the meconium. The mother should be supported upon her side for suckling, and with the first and middle fingers of the free hand she presses the nipple forward and the breast back so that the child may get good hold of the nipple and breathe easily (through the nose) while sucking.

Generally good involution of the uterus is secured by suckling, and indeed by continuing it too long a later over-diminution of the uterus may be induced (physiological atrophy) and conception prevented.

The return of menstruation, which is generally suspended during suckling, is no ground for ceasing lactation, provided that the child continues to progress.

If the mother does not suckle marked and painful en-

largement of the breasts comes on from the fourth to the ninth day. The breasts must then be bandaged up, the patient put on spare diet with very little fluid, and purgatives given. Drawing off the milk is to be forbidden. Inunctions are, to say the least, superfluous.

The temperature and the pulse of the patient are to be taken twice a day. An increase of the pulse alone is indicative of thrombosis (Leopold, Wyder).

To avoid a fatal embolus from thrombosis long continued absolute rest is needed. Unless there be special call for it no vaginal examination is undertaken until the puerperium is over.

Nursing of the Child.

The chief things are suitable feeding and extreme cleanliness. If natural feeding by the mother or a good nurse is not possible, good cow's* milk, diluted with water and sweetened with sugar of milk, should be given for the first year. This milk is best boiled in a Soxhlet's apparatus for five minutes to kill germs (tubercle bacillus). Immediately on birth the child's eyes should be washed with boiled water to prevent gonorrhœal inflammation. The remains of the cord are wrapped in sterilised salicylic wool and fastened with a binder. The child must be bathed every day (Tem. 35° C. = 95° F.).

Before putting the child to the breast the nipple must be dried, and after taking the child away its mouth should

* During the first eight days one part of milk is mixed with three of water, and later with two of water. At six months undiluted milk may be given, after gradually working up to this strength. When white flakes appear in the motion the milk is too concentrated. To 1,000 grammes of prepared food two to three teaspoonfuls of milk sugar are added. Food cooked too long produces Barlow's disease.

be wiped with a damp napkin. The nipple and areola must be washed before and after suckling with boiled water. If the nipple is flattened, or is so completely depressed that the child cannot get hold of it, a nipple shield of glass or rubber should be applied. (Fig. 10 shows Auvard's practical nipple shield; the mother sucks at one mouth-piece and the child at the other.) Trial will decide in any case which apparatus acts best.

By the second week the child should be accustomed to have no nourishment for six hours during the night. In

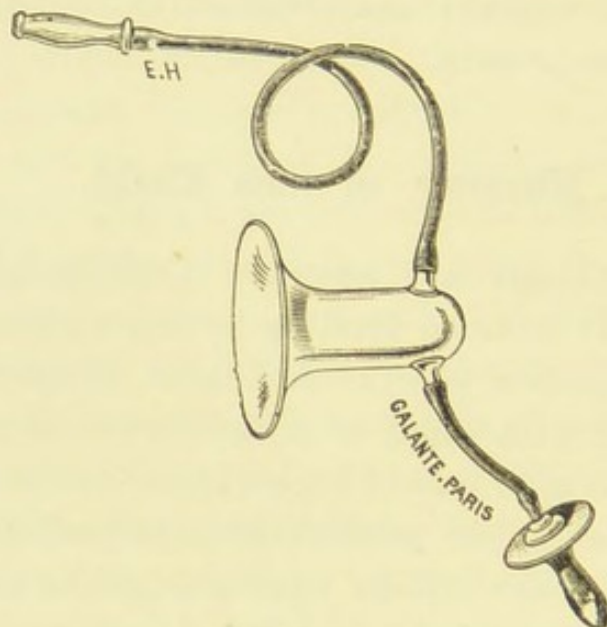


Fig. 10.

the day the breast is given every two hours and afterwards every three hours, thus making only six meals a day. A healthy child is twice as heavy at the end of four months, and three times as heavy at the end of twelve months as at birth. It puts on 25 grammes daily in the first month and only six grammes daily in the twelfth month (Gerhard).

Regular weighing of the child is the best test of its sufficient feeding, and this is specially necessary when a wet nurse is employed.

Of course the child must have its own warmed bed. It is unnecessary to cover the head as likewise to darken the room, whereby formerly it was thought possible to prevent conjunctivitis.

The lying-in room must be well ventilated.

Premature children who are too feeble to suck must be fed with a spoon.

Thorough limitation of the loss of heat is necessary for the good progress of these children. This is attained by Credé's *warmcot* and Tarnier's *conveuse*, which Auvar'd has suitably modified.

THE PATHOLOGY OF PREGNANCY.

The relations between Pregnancy and various diseases.

Febrile disorders in pregnant women lead to the death of the foetus very readily, as Runge has demonstrated, from heat retention, especially when the temperature rises suddenly.

The *acute infectious diseases* can cause abortion by inducing endometritis and also by attacking and killing the foetus directly. In many diseases, such as cardiac failure and pneumonia, labour has a very unfavourable influence upon the circulation (Fritsch, Gusserow).

Artificial labour should therefore not be induced prematurely under these conditions unless it is done very quickly by forced dilatation of the cervix without the help of uterine contractions.

Other diseases, as *chronic nephritis* and *tuberculosis*, can be so aggravated by pregnancy that artificial premature labour is necessary unless (as in nephritis) this takes place spontaneously from separation of the placenta or death of the child (Winter, Fehling). Premature labour is induced for the child's sake in tuberculosis and for the mother's in nephritis. Pregnancy also predisposes to certain diseases.

To these belongs *progressive pernicious anæmia*, which was first described by Gusserow as "anæmia of pregnancy" of the highest degree.

The termination is fatal. But artificial interruption of the pregnancy must be attempted in every case.

The same treatment is demanded in *chorea gravidarum*. The disorders of pregnancy may become pathological owing to their intensity. Such disorders of the circulation are *œdema* and *varicose veins* (treatment: bandaging of limbs); of disorders of the digestive system one specially notes *uncontrollable vomiting* (*hyperemesis gravidarum*), which, according to Ahlfeld and Kaltenbach, often stands upon a hysterical foundation.

Other complications, such as gastric ulcer and nephritis, must be excluded by sufficient examination, and displacement of the uterus must be corrected. In other respects the treatment consists in regulating the diet (fluid nourishment in small quantities, nutrient enemata), rest in bed, and the use of narcotics (potassium bromide, chloral, morphia, cocain, menthol). A change of air will often stop the vomiting. After the middle of pregnancy the vomiting mostly ceases spontaneously; the induction of artificial labour must therefore be put off as long as possible, and it should only be considered when evident objective disorders come on, such as fever and loss of weight, and the methods given do no good.

The ætiology of acute yellow atrophy of the liver, which attacks pregnant women comparatively frequently, is still obscure. It may be caused by septic infection (Wyder), and it may be combined with eclampsia (Stumpf, Ahlfeld).

Syphilis is more dangerous to the child when it is on the father's side than when it is on the mother's. The mother may remain (apparently?) sound although the father has constitutional syphilis. She is not infected by her syphilitic child when she suckles it, and can even have healthy children by another husband who is himself free from disease.

Syphilis acquired by the mother during pregnancy

does not as a rule attack the child. With recent paternal and maternal syphilis, at first abortion takes place, later on premature birth of macerated children, and finally living children are born which suffer from syphilis. If the syphilis has passed into the third stage the children remain healthy. Antisyphilitic treatment is indicated both when the syphilis is constitutional before pregnancy and when it is acquired by the mother during pregnancy. In order to prevent infection of later pregnancies it is safest to put both husband and wife on a previous course of antisyphilitic treatment; at any rate it is safer than treating the father only.

Kaltenbach orders pregnant women who have born several macerated fœtuses, yet who, with their husbands, appear perfectly sound, to take several bottles of Ricord's mixture. (R. Hydrarg. biiodati rubri, 0·15; kalii iodat. 10·0; Aq. dest. 200, two tablespoonfuls daily).

Although according to E. Martin and C. Ruge in 80 per cent. the macerated fœtus (*fœtus sanguinolentus*) is a product of syphilis, yet it is desirable in the interest of rational treatment to establish in any given case a sure diagnosis of syphilis.

This is possible owing to the presence in the syphilitic fœtus of osteochondritis (Wegener), which leads to a broadening, yellowish pigmenting and irregular course of the epiphysial line, especially at the lower end of the femur. With this there is also, as shown by C. Ruge, hypertrophy of the spleen and liver. In non-syphilitic "*fœtus sanguinolentus*" under 2,000 grammes in weight, the spleen weight is to the body weight as 1 to 800, and this proportion is 1 to 46 in the case of the liver; in syphilitic fœtuses the corresponding figures are 1 to 172 and 1 to 23. Although all macerated fœtuses are notably deficient in weight, yet in the syphilitic fœtus *sanguinolentus* the

relation between liver and body weight remains the same as in the healthy unmacerated foetus, namely, 1 to 23.

When a tumour arising from the genitals (myoma, ovarian cyst, cancer of cervix) complicates pregnancy, the advice of a gynaecologist should be had, since operative measures are frequently necessary in these conditions. Operations on or near the genitalia, and those accompanied by great loss of blood or secondary fever, easily lead to premature labour.

Nephritis Gravidarum.

The manifold relations of this affection to eclampsia, to dangerous morbid conditions of the mother, to habitual death of the child, to artificial premature labour, and the frequency with which it occurs, demand a detailed description of the disease. The name nephritis gravidarum is applied to various pathological conditions, namely:—

1. The kidneys of pregnancy (Leyden).
2. Relapsing kidneys of pregnancy.
3. True nephritis arising during pregnancy.
4. Chronic nephritis with pregnancy.

Simple albuminuria occurs in 5 per cent. of pregnant women according to clinical statistics, but investigations in Ahlfeld's clinic give 50 per cent.

1. The kidneys of pregnancy are the commonest form of disease. The symptoms consist in the onset of dropsy and albuminuria in previously quite healthy pregnant women. This occurs mostly in the second half of pregnancy, and perhaps most frequently in the last few weeks. The dropsy in the majority of cases is of an anasarcaous nature, and may be extraordinarily extensive, so that the legs become unshapely, and the woman can neither walk nor sit. Ascites is rarely present. The urine is deficient

in quantity, and contains much albumin and organised matter, cylinder casts, renal epithelium, white and red blood corpuscles, but the red ones only in scanty numbers.

In many cases this condition of the patient gives her such little trouble that she does not call in a doctor. The disease in favourable cases only lasts until labour, which comes on at the right time. After delivery the urine becomes copious and the œdema and albuminuria disappear completely.

But there is always the danger in these cases of the outbreak of eclampsia if there is not rational treatment. This accident is to be feared if the urine suddenly and markedly diminishes in amount, and if headaches, malaise, gastric pain, vomiting, dimness of vision or amaurosis are present.

Eclampsia occurs in many cases before labour, and leads to miscarriage, or the pregnancy reaches its normal term and the eclampsia convulsions occur first during labour. In many cases the albuminuria remains after labour.

The pathological condition underlying the "kidneys of pregnancy" is not a true nephritis, but, according to Leyden, consists in a simple anæmia of the kidneys, which leads to fat infiltration in the epithelium of the kidneys, especially that of the convoluted tubes, and thus to disorder in the urinary secretion. That is, there is not here a destruction of renal tissue, not a fatty degeneration with destruction of cells, but a simple functional disturbance produced by the pregnancy, which disappears when the pregnancy is over. What is the origin of this renal anæmia? Dührssen agrees with Spiegelberg, Cohnheim, and Osthoff that spasm of the renal arteries is the cause. This spasm is produced reflexly by irritation of the sensory nerves of the genital tract. The contractions of the

pregnant uterus, great distension of the uterus, and the entrance of the head into the pelvis may be given as stimuli. All these stimuli first make themselves felt in the second half of pregnancy, and this coincides well with the fact that the kidneys of pregnancy are found in the latter months of pregnancy. By accumulation of stimuli or by an unusually strong stimulus this condition of renal anæmia arises with consecutive disturbance of the nutrition of the renal epithelium, markedly diminished urine, intoxication of the blood with constituents of urinary excretion, and finally eclampsia.

Occasionally these disorders of nutrition of the kidneys may arise from obstructive suppression of urine (compression of the ureter by the foetal skull. Halbertsma.)

The treatment of this condition of the kidneys during pregnancy is above all one of regulation of the diet.

A milk diet is the best, after which eggs, fowls, meat food, vegetables, and aerated waters as a drink, may be allowed. Rest, and, best of all, complete rest in bed, has great power in lessening the albuminuria. If the urine is very scanty, hot baths up to 45° C. (113° F.) must be ordered, to be followed by warm wet packs.

The author has never yet seen a case of eclampsia occur amongst the numerous cases of kidneys of pregnancy where this method of treatment has been adopted during pregnancy.

The prognosis of this condition depends upon the possibility of timely treatment. By this we can evade both eclampsia and the passing of the kidneys into chronic nephritis. The latter is, according to Leyden, by no means infrequent, and the author saw a case of kidneys of pregnancy with eclampsia in which the albuminuria was present for years. Among 158 cases of this renal condition which had recovered from eclampsia, 26 (16·5 per

cent.) had still albumin in the urine at the time of their discharge.

2. Relapsing kidneys of pregnancy. Fehling describes the outlines of the disease as follows:—It affects women who are quite healthy apart from pregnancy, but whose urine shows free albumin, even at the early part of pregnancy, with scanty cylinder casts. With this there is often œdema and increased heart action. In most cases the foetus dies from degenerations of the placenta, induced by the disease (white infarcts); diminution of the amniotic fluid, and cessation of uterine growth follows, and, by degrees, lessening or entire disappearance of albuminuria. The further issue of it is habitual abortion. Eclampsia is rare. Cardiac degeneration is not found. The treatment of the relapsing condition is the same as for the ordinary kidneys of pregnancy.

3 & 4. These two forms of nephritis only differ in that one is shown to exist before the pregnancy, while the other arises first during pregnancy, or at least only produces marked symptoms of disease during pregnancy.

In both forms we find free albumin and numerous organised elements in the urine with œdema, except in the case of contracted kidney. The general health is much more disturbed than in the simple kidneys of pregnancy, the patients waste, and if the disease is of long duration hypertrophy of the heart is found. Retinitis and cerebral hæmorrhage occur as complications, but eclampsia is rare, that is if we take eclampsia as being uræmia with convulsions. Uræmia without convulsions is frequent. Nephritis existing before pregnancy is considerably aggravated by the pregnancy. The prognosis is very bad for the child. Fehling gives five mothers with chronic nephritis as bearing 11 dead children in 16 births.

The cause of habitual death of the foetus in nephritis lies in the above-mentioned placental degeneration—white infarction. These white infarcts are produced partly by necrosis or hyaline degeneration of the decidua (Steffeck, Jacobsohn), and partly by blood extravasations, which are due to endarteritis of the decidual vessels (Rohr, Rossier), and to hyaline degeneration of the endothelium of the vessels (Jacobsohn). The placenta becomes small, tough, and extremely bloodless.

The foetus dies from the compression of the placental circulation, or else the ovum, as a result of necrosis of the decidua, becomes a foreign body and is expelled prematurely.

The blood extravasations may also lead to premature separation of a normally inserted placenta (Winter), and thus produce still further dangers to the mother's life.

The treatment of true nephritis during pregnancy is the same as that of the simple kidneys of pregnancy. If in spite of rest in bed, milk diet, and hot baths the excretion of albumin is still great, or if ominous symptoms like uræmic headaches, severe epistaxis, retinitis, or circulatory troubles come on, then abortion or premature labour must be induced. Chloroform narcosis should be avoided on account of its deleterious action on the kidneys (see Eclampsia). A fresh conception should be prevented when there is disease of the kidneys.

Displacement of the Pregnant Uterus.

1. **Pathological Anteversion. Pendulous Abdomen.**

--This generally occurs in multiparæ with slack abdominal walls, and it only happens in primiparæ with

contracted pelves. In the most marked cases the uterus may almost stand on its head, the fundus resting on the knees, and the cervix being over the symphysis. Naturally this causes great discomfort during pregnancy, and false presentations during labour. The treatment consists in keeping the uterus up by a binder round the body.

2. **Lateroversion (dextro- and sinistroversion).**—These are connected with the position of the mother, and hence dextroversion is more common, because the mothers more often sleep on this side.

Lateroversion may lead to displacement of the presenting part to the opposite side.

3. **Retroflexion of the gravid uterus with incarceration.**—This arises as a rule from pregnancy in a previously retroflected uterus, and only seldom from primary flexion of the gravid uterus. At the end of the third month the uterus either grows out of the true pelvis or abortion takes place, or incarceration results. The incarceration sets up pressure symptoms, such as retention of urine and obstipation of the bowel. With the first condition we often get incontinence of urine (*ischuria paradoxa*). Whenever this condition is complained of the catheter should always be passed, and perhaps a male catheter is best. (Whenever a tumour is felt in the lower abdomen the catheter should be passed. The tumour is frequently due to a distended bladder.) After emptying the bladder the uterus, in a case of incarceration of the gravid retroflected uterus, is not felt in the anterior fornix, but in the posterior one; the cervix is on the other hand driven strongly forwards. Reposition takes place most quickly when the cervix is drawn downwards with volsella, and the fundus is pushed upwards and forwards from the posterior vaginal fornix; then while an assistant draws the volsella back-

wards the fundus is seized with the disengaged hand, placed outside and drawn forwards.

By means of a ring pessary the uterus should be kept in position until the fourth month. If matters be left to themselves death may ensue from gangrene of the bladder, from uræmia, from rupture of the bladder, or from ileus. In many cases only a portion of the uterus grows out of the true pelvis (*retroflexio uteri gravidi partialis*). This defective shape may also occur in an anteflexed uterus where the posterior uterine wall is either prevented from growing forwards or is driven down into the pelvis.

The author thinks that the first condition may result from perimetritic adhesions, while Scanzoni says that the second is produced by pressure of the foetal head during the later months.

An extrauterine pregnancy sac placed behind the uterus is frequently taken for an incarcerated pregnant uterus. On attempts being made to replace it fatal rupture may easily occur.

4. **Prolapsus of the Gravid Uterus.**—This arises from the impregnation of a prolapsed uterus, and more rarely from the prolapse of a pregnant uterus.

As in the unimpregnated condition, there is generally no true prolapse of the uterus, but just as in the unimpregnated condition, prolapse only of the vaginal walls with elongation of the cervix and retroversion of the uterus. As a result of the latter incarceration may take place as well in prolapse as in retroflexion. In the early months, abortion should be guarded against by keeping up the vaginal walls with a ring pessary; later on, this danger disappears by the growth upward of the uterus itself. The hypertrophied rigid cervix very often causes grave trouble during labour (see p. 141).

Special Diseases of the Uterus and of its Surroundings.

Endometritis, which is so common, is frequently the cause of abortion, or of faulty implantation of the ovum as in placenta previa, or it may lead to abnormally firm union of the ovum and the uterus.

The diseased mucous membrane may also by continuation of its secretion hinder the union of the decidua vera and reflexa, and this secretion may become so free that we speak of "Hydrorrhœa uteri gravidi."

The author found in a case of this kind, after premature labour, the deciduæ very much thickened and inflammatorily degenerated with dilated lymph vessels, which had evidently exuded the milky fluid. The husband had in this case suffered from syphilis.

The escape at intervals of largish amounts of fluid is very typical of hydrorrhœa and it may be mistaken for rupture of the membranes. The retained fluid in the case mentioned had completely flattened out the bag of membranes and the foetal skull.

J. Veit considers decidual endometritis to be the cause of uncontrollable vomiting, and Löhlein looks upon it as the rheumatism of the pregnant uterus of the old authors.

Cure of the endometritis is, of course, only possible after the pregnancy is over.

Perimetritic, or peritonitic bands, may be ruptured in pregnancy and lead to fatal bleeding (Holowko).

Internal hæmorrhage may also occur from rupture of the uterus, which during pregnancy is generally caused by external violence. Pus collections of a chronic nature (Pyosalpinx sacs) may also rupture during pregnancy and lead to fatal peritonitis.

In both conditions exact diagnosis is very difficult. But the symptoms always point to the presence of a grave condition in the abdomen, which, under favourable circumstances, is put right by laparotomy. By this means Kalténbach was able to save the mother in a case of rupture of pyosalpinx in the ninth month. After a few days premature labour took place.

Inflammatory Diseases of the Vagina.

The marked hyperæmia of the vaginal mucous membrane present during pregnancy leads normally to copious secretion of a milky fluid. Under the influence of the micro-organisms and fungi (Thrush with visible colonies) the hyperæmia may increase to inflammation, whereon the mucous membrane seems, to the examining finger, to be studded with single little nodules. This kolpitis granulosa caused by hypertrophy of the papillæ is especially common in gonorrhœal vaginitis in which the secretion becomes quite purulent. The vulva is also usually inflamed and may be covered with large condylomata, which make vaginal examinations very painful.

For simple hypersecretion luke-warm vaginal douches of $\frac{1}{2}$ to 1 per cent. solutions of lysol are given without any pressure; for inflammatory conditions, and especially for gonorrhœa, astringents are also used, as, for instance, daily douching with two pints of a 1 per cent. solution of zinc chloride. Gonorrhœal kolpitis should if possible be cured during pregnancy, so as to prevent infection of the child's eyes when passing through the vagina, and to remove the possibility of the ascent of the inflammation to the uterus and tubes during the puerperium.

In rare cases of kolpitis in pregnant women multiple small cysts filled with gas (Trimethylamine, according

to Zweifel) are found (kolpohyperplasia cystica of Winckel).

Zweifel says that these cysts arise from strangulated vaginal glands.

According to Döderlein, two types of vaginal secretion can be distinguished in pregnancy. The normal secretion is strongly acid and contains squamous epithelium and bacilli. The abnormal secretion is alkaline and contains pus cells and cocci. In the latter form disinfecting douches are necessary at all times during labour, and when possible during pregnancy.

DISEASES OF THE OVUM.

1. Diseases of the Chorion.

IN many cases a mucous degeneration of the connective tissue of the chorionic villi takes place—myxoma chorii of Virchow, called grape or bladder mole and hydatidiform mole. The whole mass consists of simple cysts up to a hazel nut in size, and filled with mucus. Each cyst is a degenerated villus. There is usually nothing to be found of the cavity of the ovum or of the foetus. The size of the ovum is vastly increased by the growth, so that in the third month of pregnancy the uterus may already reach the navel without any parts of the foetus becoming perceptible. With this the occurrence of watery discharges alternating with very profuse floodings assists in the diagnosis. The diagnosis is confirmed by the passage of or the feeling of the cysts through the open cervix.

The hydatidiform mole always leads to interruption of pregnancy, and its expulsion is attended with very profuse bleeding.

The mouths of the placental vessels, out of which the hypertrophied villi have withdrawn, gape widely, while uterine contraction, which during the early months of pregnancy is rather feeble, can only come into effect after complete expulsion of the mole. Pieces of the mole are often left behind. In many cases the villi grow deep into the maternal vessels (destructive hydatidiform mole, see p. 126).

The treatment consists in stopping the bleeding by vaginal or uterine tamponade. Curetting is absolutely contra-indicated.

Sarcoma chorii.—Gottschalk has lately described a case of this. Metastatic deposits of sarcomatously degenerated villi had occurred, and the decidua had also taken part in the sarcomatous growth. From recent investigations of Marchand, Kossmann, and C. Ruge, the condition in these cases is one of carcinoma syncytii, that is, of carcinoma of the external epithelium of the villi arising from the uterine mucous membrane. This carcinoma is very often connected with hydatidiform moles, in which, according to Marchand, the growth of the epithelium of the villi produces the peculiar characteristics.

2. Diseases of the Placenta.

White infarcts (one form of these produces the ring-like so-called marginal infarcts running round the placental margin—*placenta circumvallata*), as found in endometritis and nephritis, and syphilitic hypertrophy of the placenta, have been already described.

The last occurs, according to E. Fränkel, in paternal syphilis, and is due to a deforming cellular granulation growth of the chorionic villi with consecutive obliteration and disappearance of the vessels. In maternal syphilis an *endometritis placentaris gummosa* is described, which by other authors is held to be identical with the white infarction.

3. Anomalies of the Fœtal Vascular System.

These concern partly the fœtus and partly the umbilical cord.

In the first group we have malformation of the heart, stenosis of the ductus Botalli, compression of the vessels in lung and liver diseases. These lead, as do analogous disturbances of the circulation in the mother, to hydramnios. The anomalies of the umbilical cord, which some-

times cause hydramnios and at others death of the foetus, are multiple torsion of the cord, true knots, coiling, and stenosis of the umbilical vessels through thickening and calcification of the intima in a syphilitic foetus (Oedmannson).

Extrauterine Pregnancy.

This may be tubal, ovarian, or abdominal, according to its situation.

The first is by far the most common; no fully proved instance of primary abdominal pregnancy is so far known, and only a few ovarian cases have been found.

Tubal pregnancy arises from stenosis or atresia of the lumen of the tube. The causes producing this are perimetritis and catarrhal swelling of the tubal mucous membrane (polypi Wyder). Tubal pregnancies are subdivided into true tubal pregnancy, tubo-uterine or interstitial pregnancy, and tubo-abdominal or tubo-ovarian pregnancy. The issue is most favourable in tubal pregnancy when, owing to defective nutrition caused by hæmorrhage into the placenta, the foetus dies in the first month. A hæmatosalpinx is thus formed which only rarely (see p. 111) endangers the mother's life, and which drives the patient to the gynæcologist merely on account of pain in the lower part of the abdomen.

The danger to be feared in all extrauterine pregnancies is rupture of the distended and thinned foetal sac, with consequent fatal hæmorrhage into the free abdominal cavity.

It is only when the hæmorrhage occurs into an encapsuled space that it can come to an end. A hæmatocele is then formed (J. Veit). Werth has moreover pointed out that a tubal pregnancy, in which the danger of rupture was formerly feared, may come to a normal termination without this. Pains come on and expel a decidua from

the uterus, and extending to the foetal sac they separate the placenta, and so cause the death of the foetus. Still, even here rupture may take place with fatal hæmorrhage. If the latter does not occur, the dangers of inflammation, suppuration, or putrefaction of the foetal sac and its contents threaten the patient. The patient may die of peritonitis or septic intoxication. The attempts of Nature to cast out the foetus, after adhesion of the fruit sac with neighbouring hollow viscera or the abdominal walls, may lead to a fatal result, through exhausting suppuration.

The most favourable cases are those in which mummification of the foetus with calcification of the membranes and sac take place (Lithopædion formation).

Conceptions belonging to the first month are very quickly and completely absorbed, as Leopold has proved experimentally.

In diagnosing extrauterine pregnancy the duration of the pregnancy must be taken into consideration. In the first half of pregnancy the difficulty is to be sure that pregnancy is present; in the second half the difficulty is to make certain of the ovum being abnormally placed.

To settle the first point requires such skill in making a bimanual examination as enables the surgeon to recognise both the whole of the enlarged uterus* and also a tumour near it.

According to J. Veit the sac of an extrauterine pregnancy before rupture feels surprisingly soft, and this is the case with the uterus also. According to E. Fränkel

* Marked hypertrophy and metritis of the cervix, together with striking softness of the uterine wall above the internal os (Hegar's sign of pregnancy), has already often led to the diagnosis of extrauterine pregnancy, and thus to operative interference in cases where an intrauterine pregnancy was present.

the uterus grows chiefly in its long diameter, and is comparatively slender, and appears above all to be flattened antero-posteriorly. The diagnosis is still more certain if special signs of pregnancy are present, such as amenorrhœa, and absolutely established if a true decidua is cast out. According to Winckel this takes place in two-thirds of all cases within the first four months, even when the fœtus continues to live.

When rupture of the sac of an extrauterine pregnancy has taken place the diagnosis is assured if we find, in a woman who thought herself pregnant, the signs of internal hæmorrhage or (after this has been successfully overcome) of a hæmatocele or hæmatoma (extravasation into the broad ligament).

For purposes of treatment, extrauterine pregnancy must be considered as a malignant new growth (Werth), and therefore should be removed operatively at every stage. Since Werth has shown that most of these cases are tubal, the extirpation of the entire sac by abdominal section, even towards the end of pregnancy, has been performed more and more frequently with success, and thus the dangers have been removed which were connected as much with the separation as with the leaving behind of the placenta. These dangers are bleeding to death and decomposition of the retained placenta. In a few cases it has been possible to save the child also.

When rupture of the sac takes place with severe internal hæmorrhage, and without evident formation of a hæmatocele, abdominal* section should be performed as

* In a case where the patient was pulseless the author successfully performed laparotomy after having given a subcutaneous infusion of common salt as recommended by Wyder. He lost two cases out of 21 laparotomised, and these two were in extremis. Of eight cases operated upon by vaginal laparotomy all recovered.

soon as possible. As J. Veit and Fränkel have shown, rupture may take place even after the death of the foetus by hæmorrhage into the sac (tubemole—J. Veit) or by the expulsion of the dead ovum into the peritoneal cavity (abortion of extrauterine pregnancy—Werth). Incomplete tubal abortion without rupture of the tube may cause dangerous bleeding from the placental site, the blood flowing through the abdominal ostium into the peritoneal cavity. These observations do not point to the injections of morphia into the sac for the purpose of causing the death of the foetus, which were so warmly recommended by Winckel as being entirely without danger. If a hæmatocele or hæmatosalpinx has formed, abdominal section should only be undertaken when bleeding recurs.

From what has been said it is evident that success in treatment of extrauterine pregnancy and of the analogous pregnancy in a rudimentary cornu of the uterus can only be obtained by a surgeon versed in abdominal surgery; the aim of the practitioner should be to make a diagnosis as quickly as possible and to avoid the fatal mistake of confusing it with a retroflexion of the gravid uterus.

Untimely Termination of Pregnancy, Abortion, Immature and Premature Birth.

Termination of pregnancy in the first three months, so-called abortion, occupies the chief place of interest. Miscarriage and premature labour—the first from the 4th to the 7th month, the second from the 7th to the 10th—run their course after the manner of ordinary labour with the difference that the placenta adheres from physiological reasons more firmly in these cases and therefore it has to be more often removed by hand. The ovum is extruded whole in simple abortion. Only the children of the premature births are viable.

UNTIMELY BIRTH.

Causes of Untimely Birth.

1. Death of the foetus (syphilis).
2. Abnormalities of the foetal and maternal membranes—hydatid mole. Endometritis decidua (J. Veit), placenta previa.
3. Abnormalities of the uterus—displacements, cervical lacerations (Olshausen), metritis, myomata.
4. General diseases.

These either cause death of the foetus by sudden rising of temperature and fall of the maternal blood pressure or they set up uterine contraction through fever or anæmia (Runge).

5. Traumatism.

This leads to hæmorrhages into the membranes. Hæmorrhages of the same kind may take place in chronic nephritis.

6. Fright.

Far too much importance is attached to the two last causes by the public. But it cannot be denied that disturbances of the circulation, with consecutive vascular lesions, may be produced by psychological affections.

7. Contractions of the uterus (from hot douches, ergot, &c.).

As a rule several causes act together. The death of the foetus does not necessarily involve the extrusion of the ovum. The dead foetus may be retained for years and become mummified (missed labour).

Abortion occurs oftenest at the 3rd month, because at this time a greater portion of the chorionic villi atrophies and consequently the ovum undergoes a temporary loosening. The periods at which menstruation would have ended, if pregnancy were not present, are specially dangerous. These facts are of weight in the prophylaxis.

Mechanism of the Separation and Expulsion of the Ovum.

Separation of the ovum during abortion may result from :—

1. Dislocation of the ovum from the uterine wall.
2. Uterine contractions.
3. Hæmorrhage.

Dislocation takes place after the death of the foetus from lessening of the bag of membranes through absorption of the amniotic fluid. Owing to dislocation of the ovum, and also through the contractions of the uterus, rupture of the maternal vessels occurs and hæmorrhages follow. The latter are present in every case of abortion and are of very noticeable extent. They only cease on the complete extrusion of the ovum, since it is only then that the uterus can retract and contract properly. The ovum is still further separated by the hæmorrhage. Bleeding takes place not only externally but into the membranes (formation of hæmorrhagic and fleshy moles and solution of the tiny foetus in the amniotic fluid). If the separation of the ovum has reached a certain stage pains come on at once even when they were not present beforehand. These uterine contractions dilate the cervix and completely separate the sac of the ovum at the placental site. The sac of the ovum is driven more and

more into the cervix and the decidua vera is torn mechanically from the uterine wall. During this, the decidua vera becomes inverted in all cases in which the placenta is normally situated, and its upper part becomes freed first. In analogy with the Schultze method of placental delivery see Figs. 11 and 12. Figs. 11, 12, and 14 are sagittal sections. The placenta lies on the anterior wall, *a*. blood; *b*. decidua vera; *c*. sac of ovum with decidua reflexa, chorion, amnion, and foetus.

A second sac, *b*, formed from the decidua vera, is attached to the true sac of the ovum, *c*.

But if on the other hand the lower margin of the placenta is separated first, or the placenta is situated abnormally low down (Fig. 14), or there are already adhesions between the decidua vera and reflexa, then the sac of the ovum covered by the decidua vera is born as it was in situ (in analogy with the Duncan method of placental delivery). Since the decidua vera is a very lacerable structure, it is evident that it is an easy matter, by the described method of delivery, for the whole or the greater part of the decidua to be torn from the sac of the ovum, which is descending, and to be left behind on the uterine wall. This is what usually happens.

If the ovum sac bursts spontaneously or is burst arti-

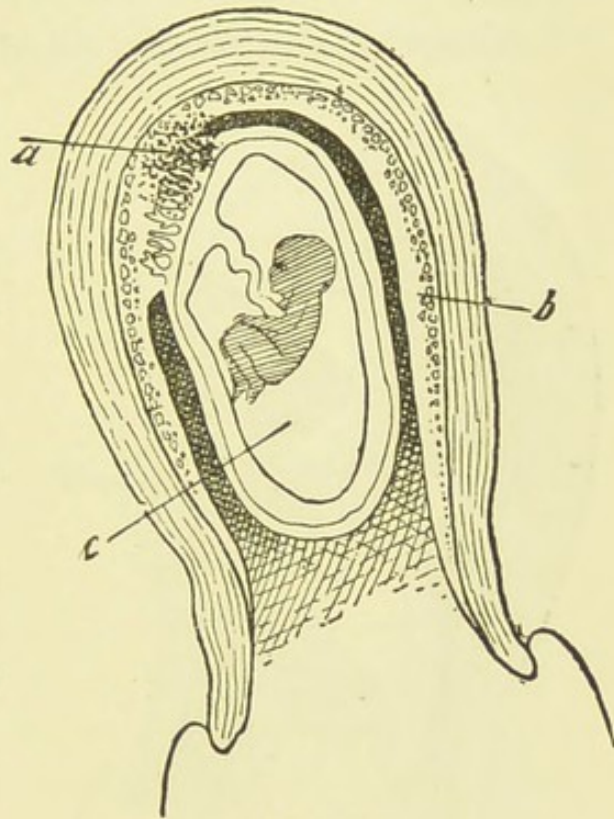


Fig. 1.

ficially before the separation of the placental attachment, the expulsion of the ovum is rendered much more difficult, since the uterine contractions have no grasp on the collapsed sac of the ovum. And when at last the latter, after having become refilled with blood, is spontaneously expelled, the decidua vera may very easily be left behind.

I cannot agree that the decidua is primarily separated by uterine contraction, as is generally accepted.

It is not thick and firm, as for instance Schröder makes out, but forms a tremulous jelly which is thrown into folds when the uterine walls contract.

The establishment of this point is of the highest importance with regard to rational treatment.

Course of Abortion.—

Bleeding is the chief symptom of abortion, and it may cause anæmia of the greatest severity. The pains are quite secondary

to the bleeding. When the ovum sac is burst the abortion may drag on for weeks or even months. We then speak of the retention of the products of conception.

These keep up bleeding and may decompose. In this way fever, with a foul discharge, arises.

If during the examination or the attempts at expulsion pathogenic micro-organisms have reached the uterus, then septic peritonitis or pyæmia may come on.

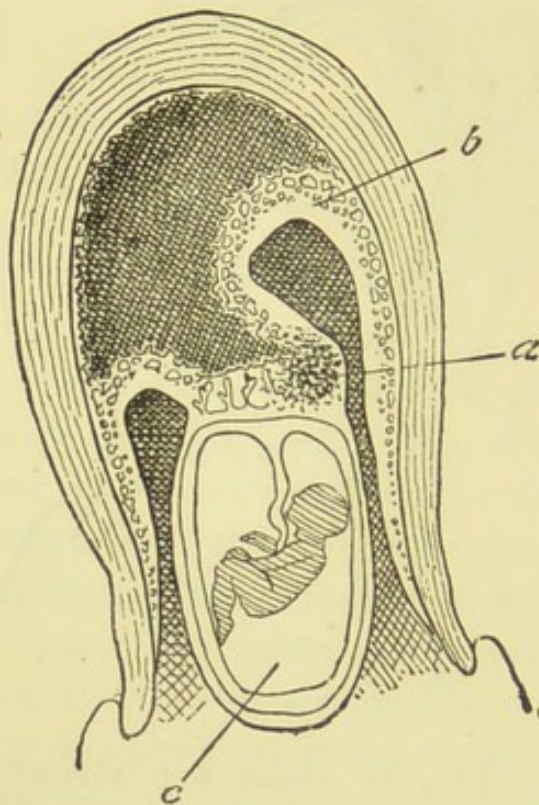


Fig. 12.

If no decomposition sets in, the retained decidual remnants may cause endometritis later on.

The *prognosis* of abortion is favourable in all cases, when a rational treatment is adopted and no general infection of the system has already taken place.

Before we can think of diagnosing *abortion* the diagnosis of pregnancy must be established. Both are easy in those cases where the internal os admits the

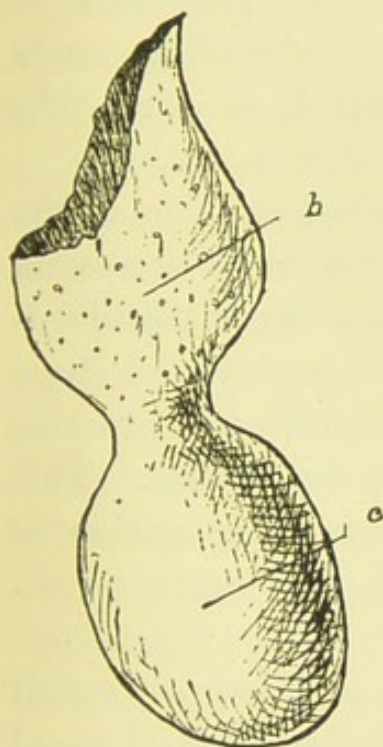


Fig. 13.

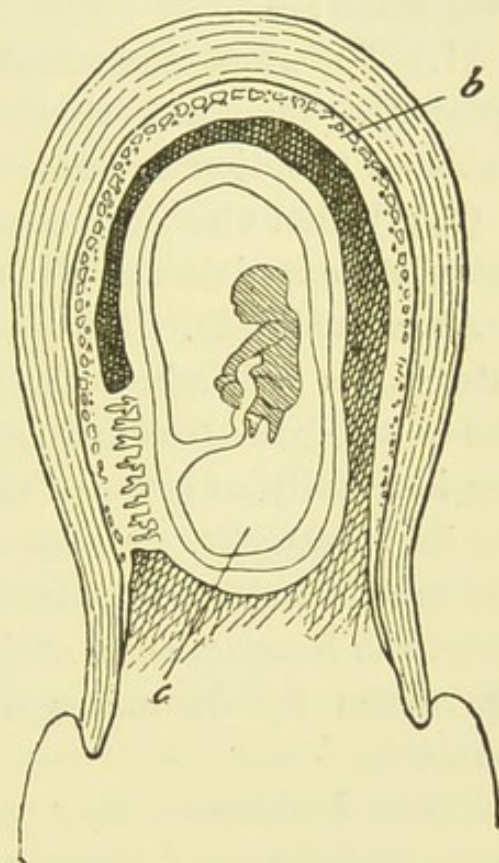


Fig. 14.

finger, that is, the ovum or its remnants are already in the cervix. If the internal os is closed the diagnosis of pregnancy may be made by considering the history, (cessation of menstruation) and by feeling the markedly anteflexed and globularly increased uterus.

One must likewise remember the possibility of any tubal tumours (pyosalpinx, extrauterine pregnancy) which contraindicate active interference.

When bleeding is also present a further question arises : Does the whole ovum or only some remnants remain in the uterus ?

If the bleeding is only slight and has lasted for a short time, we should diagnose the former, but if the bleeding has been severe (coming away of clots or pieces), and has lasted some days or weeks, we diagnose the latter.

The *treatment* of abortion should fulfil a double indication :—

(1.) To stop threatening abortion (rest in bed, opiates), provided that the foetus still lives and no habitual abortion dependent upon syphilis be diagnosed.

(2.) When abortion cannot be stopped, to secure the complete expulsion of all the parts of the ovum.

As regards (2). This period is reached as soon as the internal os will admit the finger and the sac of the ovum has entered the cervical canal. At this stage the bleeding is usually so severe that it is necessary to take steps for its treatment. Under these circumstances in practice the most common treatment is to plug the vagina. This stops the hæmorrhage, assists the further separation of the ovum by damming up the blood, and excites contraction.

These desiderata may generally be attained with still more certainty by tamponade of the uterovaginal canal as the author has proved for nine years. This method consists in stuffing as much iodoform gauze as possible into the uterus and then plugging the vagina with wool tampons in the usual way. The arrest of bleeding is certain, and the gauze in the uterus excites such action that usually within 24 hours the whole contents of the uterus, tampon, and ovum are expelled. The result is all the more certain the further pregnancy has advanced, and the more difficult also the emptying of the uterus.

In rare cases spontaneous expulsion is only obtained after a second tamponade.

This favourable action is also obtained by the same method in abortions, whether the placenta only or the placenta with the foetus be retained. It is also useful in cases difficult of diagnosis where heavy bleeding has existed for some time, when the parts of the ovum have gone and the cervix is closed. Here by tamponading the uterus, in addition to stopping the bleeding, within 24 hours there is either expulsion of the whole uterine contents or at least such dilatation of the cervix that one to two fingers can be passed into the uterus comfortably, and whatever is still retained can be thus removed.

By this method of tamponade of the utero-vaginal canal it becomes impossible for internal bleeding to take place, as it may do after vaginal plugging alone.

Klotz describes a case of internal bleeding from a 13 weeks' pregnancy where the foetus and placenta were still retained; the mother was a 12 para, the vaginal plug had been in situ 12 hours, and the uterus had reached the size of an eight months' pregnancy.

As regards insertion of the tamponade, the same strict antiseptic precautions are required as in manual or instrumental evacuation of the uterus. The external genitals must also be disinfected beforehand, in cases where previous vaginal examinations have taken place, and in feverish abortion cases, the uterus and vagina must likewise be disinfected. This is carried out with the patient across the bed.

Lysol solution (1 in 100) is recommended. This has the great advantage as regards the tamponading that it keeps the genital canal slippery. The uterus is washed out with a large double-channelled catheter.

After complete disinfection, the bladder is emptied

with a catheter. The rectum, in case it is full, must be cleared by an injection given by the midwife. The hands, instruments, and materials for plugging must also be germ-free. The last must, in addition, be impregnated with an antiseptic, in order to hinder the development of the germs always normally existing in the genital tract, and thus to prevent decomposition of the secretions soaked up by the tampons. A simply aseptic material stinks even after a few hours' tamponade, but iodoform gauze and salicylic wool tampons may be left for some days without becoming offensive to smell. The antiseptic material itself must be sterilised with the steam current to kill any germs present in it. The author has the plugging material packed in tin boxes at the cloth works. These tin boxes are then sterilised, and rendered air and watertight by soldering, but they are easy to open. For midwifery and gynæcology Boxes 1 to 3 are ordered. Box No. 1 contains a piece of iodoform gauze five metres long, a handbreadth wide, and four layers thick, with 30 grammes of salicylic wool; Box No. 2 contains two grammes of iodoform in powder, two pieces 5 and 10 metres long and 3 centimetres broad of iodoform gauze, and 20 grammes of salicylic wool; Box No. 3 contains 12 salicylic wool tampons.

All three boxes are ordered by the author for each labour, since the materials can be also utilised for diapers and pads; and he also carries Boxes 1 and 2 in his obstetric bag. For the method of tamponading described here Box 2 is used.

Asepsis of the hands is obtained by brushing with a 1 per cent. lysol solution for three minutes, and asepsis of the instruments by boiling them in a fit vessel or pan after folding them in a towel.

Tamponade of the vagina is best performed with the

help of one or two of Simon's specula or a valvular speculum, by which the portio and both vaginal vaults are exposed. By means of long dressing forceps or bullet forceps the first tampon is placed in the posterior, and the second in the anterior vaginal vault; the third is placed against the os, and one or two more are put in the vagina. Instead of tampons the vaults may be plugged with iodoform gauze, and one or two tampons are then put into the vagina.

The lower third of the vagina is left empty, since otherwise smart pains and retention of urine may occur.

If there is no speculum at hand the plugging may be carried out as follows: The left forefinger and, if necessary, the middle finger are used to form a speculum, and push back the perinæum and the posterior vaginal wall, while the first tampon is pushed by the right forefinger or forceps into the posterior vaginal vault. In order to get the tampon so far it is necessary in some cases to withdraw the left forefinger, whereupon the right one can be carried higher.

The technique of tamponading the uterus is as follows: After exposing the portio in the speculum the anterior lip is seized with volsella, and the 10 centimetre strip of gauze, or a lesser width if the cervix is narrow, is pushed in by the long forceps up to the fundus or as high as it will go, and more and more of it is pushed in until no more will go in. If one has no speculum the anterior lip should be seized with the volsella under guidance of the left forefinger, and the cervix drawn down to the vulva and then tamponaded; and if the cervix cannot be drawn down so far, the forceps are handed over to an assistant and the gauze strips are introduced over the left forefinger by means of long forceps into the uterine mouth and the uterus plugged. If there is no assistance the box may be

grasped between the knees. If the cervix is very narrow Asch's grooved sound may be used to carry out the tamponade. (The technique of plugging the uterus at term is given below.)

The prepared wool tampons are drawn out by their threads; the tampons which are made at the time from the wool in Box No. 2 are removed in the same way as the gauze strips by seizing them with volsella, guided by the left forefinger.

If these methods do not succeed, or if after their use bits of the ovum (for instance the decidua) remain behind, or high fever arises from decomposition of the contents of the uterus, manual or instrumental evacuation of the uterus is indicated. To render this a safe procedure there must be much technical skill, strict observation of all anti-septic precautions, and in certain cases anæsthesia.

Instrumental evacuation of the uterus is performed with the curette or a sharp spoon (curettement, abrasio, scraping, gouging). This operation should have been carried out at least once by the commencing obstetrician under skilled supervision. The technique is as follows:—

After careful disinfection of the vagina, the anterior lip of the cervix is seized with volsella under the guidance of a speculum or the fore and middle fingers of the left hand; the volsella are held by an assistant, a double channelled uterine catheter is passed into the uterus under the guidance of the same fingers; the uterus is washed out, and then the curette is passed. The beginner will do well now, after letting the volsella go free, to force the uterus with the curette somewhat forwards and upwards in order to feel with the external hand whether the curette is properly in the fundus. If this is the case the volsella are taken in the left hand and the uterus is scraped methodically first anteriorly then posteriorly and

by tilting of the curette at the fundus and the lateral angles. In doing this the curette must naturally be pressed with a certain force against the uterine wall.

One may scrape downwards with force, but the curette must be pushed upwards gently. Perforation of the uterus caused by an aseptic instrument generally does no harm, unless liq. ferri or some other caustic be afterwards injected and unless some infectious germ was already present in the uterus.

If the cavity is very large the handle of the curette must be bent. After curetting, the uterus must be washed out again.

The emptying should always be done with the curette until the middle of the third month, and at a later period only when the ovum lies in the cervical canal, and is attached by the lower segment of the decidua vera to the uterus (cervical abortion). The use of the curette alone avoids the passing of the finger, which is much more painful, and renders anæsthesia superfluous. When the placenta has formed (towards the end of the third month) the ovum sac must be separated with the fingers at the placental site, and after expulsion of the ovum the still adherent decidua vera must be removed with the curette, which separates the decidua much more gently, quickly, and safely than the finger, and, according to my investigations, in exactly the same plane in which the decidua vera spontaneously loosens, *i.e.*, in the deeper gland layer.

Figs. 11 and 12 represent the two different stages of abortion. In Fig. 11 the os uteri is dilated, but the whole ovum is still attached, separation is only to be suspected beforehand by the fact that the finger can be moved freely in the space between the decidua vera and the decidua reflexa.

In Fig. 12 the ovum is separated from the placental site, and consequently has fallen into the cervical canal. In the first case combined treatment, and in the second, curetting should be practised. Curetting renders unnecessary the incisions recommended by many authors when the os uteri is narrow.

Digital emptying of the uterus is rendered much easier by anæsthesia. Anæsthesia alone enables one to be always successful in drawing the uterus on to the finger like a glove. This is very necessary in order to reach the placental site. The removal of a ruptured ovum is not more difficult than that of an intact one.

No traction should be made upon the portions of ovum projecting loosely into the uterine cavity, but the placental site should be at once sought, and with it the fundus. If the cervix is not passable to two fingers it is possible, with strong external pressure, to reach the fundus with one finger. For this two fingers are passed into the vagina, the forefinger is placed transversely in the anterior fornix and the middle finger is passed into the uterus. The palmar surface of this finger should be always kept to the placenta and not to the uterine wall, and the placenta as a whole is pressed away from the uterine wall while the finger with saw-like movement is driven between them.

If there are no more distinct prominences in the uterine cavity to be felt the operator stops, for the placental site normally feels rough, and is elevated slightly above the level of its surroundings.

The use of the curette for the removal of large placental masses is most strongly contra-advised because it is so easy to perforate the uterus and to leave portions of the placenta behind.

If there is a suspicion of having left pieces of placenta

behind tamponading is done. On drawing out the strips the placental remnants usually come away (see Chapter on Placental and Membranous Remnants).

The separated membranes can in many cases be extracted with the finger in the uterus, in other cases it is more convenient to place two fingers in the anterior vaginal fornix, then to grasp the back of the uterus with the external hand and to squeeze out the uterus between them (Höning's manipulation). The best position for emptying the uterus is across the bed (lithotomy position).

In severe anæmia ether is better than chloroform as an anæsthetic.

When severe flooding has been going on for some time, and the os uteri is not dilated, if the uterus be small curetting may be performed at once, but if the uterus be large, its cavity should be firmly tamponaded with iodoform gauze. If on account of the decomposition and resulting pyrexia one cannot wait so long, attempts should be made to force the finger into the uterus under deep anæsthesia. If this is not successful, dilatation with metallic dilators should be at once practised. In miscarriages of the fourth and fifth months it may be necessary after separation of the placenta with the finger to remove the decidua vera by curetting, if the latter is very thick or if there is decomposition in the uterine cavity.

Even after complete evacuation, flooding may go on from simple atony of the uterus. Uterine tamponading stops this flooding at once; the vagina must also be tamponaded firmly with cotton wool plugs (the material for this is found in Case 2). When anæmia is marked the uterus is washed out with 1 per cent. lysol, and not with carbolic acid lotion. The 4-5 month fœtus should only be extracted when decomposition is present, or there is

great danger threatening the mother, otherwise its spontaneous delivery should be awaited.

The great difficulty in these cases is the extraction of the head.

It should be pressed by the finger in the uterus against the symphysis, and then the finger should be pushed into it at its weakest point. When decomposition has been the indication for evacuation of the uterus it is advantageous for lasting disinfection and drainage to tamponade the uterus with iodoform gauze (Fritsch, Author). The vaginal tamponade must be preferred to evacuation in cases of hydatidiform mole, that peculiar myxomatous degeneration of chorionic villi. Sometimes the degenerated villi grow deep into the uterine wall (v. Volkman, v. Jarotzky, and Waldeyer); complete removal of them under these circumstances by means of the finger or the curette is impossible, and might lead to rupture of the uterus.

After the abortion has been completed the patient must keep her bed eight days. The treatment should be directed afterwards to the cause of the abortion.

History of a Case of Abortion or Premature Birth.

The following notes are necessary :—

1. Age, whether married, last menstruation, onset and amount of flooding, whether the membranes have come away, the kind of treatment carried out so far (tamponade ?), causes of the present abortion, number of previous abortions and labours, whether any of the children are living, and to which labours they belong.

2. Condition of the patient at the onset of the abortion (temperature, pulse, anæmia, foul discharge, flooding).

3. Whether there be any distension of the rectum or the bladder, position of the uterus (Retroflexion), its size, whether the cervical canal and the internal os are passable for one or two fingers, and whether membranes are to be felt in the cervical canal or within the uterine cavity.

4. The treatment carried out (manual separation of the ovum at the placental site? Removal of the decidua by curetting? Tamponade? Dover's powder?).

5. The consistence of the membranes, whether spontaneously cast out or removed artificially, whether an ovum was found, if this was recently dead, or macerated, or mummified.

6. The condition of the patient after spontaneous expulsion or evacuation (temperature, pulse, smell, amount and condition of the lochia, continuance of flooding, and method of involution of the uterus afterwards).

7. Position of the uterus and state of the adnexa on discharge from treatment.

PATHOLOGY OF LABOUR.

General Diseases and Accidents.

Operative termination of labour, or operative interference to hasten normal labour, is only indicated as a rule when either the mother or the child is in danger.

Exceptions.—Prophylactic version in flattened pelvis and in unfavourable head presentations, prophylactic drawing down of a foot in breech presentations with prolapse of the umbilical cord, Cæsarean section, which one undertakes preferably with intact membranes.* If the endangered child can only be saved by an operation which risks the mother's life, then as a general rule this operation is not attempted; *for the life of the mother is of more value than that of the child*—indeed, in the interest of the mother the living child may be subjected to operation and destroyed if the mother be in danger.

The conditions dangerous to the life of the mother are as follows:—

1. *Fever over 38° C. (100·4° F.), with a pulse rate of 100 or more.*

The fever shows that septic infection (streptococcal invasion) of any wounds present, or absorption of the products of putrefaction, has taken place. The former may occur even before rupture of the membranes through wounds of the cervix produced spontaneously or artificially (incisions and abrasions). The latter only takes place

* The practitioner in the obstetric polyclinic must give a sufficient notice both when general and special disorders are present in the cases where it seems likely that a prophylactic operation will be necessary.

after rupture of the membranes, since it is only then that matters capable of decomposition (amniotic fluid, meconium, the dead foetus) can come into contact with the germs of decomposition which enter the uterus by unclean hands and instruments, or with the atmospheric air.

Decomposition shows itself, in addition to the fever, by the foulness of any amniotic fluid which may still escape. If the decomposition in the uterus is very great, gases may be produced (Tympania uteri), of which according to Gebhardt the bacterium coli is the cause. Although there are undoubted physiological elevations of the temperature in labour, still it is well to consider fever as pathological whenever an internal examination has been made with a doubtfully aseptic hand and when the fever comes on some time after rupture of the membranes. In this case labour must be terminated artificially if the uterine pains are defective.

Ahlfeld has called attention to two criteria which allow elevation of temperature in labour to be recognised as pathological, namely, the onset of fever after a period of absolute uterine inertia and the good effect produced by douches of the genital tract. The author has observed many cases in which a temperature of only 38° C. and protracted expulsion of the child have led him to terminate the labour instrumentally when the head was in a good position for applying the forceps, and in which after delivery of a living child the uterine contents were very decomposed, so much so that not only the waters but the child itself had a most offensive smell.

2 *Great stretching of the lower uterine segment.*

This is pathological and points to threatening rupture of the uterus if the contraction ring stands at a higher level than a hand's breadth above the symphysis pubis. This dangerous stretching comes on if, while the uterine

contractions continue active, the presenting part does not enter the pelvis owing to some opposition (contracted pelvis, cross birth, hydrocephalus, occipito posterior presentations).

The signs of such pathological stretching are :—

(a) Feeling the contraction ring in the neighbourhood of the navel or above this.

(b) Tenderness of the lower uterine segment, in the intervals between pains : present spontaneously, and to be evoked by pressure.

(c) Fever with marked acceleration of a very weak, small pulse.

(d) Œdema of the labia } pressure symptoms.
(e) Hæmaturia }

(f) Vomiting, dry tongue.

3. *Rupture of the uterus.*

If the child enters the peritoneal cavity the following signs are always present :—

(1) Scarcely perceptible pulse.

(2) Escape of blood from the vagina.

(3) Mobility and retreat of the presenting part.

Severe pains are often present beforehand; the cessation of uterine contractions is frequently not so noticeable. The part of the uterus adjacent to the child may be taken for a segment of the uterus, strongly distended by internal hæmorrhage (concealed).

If the os uteri is drawn forward by the presenting part and the cervix abnormally stretched the uterus may tear away from the vagina, and in this way the child may pass into the peritoneal cavity. The prognosis and treatment of so-called kolpaporrhæxis is the same as for rupture of the uterus.

4. *Hæmorrhage.*

Bleeding may often be stopped without delivery

having to be undertaken (combined turning in placenta previa).

5. *Eclampsia.*

6. *Complications of labour by other accidental diseases.*

Heart and lung diseases play an important part in this group. The action of the heart is easily impeded as a result of the increase in the blood pressure during each pain. Paralysis of the heart or œdema of the lungs may arise. These may continue afterwards in the lying-in in spite of rapid delivery (Fritsch).

The child's life is endangered by all things which prevent oxygen from reaching the child or which lead to increase and overloading of the foetal blood with carbonic acid gas. The commonest cause of this is the abnormally prolonged duration of labour after rupture of the membranes, because the uterus in these cases becomes smaller and compresses the maternal vessels running to the placenta. As a result, less oxygen comes to the child and finally it dies from asphyxia. The signs of threatened death from suffocation and the other disorders which may lead to asphyxia are as follows:—

1. Continuous slowing of the foetal heart beats to 110 and lower in the intervals between the pains.
2. Continuous acceleration above 160.
3. Sudden formation of a caput succedaneum.

The slowing of the heart is due usually to irritation of the vagus by the excess of the CO_2 in the foetal blood, the acceleration, to a paralysis of the vagus. The latter is therefore graver prognostically than the slowing. In rare cases the slowing is due to compression of the brain. Here the child gets too little oxygen as before, since in a given time less foetal blood passes through the placenta and less oxygen is taken up.

Asphyxia is thus sometimes the cause and at other times the result of irritation of the vagus. The presence of severe cerebral compression is shown by the rapid formation of a swelling on the head. If the asphyxia be caused, as it may be, through primary hindrance to the passage of oxygen to the placenta, or by cerebral compression, there follows as a result of the irritation of the breathing centre by the excess of CO_2 in the blood, premature breathing* by the child, and the child may aspirate into its air-tubes amniotic fluid, meconium, and mucus. It is not this which causes the death of the child—this is caused by the excess of CO_2 in the blood and the want of oxygen producing paralysis of the cardiac nerves. Premature respiration only leads to death in so far as it increases the demand on the already weakened heart through the opening up of the pulmonary circulation.

The results of premature breathing are specially to be considered when a child which has been asphyxiated in the uterus is yet born alive, because the indication for treatment under such circumstances is to get rid of any aspirated matter.

4. Escape of meconium (irritation of the splanchnic nerves by the excess of CO_2 in the blood).

In breech cases where the breech has already entered the pelvis the escape of meconium means little.

Meconium is here simply mechanically expressed. Certain drugs, as quinine administered to the mother, cause escape of meconium (Porak, Runge).

5. Prolapse of the funis.

As soon as the presenting part enters the pelvis the

* If air enter the uterus during operative interference this can be inspired by the child during asphyxia and the child may then scream. The author heard this "Vagitus uterinus" once in a case where the practitioner had made prolonged attempts at turning.

cord may be compressed, the connection between the child and the placenta is broken off, and the child, receiving no more oxygen, is suffocated.

6. Hæmorrhage.

Hæmorrhage from the foetal circulation only arises under two conditions: the first in "insertio velamentosa" (the insertion of the umbilical cord into the membranes), when the umbilical vessels course over the lower segment of the ovum and are torn in rupture of the membranes; the second in operative perforation of the placenta in cases of "placenta previa centralis." The child is also exposed to danger from maternal hæmorrhage—by lessening its area for respiration when the bleeding is caused by a partial separation of the placenta. If the bleeding comes from another cause the oxygen supply of the child is obstructed as a result of the severe and sudden fall of the maternal blood pressure (Runge).

7. Sudden onset of high temperature (Runge). Death of the child from heat accumulation.

Poor labour pains or the so-called exhaustion of the patient are never sufficient indications by themselves for terminating labour, *but become so when they are combined with one of the already mentioned dangers to the mother or child.*

Special Pathology of Labour.

The most varied disturbances of labour may cause danger to mother or child.

A. Disorders of the mechanism of labour itself. The labour may be too precipitate, or make little or no progress.

To these disorders belong:—

I. Anomalies of the expulsive forces. Weakness of

the pains, defective action of abdominal pressure, spasmodic labour pains, and tetanus uteri.

II. Abnormal obstruction.

1. Maternal : through closure or narrowing of the parturient canal.

a. In the soft parts.

b. In the bony pelvis.

2. Foetal : through malposition, malpresentation, and abnormal attitude, abnormal size and formation.

III. A combination of good pains, energetic abdominal pressure, small opposition on the part of the child, and of the maternal passages, which lead without skilled assistance to quick or precipitate labour.

B. Disorders unconnected with the mechanism of birth.

I. Eclampsia.

II. Hæmorrhage during labour.

III. Inversion of the uterus.

IV. Prolapse of the umbilical cord.

V. Air embolism.

It is important for the accoucheur to have the scheme A in his mind. It is often possible by a process of exclusion with the help of this scheme to diagnose disorders which are not so definite in their origin as those placed under B. For instance, if the head does not enter the pelvis in spite of favourable position and strong pains, in spite of complete dilatation of the os uteri and a wide pelvis, we have to deal with an abnormally large head, *e.g.*, hydrocephalus.

Weak Labour Pains.

Primary and secondary forms must be differentiated. Primary weakness of the pains (weakness from the onset of labour) is found:—

1. In general debility, chlorosis, and in persons debilitated by hunger and general diseases.

2. In women who have borne children often and quickly, one after the other, without the requisite nursing.

3. In cases of generally contracted pelvis; and in very young or very old primiparæ as a result of defective development of the uterine muscle.

4. In cases of abnormal distension of the uterus (twins, hydramnios, tympania uteri).

5. In cases of tumour of the uterine wall.

6. In cases of over distension of the bladder and rectum.

Uterine inertia or weakness of the labour pains is only dangerous after rupture of the membranes and in the second and third stages of labour.

One should not therefore be over persuaded by the cries of the patient and her entourage, to interfere operatively during the first stage of labour.

In this case more general treatment is required. Wine, strong coffee, and light but nourishing food should be given to debilitated women (see 1, 2, and 3), free ventilation should be attended to, and all unnecessary persons sent out of the room.

When the patients are very excited they may be calmed by narcotics. A light superficial chloroform-narcosis continued for some time often works wonders especially in the cases called spasmodic or tetanoid, in which the uterus does not normally relax in the intervals between the pains.

In these cases the patient continually complains of severe pains and therefore does not bring her abdominal pressure into action. Anæsthesia here produces a more regular action of the pains with utilisation of the abdominal pressure which quickly hastens delivery.

For this a few drops of chloroform are poured upon the inhaler at the onset of a pain, and this light narcosis may be maintained for as long as five hours.

If the primary inertia lasts, especially after rupture of the membranes, a warm body or sitz bath, hot fomentations on the abdomen, and frequent lukewarm vaginal irrigations with $\frac{1}{4}$ per cent. solution of lysol, should be prescribed in order to directly excite uterine contraction. The bladder and the rectum must be emptied.

In hydramnios one should rupture the membranes as soon as the os uteri has reached the size of a crown piece. This is done in an interval and as far as possible above the os uteri so that the umbilical cord shall not be swept down with the head.

The best instrument for this purpose is a well-boiled knitting needle.*

Secondary uterine inertia arises from abnormally great resistance. It must be considered as salutary on the whole, since otherwise lacerations of the lower uterine segment of the os uteri and of the perinæum may easily arise.

If with secondary inertia there is an indication present for terminating the labour, then the patient must be delivered; but if not, and there is a possibility of spontaneous delivery, the tired uterus is given rest in order to

* When the uterus is excessively distended with over production of amniotic fluid it may be necessary, on account of the various circulatory, respiratory and digestive disturbances in the mother, to open the amniotic sac during pregnancy before labour.

collect fresh strength. One often has to terminate labour artificially in these cases *because the protraction resulting from weak labour pains, after rupture of the membranes, may gradually cause danger to the life of both mother and child*; the first through the facilitated entrance of micro-organisms into the uterus, and the second from the lasting diminution in size of the uterus which comes on after rupture of the membranes.

Long duration of labour after rupture of the membranes is the commonest cause of foetal death in the uterus, and not, as the stereotyped examination answer runs, pressure upon the umbilical cord (not prolapsed) or premature separation of the placenta.

In case delivery is undertaken for inertia 1-2 grammes (15-30 grains) of ergot, or an injection of ergotin (Ergotin dialys., Aq. dest., Glycerin. ana.) is given shortly before to prevent a continuance of the inertia into the after-birth period. The practitioner should entirely give up the preliminary use of ergot in the first two stages of labour. By the injudicious use of ergot, tetanus uteri, that is a tonic contraction of the uterus, is caused. The uterus remains as hard as a board, and is closely applied to the child, so that it is impossible to pass the hand between the uterine wall and the child. Any change from contraction to relaxation is quite wanting, and the mother has continuous severe pain.

The causes of tetanus are as follows:—Impassable obstruction (contracted pelvis, cross-birth), unsuccessful attempts at delivery, rough and repeated manual dilatation of the os, and the injudicious use of ergot. Since a muscle in constant contraction does no more work the labour is at a standstill. Rupture of the uterus does not take place unless there has been severe stretching of the lower uterine segment before the onset of the tetanus;

but the mother often dies of sepsis, even after successful delivery, since the conditions leading to tetanus are likewise predisposing to sepsis, for the difficult labours tending to tetanus cause frequent internal examination.

Tetanus is also very unfavourable for the child, because the child usually dies of asphyxia from obstruction of the placental oxygen supply. True tetanus uteri is not removed by anæsthesia, and the author has also seen Fraenkel's injection of 0·01 to 0·03 grm. of morphia and 0·001 grm. of atropine have as little effect.

He therefore considers the long continued use of various narcotic agents in tetanus uteri to be contradicted since they do not remove the tetanus, and they endanger the life of the already weakened mother by the possibility of fatty degeneration of vital organs. Therefore only a short anæsthesia is advised to hasten delivery, for if not delivered, the woman dies of sepsis, or suffers from rupture of the uterus instead.

The method of delivery cannot possibly be that of version. Even when one can reach the feet, turning is impossible owing to the firm embrace of the fœtus by the uterus. Above all, a forcible attempt to turn may lead to rupture of the uterus or its laceration from the vagina (perforating vaginal rupture—Kolpaporrhæxis). If we have to do with cross-birth, and if the child be dead, embryotomy is indicated. This may be very difficult owing to the presenting part often being high up in tetanus uteri and the cervix only incompletely dilated, so that under these conditions the author holds Cæsarean section to be technically more simple when the child is alive, and other things are favourable (sufficient assistance, possibility of removal into a hospital). If the head presents and is fixed in the pelvis, or can be pushed into the pelvis, then, if the child be living, forceps are advisable. If the child be

dead, perforation should be done in all cases where the application of forceps appears difficult, indeed perforation is advised in every case, whether the child be living or dead, when the head remains above the pelvis.

If, in addition to tetanus, there are signs of sepsis or sapræmia, such as fever, very foul discharge, and tympania uteri, the placenta must be expressed at once after extraction of the child, and the uterus then washed out with several pints of 1 per cent. lysol or 3 per cent. carbolic solution.

If Credé's manipulation fails, the uterus must be washed out, the placenta removed by the hand, and the uterus again washed out.

Atresia or Stenosis of the Soft Parts.

1. *Atresia or stenosis of the os uteri.*—This condition, which, according to Schröder, generally occurs in old primiparæ, is usually one of simple rigidity of the os uteri; more rarely there is an adhesion (*conglutatio orificii externi*) or an occlusion (*atresia*), which of course can only have occurred during the pregnancy.

Results.—In spite of strong pains the os uteri does not dilate, the lower cervical segment formed by the portio is driven strongly downwards and stretched; finally secondary uterine inertia sets in or the portio tears, at or above the os uteri, and may even be completely torn off.

Treatment.—When there is rigidity or adhesion of the os uteri, simple pressure with the finger or a sound upon the os, suffices to open it. If this is not successful, four superficial incisions in the cervical wall are made with Siebold's scissors, under guidance of the index and middle fingers of the left hand. In *atresia* a cross-cut is

made, after one has pulled the site of the os uteri into a cone with volsella. If in spite of this the os uteri does not dilate, the case is one of rigidity of the cervical tissues.

2. *Rigidity of the portio vaginalis.*—This also occurs frequently in old primiparæ, and depends, from the author's researches, upon a want of elastic tissue. It occurs in multiparæ when a number of years has passed since the last confinement, the patient is near the climacteric, and, as a consequence, senile atrophy of the elastic fibres of the portio has already begun. It is also seen when the portio has been amputated, and in syphilitic and commencing carcinomatous degeneration.

Symptoms of rigidity.—The os uteri dilates incompletely in spite of strong labour pains. The flattened out portio overlies the presenting part like a thick band.

Results.—Secondary uterine inertia or great stretching of the lower uterine segment comes on.

Treatment.—If there is no immediate danger to mother or child narcotics are given, which will quickly relieve the rigidity when only apparent, that is the anæsthesia causes regular uterine pains, and, with these, dilatation of the os.

Superficial incisions in the cervical walls are only made when the use of narcotics and rupture of the membranes have failed to produce dilatation. Antiseptic precautions must be observed.

If the labour still tarries after the making of the incisions, as often happens, septic infection of these wounds may result.

When mother or child is in immediate danger, delivery by means of four deep incisions reaching to the insertion of the cervical wall into the vagina must be considered (*see* Operative dilatation of the os uteri).

3. *Rigidity of the whole cervix.*—This occurs from so-called prolapse of the uterus, which was present before pregnancy, and from widely diffused carcinomatous disease.*

Symptoms.—The cervix remains intact throughout; not even the supravaginal portion of the cervix is flattened out.

The **results** are as in 2.

Treatment.—In carcinoma—and most cases of carcinoma in pregnant women belong to this category—Cæsarean section or the author's vaginal Cæsarean section should be performed. Incisions do no good here because the narrow parts are above the insertion of the portio into the vagina. In prolapse it is well to wait at first—generally the os uteri is finally drawn upwards and dilated—and to try mechanical dilatation (*see* artificial dilatation of the os) only when mother or child is in danger.

4. *Atresia or stenosis of the vagina and vulva.*—These conditions are either congenital (annular stricture) or acquired (cicatricial, after ulcerative processes, difficult labours, infectious diseases, or syphilis).

Treatment.—If the head stretches the cicatrices, corresponding incisions are made. In this way the intact child may often be extracted (Wyder), and the perforated one always. If the mother desires a living child in any case, then Cæsarean section may be considered.

In rigidity and stenosis of the vagina and vulva, such as often exists in very young or old primiparæ, one should

* Rarely the maternal and foetal membranes are so intimately grown together, at the internal os, that the lower uterine segment cannot retract itself upon the ovum, and consequently the cervical canal is not opened up. **Treatment.**—Separation of the membranes with the finger.

treat the case expectantly until an indication arises for terminating labour.

If the head then still stands above the lower third of the vagina, and if one wishes to extract the child safely and quickly, and to avoid perinæal laceration, the incisions which the author calls vagino-perinæal should be made (*see* artificial dilatation of the lower third of the vagina). If the head is at the pelvic outlet simple vulval incisions are made and delivery effected. Lateral perinæal incisions should be made in cases where rupture of the perinæum is threatened by spontaneous delivery.

In the rare cases where spasm of the levator ani (vaginismus) obstructs labour, and does not pass off even with deep narcosis, perinæal incisions should be made and labour terminated.

In this way perforation of the child's head may be safely avoided.

5. *Atresia or stenosis of the soft parts by tumours, or obstructions simulating tumour.*—These are:—

1. Distension of the bladder and rectum.

Treatment.—Emptying. A strong male catheter should be always passed in such cases, and the author has succeeded, by using the lithotomy position and pushing the head backwards from the vagina, in cases where others have tried and failed.

2. Vesical calculus.

If the calculus cannot be pushed to one side it must be cut down upon from the vagina and the wound closed at once.

3. Myoma of the uterus.

Polypi which block the way for the child should be removed, cervical myomata, when they are within reach, should be enucleated from the vagina or through the os uteri. Large low-lying myomata of the uterine wall often

completely obstruct the pelvic canal at the onset of labour, but they can generally be pushed up gradually or may become spontaneously drawn back. If this does not take place Porro's modification of Cæsarean section or vaginal Cæsarean section is indicated.

4. Carcinoma causes trouble not so much by its size as by changing the cervix into an unyielding tube (see p. 141).

5. Ovarian tumours.

Treatment.—Reposition, if this fails, puncture, and if this is insufficient, ovariectomy or incision from the vaginal fornix, evacuation of the contents of the tumour, suture of the tumour and vaginal incisions and ovariectomy in the early hours after delivery.

6. Tumours of the pelvic cellular tissues or pelvic bones.

Treatment.—Extirpation or Cæsarean section.

Contracted Pelvis.

The following is a superficial classification of contracted pelves :—

A. Generally contracted pelvis.

1. The generally equally contracted pelvis.
2. The generally contracted flat pelvis.

B. Partially contracted pelvis.

1. Antero-posteriorly contracted pelvis.
 - (a) Simple flat pelvis.
 - (b) Rachitic flat pelvis.
 - (c) Spondylolisthetic pelvis.
 - (d) Pelvis flattened from double hip dislocation.
2. Transversely contracted pelvis.
 - (a) Kyphotic pelvis.
 - (b) Funnel-shaped pelvis.

- (c) Osteomalacic pelvis.
- (d) Transverse ankylotic (Roberts') pelvis.
- 3. Obliquely contracted pelvis.
 - (a) Ankylotic obliquely contracted pelvis.
 - (b) Coxalgic pelvis.
 - (c) Skoliotic rachitic pelvis.
- 4. Irregularly contracted pelvis.

This may be contracted from exostoses, tumours of the pelvic bones, and from badly united fractures.

The contracted pelves of practical importance, which are most commonly met with, are given below in their order of frequency, and with their typical pelvic measurements.

	D. Spin	D. Crist.	Conj. Ext.	Conj. Diag.	Conj. Vera.
1. The simple flattened pelvis	25	23	18	11	9
2. The rachitic flat pelvis	27-29	28	18-13	11-6	9-4
3. The generally contracted pelvis... ..	23	26	18	11	9
4. The generally contracted flat pelvis	23	26	16	9	7
(The measurements of the normal pelvis are)	25(26·3)	28 (29·3)	20	13	11)

Nature and Origin of the various Forms of Pelvis.

The *flattened pelves* are those which have a shortened conjugata vera. The *simple flat* pelvis may be congenital (Fehling). According to other authors it arises from carrying heavy weights during early youth. This forces the whole sacrum forwards. The true conjugate does not measure less than 8 c.m. According to Ahlfeld this pelvis when examined fully is found to be rachitic.

The *rachitic flat pelvis* may be congenital, according to Kehrer, or may arise, according to Fehling, from rickets, which causes the pelvis to remain at an infantile stage of development. This explanation is in many respects much simpler than that of Litzmann, who puts it down to the pressure of the weight of the trunk upon the diseased bones of the pelvis.

This pressure will drive the upper part of the sacrum strongly forwards and downwards, while the lower half of the sacrum at the same time recedes.

The vertebral bodies of the sacrum are also driven in front of their lateral processes so that the anterior surface of the sacrum in cross section becomes straight or even convex.

By means of the sacro-iliac ligaments the sacrum, which has thus been thrust forwards, exerts an abnormally strong traction on the iliac bones, which would separate widely from one another if they were not held together at the symphysis.

In this way the increased transverse diameter of rachitic pelvis arises, as also the turning of the iliac fossæ to look outwards. This can be recognised during life by the difference between the diameters of the spines and the crests being lessened or even reversed. The true conjugate diameter may go down to 4 c.m.

Note.—If the lower extremities are used by a patient suffering from rickets, the so-called *pseudo-osteomalacian* pelvis arises, which differs from the true osteomalacian pelvis only by its ætiology and its smaller contraction. The pelvis with congenital split* of the symphysis has

* With the exception of a case of Freund's, ectopia vesicæ was always present with this deformity. Labour is rendered difficult owing to the rigidity of the soft parts and the defective abdominal pressure. After labour there has always been vaginal prolapse.

a great resemblance to the rachitic form (more especially in the deformity of the sacrum). A contraction of the conjugate diameter of the pelvic inlet does not, however, arise in this way, since a portion of the anterior pelvic wall is wanting.

In the *generally contracted* pelvis a contraction of all the diameters of all the pelvic planes is present, but it does not as a rule exceed 2 c.m. This pelvis is a condition of arrested development of the pelvis at an infantile stage (Litzmann).

The *generally contracted flat pelvis* arises from rickets, if this hinders the growth of certain bones through premature ossification. It unites the characters of the generally contracted with those of the rachitic flat pelvis.

The *spandylolisthetic* pelvis arises from a fracture or congenital fissure in the arch of the last lumbar vertebra, the body of which slides forward upon the first sacral vertebra, while the arch with its inferior oblique processes is held back by its union with the sacral processes (Neugebauer, jun.).

This pelvis has practically the same importance as a highly contracted rachitic pelvis.

In the flattened pelvis of double hip joint luxation flattening takes place through the removal of the pressure of the heads of the femora.

The *kyphotic pelvis* arises in low situated lumbar kyphosis through the upper limb of the kyphosis drawing the lower one, and this again the sacrum, backwards. Just as increased sinking in of the sacrum (in rachitic pelvis) leads to an increased transverse diameter, so the backward displacement of the sacrum leads to a lessened transverse, which shows itself chiefly by a narrowing of the transverse diameter of the pelvic outlet.

The *funnel-shaped pelvis*, according to Schauta, arises in

a similar manner to the kyphotic pelvis, by pressure of the vertebral column upon the sacrum, which recedes on account of the high position of the promontory (in congenital abnormal elevation of the true pelvis). The method of contraction is just the same in funnel-shaped as in kyphotic pelvises.

The *osteomalacian* pelvis arises from pressure of the body weight and resistance of the femora upon bones already softened by disease. Osteomalacia occurs endemically under certain conditions. At the onset of the disease there are severe shooting pains in all the limbs. The conjugate diameter is also contracted later on, but the transverse contraction is more marked, and may proceed to complete obliteration of the pelvic canal. The beak shape of the symphysis is very characteristic.

Robert's pelvis depends upon the bending of both sacral wings, ankylosis of the sacro-iliac synchondrosis may be the cause, but more frequently is the result.

The *ankylotic obliquely contracted* pelvis arises in the same way, but the process takes place on one side only. In this way it happens that the ilium on the side which receives the pressure of the femur is driven upwards, inwards, and backwards. The backward displacement is only wanting when the ankylosis is primary.

In the *coxalgic* pelvis the displacement is upward, inward, and backward as in the last, the cause is hip joint disease; for, since only the sound leg is used as a rule, the one-sided pressure of the femur causes displacement of the sound side. If on the other hand the shortened diseased limb be used, the weight of the body falls chiefly on the diseased side, and the pelvis becomes obliquely contracted on the diseased side (Spiegelberg, Gusserow).

In the *scoliotic rachitic* pelvis the displacement is much the same. The one-sided pressure here takes place

through a scoliosis of the spine which is situated low down. The contraction lies on the side to which the convexity of the scoliosis is directed.

We have so far only called in two factors to account for contracted pelvis, namely, disturbances of development and altered relations of body weight, but there is still a third factor, and this is muscular action.

Kehrer has worked out experimental, and Gusserow clinical proof for this on a fractured obliquely contracted pelvis.

DIAGNOSIS OF THE VARIOUS FORMS OF CONTRACTED PELVIS.

Pelvic Measurement.

THE diagnosis of contracted pelvis, and of its special variety, can only be made with exactitude by measurement of the pelvis.

It is sufficient for the most commonly occurring varieties—the antero-posterior and generally contracted—to know the distance between the anterior superior iliac spines, the iliac crests, and the measurements of the external conjugate and the diagonal conjugate.

The distance between the iliac spines is obtained by feeling the spines with the forefingers and placing the points of the callipers immediately external to them. The distance between the crests is obtained by carrying the calliper points back from the spines along the external lip of the crests and reading off the greatest distance found.

For the measurement of the external conjugate the patient lies on her left side. The posterior point is the depression below the spinous process of the last lumbar vertebra. This lies two fingers' breadths above a line uniting the posterior superior iliac spines, which are perceptible to the eye and finger as two dimples.

While the point of the callipers is fixed with the forefinger on the posterior point of measurement, the woman is made to turn slowly upon her back again and the other point is placed on the anterior surface of the symphysis

and near the upper margin so as to get as large a measurement as possible.

To measure the diagonal conjugate, the patient lies lengthwise in bed and a firm bolster is pushed under the pelvis or the pelvis is raised. Both are unnecessary if the patient lie across the bed. Then the fore and middle fingers of the left hand—in very great contraction the forefinger alone is sufficient—are introduced up to the promontory, the tip of the middle finger is applied to this and the forefinger is pressed firmly into the pubic arch. The spot at which the sharp rim of the pubic arch—the ligamentum arcuatum—presses on the finger is marked by the nail of the right forefinger, and the fingers are brought out in this position from the vagina, and with the help of the midwife the distance from the spot to the tip of the middle finger is measured with the callipers. The true conjugate is obtained by subtracting 9 c.m. from the external and 2 c.m. from the diagonal conjugate. When there is any discrepancy the measurement obtained from the diagonal conjugate is of more value than that from the external conjugate. The measurement (p. 63) of the transverse diameter of the pelvic outlet is essential for diagnosing transversely contracted pelves.

When kyphosis exists low down, one is compelled to measure this outlet. The suspicion of funnel pelvis, when the contraction is not very marked, arises first during the progress of labour, if in spite of yielding soft parts, of strong pains and of descent of the small fontanelle which rotates forwards, the head remains stationary in the narrow part or the outlet of the pelvis.

If there is lameness, it should excite suspicion of obliquely contracted pelvis. For the diagnosis of this, examination of the pelvis is of greater value than measurement. The first establishes the higher position of

the iliac bone the straighter course of the diseased half of the pelvis and its displacement towards the promontory, so that the symphysis does not lie directly opposite to the promontory.

Skutsch has invented a useful instrument for the measurement of all the internal diameters together.

The following conditions point to the possibility of the presence of a contracted pelvis.

1. Remarkable smallness of figure. Osteomalacia reduces the body height: the woman notices that her clothes become too long for her.

2. Distortion and dislocation of extremities.

3. Pendulous abdomen in primiparæ.

4. Difficult and very tedious previous labours.

5. Variations from normal labour.

(a) Premature escape of the waters.

(b) Prolapse of the funis and the extremities.

(c) Non-engagement of the head in the pelvis.

(d) Irregular presentation and attitude.

(e) The manner of engagement of the head.

(a) In flat pelvis: Descent of the large fontanelle and antero parietal position.

(β) In generally contracted pelvis: Striking descent of the small fontanelle.

(γ) In generally contracted flat pelvis: Antero-parietal position and descent of the small fontanelle.

The positions given under α , β , and γ are to be considered favourable for the pelvis concerned, because it is only in these positions that the head can pass the pelvic contraction.

Contracted pelvis is the cause of a great series of difficulties during labour, but of course it is not the only cause of difficulty; for instance a cross birth may happen as often from a pendulous abdomen with a normal pelvis.

Mechanism of Labour in Contracted Pelves.

The possibility of delivery in contracted pelvis depends upon —

1. The degree of contraction. Litzmann differentiates four degrees.

First.—In which the conjugata vera measures 9·5-8·5 cm.

Second.— " " " " 8·5-7 "

Third.— " " " " 7·5·5 "

Fourth.— " " " " under 5·5 "

2. The strength of the pains and the action of the abnormal pressure.

3. Size and hardness of the skull.

4. The engagement of the head.

These various factors explain the unfavourable course of later labours in one and the same case of contracted pelvis. The pains become weaker, the head bigger and firmer, and, as a result of pendulous abdomen, the presentation is often abnormal. The dangers to which the possessor of a contracted pelvis is exposed by labour are given on page 120, sections 1, 2 and 3; besides these, bruising of the soft parts with secondary necrosis (which may cause a vesico-vaginal or vesico-cervical fistula during the lying in) and rupture of the pelvic symphyses may arise.

The latter only occurs in spontaneous delivery when proliferation of the cartilage, through previous labours, has removed the firmness of the articular union.

The danger for the child lies in asphyxia, due to the long duration of labour, or to the abnormally severe pressure upon the skull. The local pressure of the promontory causes a depression of the skull which in its highest degree constitutes the spoon-shaped impression.

This, as a rule, leads to death of the foetus from severe injury to the brain.

The danger of circumscribed pressure also requires notice in the various methods of artificial delivery. These may cause injuries to the head (fracture of skull with consecutive fatal hæmorrhage into the brain) and to the rest of the body.

Treatment of Flat Pelvis.

In the fourth degree Cæsarean section alone needs consideration, since even fragments of the foetus cannot pass such a contraction of the pelvis (absolute indication for Cæsarean section).

In the third degree one can choose between perforation and Cæsarean section (relative indication for Cæsarean section if the mother desires a living child).

In degrees 2 and 1 the child may be born spontaneously if the pains are good, the head small, and the presentation favourable. But frequently version, forceps, or perforation are required. For a pelvis of 7-8 c.m., artificial induction of labour at the 32-36th week is indicated when the patient comes to the practitioner during pregnancy, and prophylactic version has previously had an unfavourable issue for the child. With regard to the question whether in cases of flat pelvis, one should remain expectant, or perform the so-called prophylactic version, *i.e.*, early version, before either mother or child is in danger, the author is of opinion that the latter operation is absolutely without danger to the mother when carried out by a skilled and antiseptic accoucheur, and that the mortality of the children is certainly not more than ten per cent. beyond that of the usual mortality at birth. From

a collection of 115 cases of version and extraction in flat pelves from our obstetric polyclinic, where the operation had often to be performed too late, the maternal mortality was 6·8 per cent., and that of the children 13 per cent.

The value of prophylactic turning is based on the fact that the after-coming head passes more easily through the pelvis than the presenting head, because one can pull it momentarily with much greater force through the contracted space, as Gusserow has specially pointed out.

An unskilled, but antiseptic accoucheur will not endanger the mother by turning prophylactically, that is by turning while the head is movable and the os fully dilated, but will cause the child's death more frequently (in 57 per cent. of the cases—Dohrn Winkel) than he would by remaining expectant and applying the forceps only after the contracted place is passed. The expectant treatment, however, endangers the mother more, owing to the long duration of labour.

The danger to the mother, and also to the child, is yet greater if, in a case which has been treated expectantly, the forceps are applied to the head while it is still at the narrowed pelvic inlet.

From this point of view it is perhaps better for the mother that even the experienced antiseptic accoucheur should be advised to perform prophylactic turning in pelvic contraction of the first and second degrees.

The use of prophylactic version is limited in practice because the practitioner is called too late, when version has become difficult; this is certainly often the case in primiparæ. If the head in a primipara is found to be still movable, prophylactic version, by the experienced accoucheur, is as easy in this case as in a multipara after he has removed, by means of intrauterine kolpeuryesis (hydrostatic bags), the hindrances presented by an incom-

pletely dilated os uteri, rigid vagina and perinæum. If delivery of the after-coming head does not take place the head must be perforated.

On the other hand, if the head is fixed in the pelvic inlet and neither mother nor child is in danger, the treatment is expectant and is limited to laying the patient on the side of the large fontanelle.

If the mother or child is in danger an attempt should be made by external pressure (Hofmeier) in Walcher's position (legs hanging down) to force the head through the narrow part. If this succeeds, and we have, in addition to the descent of the head, a criterion of its success in the altered position of the head, the small fontanelle having descended and the sagittal suture having moved away from the promontory, the labour can then be easily ended by forceps.

If it does not succeed a careful application of the forceps may be tried, and if the head does not progress after a few tractions they should be taken off. The practitioner need not fear doing this if he tells the friends beforehand that it is only an attempt which he is making.

As a rule the application of the forceps, under these conditions of the head in the contracted pelvic inlet, does not do much good.

After the attempt with forceps has failed, if the indication for interference has been danger to the mother, one should perforate. But if on the other hand the operation has been undertaken in the interest of the child, then it is not necessary to proceed at once to perforation, provided that the attempt with the forceps has been made under strict antiseptic precautions.

Possibly the child may be born spontaneously later, and be alive. As a criterion of carefulness in making

such an attempt with the forceps, I may adduce the fact that the foetal heart sounds should show no variation afterwards. Of course the mother's condition must be carefully considered after an ineffectual attempt of this sort, and perforation performed as soon as any danger to the mother comes on.

Whether symphysiotomy, which has recently celebrated its rebirth, will be able to keep its place in obstetric operations and to limit the indications for Cæsarean section, perforation, and induced premature labour, is yet an open question which must be determined by further experience.

Treatment of Generally Contracted Pelvis.

In cases of *generally contracted pelvis* one should remain expectant, and endeavour, by simply placing the mother on the side of the small fontanelle, to promote the descent of the small fontanelle. The reason for this is, that the after-coming head cannot be pulled through the generally contracted pelvis with sufficient speed to save the child's life. The expectant treatment does not apply to parieto-posterior positions, to prolapse of the cord after reposition has failed, nor to cross births. If an indication for terminating labour comes on, the head is then either in good position in the pelvic inlet so that the small fontanelle comes down, or is easily put in favourable position by Walcher's method (which increases the conjugate by 1 centimetre) and by external pressure. Under these circumstances forceps extraction may take place with surprising ease, especially if the resistance of the os uteri, of the vagina (abnormally narrow in generally contracted pelvis: Freund and the Author), and of the

rigid perinæum, be removed by suitable incisions (see below)—operations which the author would prefer as a rule to reserve for the specially trained accoucheur.

Perforation may be limited to the rare cases where the head in spite of external pressure will not engage the pelvis, and the mother is in danger through the great stretching of the lower uterine segment.

When previous confinements have been unfavourable the question of induction of premature labour and of Cæsarean section requires consideration.

Treatment of other forms of Contracted Pelvis.

In *kyphotic* and *funnel-shaped* pelvis grave difficulty in labour is encountered, especially in primiparæ. This is a sign that it is not the pelvis alone which causes the obstruction. After vagino-perinæal incision this may disappear, and by this method the author was able to complete forceps extraction in a case of kyphotic pelvis, and also in a case of funnel-shaped pelvis with a diameter of 8 c.m. at the pelvic outlet, when previous attempts had been made without success.

If forceps extraction is not successful perforation must be performed. Induction of premature labour and Cæsarean section may need consideration.

In *osteomalacian* pelvis of high degree Cæsarean section is indicated. Delivery "per vias naturales" is, however, possible in many cases if waited for, because the softened bones may yield.

In *transversely ankylosed* pelvis Cæsarean section is indicated.

In *obliquely contracted* pelvis of high degree one side of the pelvis is entirely useless as a parturient passage.

Labour then goes on as in a generally contracted pelvis and sometimes with surprising ease. In other cases it may be necessary to resort to version with guiding of the occiput into the wider half of the pelvis while the head is still movable (E. Martin), while if the head is impacted the use of forceps or perforation, and when previous labours have been unfavourable, either Cæsarean section or the induction of premature labour may be necessary.

The *treatment of pelvic contraction* from tumours, depends upon the amount of contraction.

LABOUR OBSTRUCTED BY ABNORMAL RESISTANCE ON THE PART OF THE CHILD.

1. Through Abnormal Presentation, Position, and Attitude.

To these belong :—

(a) Cross births.

(b) Occipito-posterior positions.

(c) Face presentations with the chin directed backward or to the side at the pelvic outlet (p. 76).

(d) Prolapse of the hand or foot along with the head.

(e) A low transverse position.

In *a* and *b* turning is used if still possible, if not, embryotomy or perforation.

Litzmann was not successful with the forceps in the case of posterior parietal position first described by him.

A cautious attempt with the forceps is only allowable, according to him, when the sagittal suture moves away from the symphysis on external pressure. More important, practically, is the fact that the posterior parietal position occurs in quite normal pelves, and that, in spite of the ease with which it can be diagnosed, it is seldom recognised, and, owing to this, grave disturbances of labour, and even rupture of the uterus, may arise.

Prolapse of the arm is only possible when the head at the moment of rupture of the membranes does not fill up the pelvic inlet.

If the head does not enter the pelvis in spite of the mother being laid on the side opposite to that of the prolapse, then the mother should be laid upon the side of the

prolapse and the prolapsed arm replaced by pushing it with the whole hand above the head. The mother should then be put back upon the side opposite to that of the prolapse. In flattened pelves one should turn. If the head is impacted with the arm in the pelvis, expectant treatment is pursued until an indication occurs for terminating labour, and the forceps are then applied, taking care not to include the arm.

Prolapse of a foot with the head, as a rule, only occurs with a dead or premature foetus or after unfortunate attempts at version. But the author has seen many cases where the foot presented with the head while the membranes were unruptured and in which the foot did not recede on rupture of the membranes.* The treatment is simple and consists in drawing down the foot with a noose and simultaneously pushing back the head (double manipulation of Justine Siegemundin). Twin presentation should have been previously excluded (head of one and foot of other presenting) as otherwise this procedure might cause a serious impaction of both foetuses in the pelvis.

A *low transverse* position exists when the sagittal suture runs transversely at the pelvic outlet.

Causes.—Prolapse of the anterior arm, impaction of a small head (which is coming through the pelvis quickly with its sagittal suture transverse) in the transverse diameter of the pelvis, this being less than the antero-posterior diameter of the foetal skull; simple flat pelvis and large head, generally contracted flat pelvis and normal head, funnel-shaped pelvis, in which the head keeps its transverse position up to the pelvic outlet and

* Similar cases have been observed by Naegele and Hecker after rupture of the membranes. The latter simply replaced the prolapsed foot and arm, after which the labour terminated almost at once.

then is wedged between the tubera ischii, and weak labour pains in the third and fourth head positions with big head, as a result of which the small fontanelle does not rotate forwards but remains half way.

Contrary to the accepted teaching, the result in low transverse positions is varied, as the author has often noticed.

1. After a long standstill the small fontanelle may still rotate forwards, and this may take place either in the pelvic outlet or in the soft genital canal below this (Muret). The child is then born rapidly.

2. Rotation does not take place. The head comes out in transverse position or produces pressure symptoms. In the latter case the child is in danger from the protraction of labour.

The prognosis is not favourable unless there is interference, and there is danger of laceration of the perinæum if labour is allowed to terminate spontaneously.

The treatment is expectant. The mother is placed on the side of the small fontanelle, and uterine contraction is stimulated. Muret speaks highly of manual attempts at rotation by Kleinwächter's method, if the head has passed out of the bony pelvis. If the mother or child is in danger forceps must be applied obliquely. When the child is dead and forceps extraction difficult, perforation is necessary.

2. From Abnormal Size.*

a. Of the Head.

A large head in a normal pelvis behaves like a normal head in a flat pelvis; since it is the increase in the trans-

* Abnormally large children are in many cases the result of an abnormally long pregnancy (300 days and even longer)—partus serotinus, over-carrying.

verse diameter of the head which causes the chief trouble in labour.

Progress.—The head enters the pelvis slowly or remains above it. If there is an indication for terminating labour one attempts to force the head into the pelvis by external pressure while the patient is in Walcher's position (Author), and if this succeeds, forceps are applied. If this does not succeed, version should be performed, since the after-coming head may pass through the pelvis. If both attempts fail and the mother is in danger, perforation should be done.

The diagnosis of abnormal size of the head should be made by exclusion (p. 134). The differential diagnosis from hydrocephalus is important (wide sutures and fontanelles), because in the latter case the head, whether presenting or after-coming, should be punctured with a trocar. The canula for subcutaneous infusion may be utilised.

b. Of the Shoulders.

This may happen in children with heads of normal size.

Diagnosis.—Difficult birth of the shoulders.

Treatment.—Cross bed position, manual or instrumental traction by a blunt hook upon the more easily reached shoulder (posterior), after the anterior one has been forced into the pelvis by strongly depressing the delivered head or by pressure from above.

The intentional fracture of an arm is, in the author's opinion, permissible in difficult cases. It is then quickly possible to pull this arm down. In any case it is more reasonable to deliver a living child with a broken arm than a dead child with a whole arm. If the child is dead it may be best for the mother, to decapitate the child, its

trunk being pushed up and both arms removed. This was carried out twice in the obstetric polyclinic of the Charité. The author saw rupture of the symphysis produced during severe manual delivery of the shoulders in a normal pelvis in which the joints were pathologically loose. The child weighed 5,884 grs., the circumference of the shoulders was 50 cm., their width 17 cm., while the circumference of the head was only 34 cm.

c. Of the Trunk.

Causes.—Dropsy and emphysematous distension of the skin, ascites, and the most varied tumours in and on the body of the child.

Diagnosis.—The birth of the shoulders is difficult. If the arms have been drawn down, the trunk does not follow. By passing in the whole hand the obstruction is discovered. If there is difficulty in the introduction of the hand this may be omitted. The diagnosis is certain without it.

Treatment.—Puncture: This is most easily performed through the thorax with the scissor-shaped perforator. After perforation of the diaphragm, the ascitic fluid flows away at once. With solid tumours exenteration should follow.

3. From Malformations, specially Double Monsters.

Diagnosis.—The first suspicion will be one of twin pregnancy. When the labour has been protracted examination with the whole hand will discover the bond of connection. Generally the labour progresses spontaneously on account of the smallness of the foetuses.

Treatment.—Bringing down all four feet, and ex-

traction of the posteriorly placed child first; embryotomy is seldom necessary.

Note.—The delivery of the after-coming shoulders in hemicephalus now and then causes trouble, not because they are abnormally broad, but because the rudimentary head insufficiently dilates the soft parts.

Precipitate Labour.

This arises when a series of factors, in themselves favourable, such as good pains, strong abdominal pressure, small resistance from the parturient canal and from the child, all occur together. Under these circumstances the whole labour may occupy not more than half an hour, as the author has observed in two cases.

More commonly it is the expulsion stage which proceeds abnormally quickly, and the pains of the stage of dilatation have not been observed at all by the mother. These labours only become pathological when the patient neglects to call in proper assistance in spite of the painful contractions of the dilatation stage. These are often taken for colicky pains by primiparæ.

Perinæal lacerations may arise; if the woman is taken in labour whilst standing (street births), the cord may be snapped and the foetal skull suffer injuries.

In the third stage atony of the uterus often comes on with possibly inversion, from which the mother may bleed profusely.

With suitable control the labour will certainly not be a precipitate one, for one has the power, by placing the woman on her side, by strong repression of the head and by careful support of the perinæum, to delay the exit of the head and to make this innocuous to the perinæum.

With this artificial retardation of labour one also removes the consequent dangers of uterine atony and inversion.

Eclampsia.

By eclampsia gravidarum, parturientium et puerperarum we understand suddenly occurring tonic and clonic convulsions of the whole body of the pregnant, parturient, or lying-in woman; these are associated with loss of consciousness. Loss of consciousness outlasts the convulsive attack, so that in many attacks the patient does not come out of the coma at all. In 50 per cent. of the cases, eclampsia occurs during labour, and in 25 per cent., during pregnancy and the lying-in.

Ætiology.—The cause of eclampsia in the overwhelming majority of cases is uræmia, an intoxication of the blood, which is caused by the retention in the blood of kreatin, kreatinin, acid phosphate of potash, and other urinary salts. This retention happens most often with Leyden's kidneys of pregnancy—more rarely in true nephritis, in obstructive hyperæmia of the kidneys, in suppression of urine from pressure on the ureters, and in hydronephrosis.

Kreatin and the other substances mentioned deposit in the cortex of the cerebrum and excite certain motor centres there, and in this way produce both convulsions and coma (Landois). The overcharging of the blood with these materials can therefore excite the symptoms of eclampsia directly—frequently, however, irritation of sensory nerves (most commonly of the genital tract) or psychological irritation take part as predisposing causes, the blood being already intoxicated, and therefore the irritability of the cerebral centres, heightened.

This form of eclampsia, due to impure blood, is called eclampsia uræmica or eclampsia hæmatogenes.

As previously mentioned, the kidneys of pregnancy are the commonest form of kidney disease leading to eclampsia uræmica. Anatomically, this disease is characterised by anæmia of the kidneys and fatty infiltration of the renal epithelium, clinically, by œdema, lessening of urine, copious albumen, and the presence in the urine of cylinder casts, renal epithelium, and white blood corpuscles.

It arises towards the end of pregnancy, at any rate after the first half, and disappears, in the majority of cases, after birth. The anatomical state and time of onset of the kidneys of pregnancy make it probable that they are caused by contraction of the renal arteries (Cohnheim, Spiegelberg, Osthoff). This is set up reflexly from irritation of the sensory nerves of the genital tract.

Stimuli (such as uterine pains, great distension of the uterus, engagement of the head in the pelvis) only come into sufficient power during the latter weeks or months of pregnancy. Exceptionally other intoxications, as by alcohol, lead, corrosive sublimate, and carbolic acid, may produce kidney lesions and eclampsia.

And the possibility is not to be overlooked that bacterial poisons may set up eclampsia by producing disease of the kidneys or by decomposing the blood when the kidneys of pregnancy are already present.

So far, however, there is no proof of this.

In about 5 per cent. of the cases, eclampsia occurs when the kidneys are sound and the blood is of normal constitution (as eclampsia reflectorica). In this form the convulsive centres are reflexly excited through sensory nerves (generally of the genital tract) or by psychical conditions, and the stimulus may be very great (abnormal distension of the uterus, very painful uterine action), or the irritability of the convulsive centres may be heightened (as in nervous persons or very old or very young primi

paræ). As already mentioned, mixed forms of eclampsia uræmica and eclampsia reflectorica are frequent, since with the heightened irritability of the motor centres already present, due to urinary intoxication, any peripheral stimuli, especially from the genital nerves conducted to these centres, may cause the threatening explosion to burst forth. The primary and true cause, however, still remains, the uratin intoxication due to the kidneys of pregnancy. Nevertheless the share of the nervous system is not without weight, and this explains the fact that primiparæ form 84 per cent. of all eclamptic cases. The nervous system is affected quite differently by the first pregnancy and labour than is the case in following pregnancies.

The anæmia of the brain which is so often seen at the autopsy points to the implication of the vasomotor centre in the medulla oblongata. In uræmic eclampsia, according to Landois' investigations, these centres can only be affected secondarily, because kreatin, and the other bodies mentioned, when they are applied to certain centres of the cerebrum in animals, induce the typical form of eclampsia directly.

In the reflex eclampsia and the mixed forms, on the other hand, it is not yet decided whether the vasomotor centre in the medulla oblongata is primarily excited (through irritation of the constrictor nerves) and then secondarily causes anæmia (by contraction of the cerebral arteries) with consequent stimulation of the convulsive centres of Nothnagel in the pons, and the motor centres of the cerebrum; or whether the irritation of the uterine and pelvic nerves (sciatic according to Wernich) is carried directly to the motor centres and from these secondarily excites the vasomotor centres (Landois and Ealenberg).

Traube and Rosenstein explain the cerebral anæmia in quite a different way, namely, by the pressure of cerebral œdema, which owes its origin variously to the increased blood pressure during the pains, and to the hydræmic state of blood in pregnant women, especially when there is albuminuria.

This theory explains neither the eclampsia of pregnancy and of the puerperium nor the fact that albuminuria may exist for a long time without causing eclampsia, and that only a continuous diminution, or a sudden suppression of urinary secretion brings about the eclampsia.

The Traube-Rosenstein theory is therefore at present universally abandoned. The cerebral anæmia without œdema is explained by the previously evolved theory as being due to the vasomotor centre, and the œdema arises from venous congestion which takes place with each eclamptic attack.

In summing up, we can say that in 80 per cent. of the cases the cause lies in the condition called the kidneys of pregnancy which has led to retention of urinary constituents. The retention, and the eclampsia, occur as soon as the urine markedly diminishes in amount.

In 15 per cent. other diseases of the kidneys, such as certain poisons with consecutive lesion of the kidneys, produce retention and eclampsia. In five per cent. there is no organic degeneration to blame. These are due to pure nervous disorders, to abnormal irritations, which act on the motor centres when there exists individual abnormal excitability of those centres.

Symptoms.—In the majority of cases of eclampsia uræmica there are premonitions which, unfortunately, are but seldom brought to the notice of the physician before the outburst of eclampsia. For days and weeks previously the diminution of the urine strikes the patient apart from

swelling of the feet, hands, and face. Frequently during the whole of this time the patient suffers from headaches. Other symptoms, such as nausea, vomiting, weight in the epigastrium, severe gastric pains, faintness, amblyopia, amaurosis, noises in the ears, only precede by a very short time the outbreak of eclampsia.

The eclamptic attack begins with slight clonic spasms, convulsions of the facial muscles and the extremities; then follows a longer stage of tonic contraction of the whole body musculature, lasting 20 seconds, whereupon the third and longest stage (45 seconds) with clonic spasms ends the scene. Consciousness is lost with the first onset of spasms, and the unconscious state outlasts the spasms for some time. During the clonic spasms the muscles of the face are first severely convulsed. At this time, as a rule, the tongue is driven between the teeth and bitten. Then convulsions of the whole body follow, which reach the lower extremities last of all. The cyanosis and bloating of the face are very horrible, and they arise from the impeded respiration and circulation during the tonic stage, and greatly distort the features. Icterus very often occurs later on (see p. 171). A single fit lasts one to one and a half minutes. After it there is deep sleep with stertorous breathing. The labour may quietly progress during this. If the fits are frequent, consciousness is entirely absent, the temperature rises progressively to its highest point (Winckel) and signs of œdema of the lungs and weakness of the heart appear before death. As a consequence of cerebral hæmorrhage, lateral or complete paralysis may occur. When there have been a great number of fits without death resulting, consciousness does not return after cessation of the eclampsia for hours or even days. Of the labour which has taken place in the meantime the mother knows nothing, and, in certain cases,

nothing of the events which took place in connection therewith before the onset of eclampsia.

In severe cases of eclampsia there is complete suppression of urine, in others it is diminished and full of albumen, so that on boiling it may coagulate firmly. After cessation of eclampsia the urine is quickly increased and the amount of albumen diminishes.

Traces of albumen are, however, to be found in about 15 per cent. of the cases in the second week after labour, and in a few cases chronic nephritis is a result of the kidneys of pregnancy.

Reflex eclampsia causes only secondary albuminuria (through the excessive muscular action) of a fleeting and slight character. Pneumonia, from foreign matters swallowed, and puerperal insanity may be sequelæ of eclampsia. The latter usually terminates favourably. The author saw one case of fatal gastric bleeding, 45 hours after the last fit and five hours after labour.

The interdependence of eclamptic attacks and labour is important. On the one hand eclampsia coming on during pregnancy induces labour in the majority of cases—the time of the overloading of the blood with carbonic acid is that which excites uterine contraction; on the other hand in 89 per cent. the fits cease at once, or very shortly after the uterus is empty. The death of the foetus, too, which with viable children is caused—in 49 per cent. of the cases—by the overcharging of the maternal blood with carbonic acid—perhaps also by poisoning of the foetal blood by the passage into it of the retained urinary components (Feis)—often removes the eclampsia (Winckel).

With non-viable children eclampsia always causes death, either directly by the venous condition of the maternal blood or by this producing abortion (Author).

The frequency of eclampsia in the patients of clinics

and polyclinics is one in 330; the statistics of the Vienna maternities give only one in 589. For all labours Löhlein gives one in 675 = 0·15 per cent. In 1·5 per cent. of the cases the eclampsia recurs at a later birth, as the author found in the obstetric clinic at the Charité, Berlin.

The anatomical conditions and their meaning are variable; sometimes anæmia and fatty infiltration of the kidneys, sometimes different forms of nephritis, and sometimes hydronephrosis are present. Cloudy swelling, fatty degeneration, and necrosis of the renal epithelium (which condition is also found in the liver, cardiac muscle, and mucous membrane of the stomach—the possibility of fatal gastric bleeding must be remembered) are not, in the author's opinion, directly dependent upon the renal disturbances, but are due to destruction of the red blood cells, which is caused in severe eclampsia partly from the retained urinary constituents and partly by the chloroform or chloral narcosis which has been induced. In such cases jaundice may be also seen. Apart from the degenerations due to the uræmia and protracted narcosis, there are others which are produced directly by the convulsions. These are hæmorrhages into the liver, from which fat emboli (Virchow) and emboli of liver cells (Jürgens) may pass to the lungs, kidneys, and brain. Schmorl describes emboli as occurring from detached endothelium of vessels.

These emboli easily cause œdema of the lungs, and in other organs small hæmorrhages, while gross hæmorrhages, especially in the brain, are dependent upon bursting of the vessels. This may be brought about by the increased blood pressure during the eclamptic fits. The brain, in addition to œdema of the meninges, exhibits anæmia and sometimes hyperæmia. Their relations to eclampsia are mentioned above.

As a result of the convulsions and the deranged respiration ensuing therefrom, we frequently get hyperæmia and œdema of the lungs, and pneumonia from aspiration of foreign bodies is usually present—a result of the unconscious state of the patients in eclampsia.

The **diagnosis** of eclampsia is generally easy. Convulsions with loss of consciousness can only be due to epilepsy or cerebral disease over and above eclampsia. Epileptic fits seldom occur immediately during the labour, and then there are not more than one or two fits. The history also generally tells us of previous epilepsy. In cerebral diseases there are signs of paralysis, and in meningitis there has been fever. Then the symptoms of the kidneys of pregnancy are wanting in these conditions. Still less easy is the confusion of eclampsia with the convulsions which are due to cerebral anæmia, and which shortly precede death after severe flooding. In hysterical convulsions there is no loss of consciousness. If no convulsions are observed any sopor present may be due to eclampsia, to brain affections, or to drunkenness (Spiegelberg). The smell of the breath and the vomit clears up the matter in the last case.

When pregnancy has not been diagnosed the detection of eclampsia is very difficult.

It happens often in Berlin that patients ill with eclampsia in the streets are taken to the station for epileptics and there treated as epileptics.

Prognosis.—The mortality of the mothers from eclampsia is 25 per cent., according to the statistics from 400 cases in the Berlin maternities. The mortality of eclampsia evinced before labour is somewhat higher, and of that after labour is somewhat lower. The prognosis as concerns the mother depends upon the number of fits.

When there are more than 10 fits the prognosis is bad, but in exceptional cases recovery may take place after a far greater number of attacks. Rosenstein saw one case recover after 81 fits. But as a result of a few, indeed even one fit, fatal cerebral hæmorrhage or pulmonary fat embolism may occur. There may also be fatty degeneration of vital organs caused, after a few fits, by destruction of red blood corpuscles—partly from intoxication of the blood and partly from the anæsthetic used.

Further points of moment in prognosis are the possibility of food-pneumonia and insanity.

The rare cases of reflex eclampsia have a better prognosis. Here the fits stop at once when the cause of irritation—the pains of labour—cease.

In cases of uræmic eclampsia we as yet have no criterion whereby it is possible to tell beforehand whether a case is mild or not. This is proved afterwards by the number of fits and strength of the pulse.

The prognosis, therefore, is to be considered doubtful in every case of eclampsia. We can only hope for a good result when it is possible to bring about delivery before the next attack, and with a free respiration and good pulse, for in 89 per cent. of the cases the eclampsia ceases at once or very quickly when the uterus is emptied. Quick emptying of the uterus also influences the prognosis for the children, of whom so far by the usual method of protracted narcosis 50 per cent. have died from deficiency of oxygen in the maternal blood.

Treatment.—Eclampsia may be prevented in many cases by suitable treatment.

Pregnant women with symptoms of the kidneys of pregnancy must be at once put on a strict milk diet. Energetic diaphoresis must be obtained by baths or wet packs. In a great number of cases thus treated the

author never saw eclampsia come on later during labour.

If during labour in a case of nephritis of pregnancy there is noted a diminution of urine and an increase of albumen, and if further headache, vomiting, dimness of vision, weight in the epigastrium appear, then with the os dilated labour should be operatively terminated at once under deep anæsthesia. *When eclampsia has already set in* the only rational treatment is the immediate emptying of the uterus under deep anæsthesia, since with this, as the author has proved, in 93·75 per cent. of the cases the eclampsia ceases at once or very soon after. The dangers of the operative interference are slight compared with the danger of eclampsia, if the operation is carried out antiseptically and the author's method of plugging the utero-vaginal canal with iodoform gauze is adopted against the frequent atonic secondary hæmorrhages.

Even now the mortality from eclampsia is less after delivery under deep anæsthesia than after spontaneous delivery. The mortality after operative emptying of the uterus will still go down markedly if delivery is effected whenever possible at once after the first fit noticed. The disease is thus cut short and so are its deleterious results for the mother and child, which results arise only from the long continuance of eclampsia, and the evil effect of symptomatic treatment (narcosis). The immediate emptying of the uterus is indicated in every stage of pregnancy because eclampsia always kills the foetus in the first seven months—either directly or by inducing premature labour. The fact upheld by Schauta that operations worsen the prognosis of eclampsia is only true when the delivery takes place without deep narcosis. The omission of deep narcosis in the delivery

of eclamptics should therefore be considered bad practice.

Protracted narcosis for eclampsia is on the other hand irrational, because it excites broncho-pneumonia and breaks up the red blood corpuscles and causes fatty degeneration of vital organs, partly by direct action and partly in conjunction with the intoxication of the blood already present from the uræmia.

In eclampsia, occurring with marked distension of the uterus, death may follow after a few chloroform inhalations—*direct death from chloroform*.

In these cases it may be advisable to puncture the membranes so as to diminish the volume of the uterus before inducing any anæsthesia. Since chloral changes into chloroform in the blood its use has the same disadvantages as that of chloroform.

Since the intoxication of the blood present in eclampsia induces fatty degeneration of the cardiac muscle, large doses of morphia are likewise to be considered dangerous.

On these foundations the treatment of an eclamptic case is as follows:—

Deep chloroform anæsthesia is at once induced, and the patient placed across the bed. After external examination, and disinfection of the hands, vulva, and vagina with 1 per cent. lysol solution, and drawing off the urine (kept for later examination), a vaginal examination is made.

If the os is fully dilated, and the head stands with its greatest circumference at least in the pelvic inlet, or can be pressed by strong external pressure into the pelvis so far, then after a prophylactic injection of ergotin, the forceps are applied, obliquely in all cases where the sagittal suture runs obliquely or transversely. If the pelvic floor or the perinæum offers great resistance to the

forceps extraction they are divided with Cowper's scissors, more or less deeply, on one side, and the obstruction thus removed in the interest of safer and easier delivery of the head.

After delivery the placenta is expressed while the deep narcosis continues, or if there is severe flooding it is removed by the hand. If atony continues and hot water douches are unsuccessful, tamponade of the uterus by the author's method is indicated.

Then the incisions or lacerations of the perinæum are stitched. It is only after this that anæsthesia is discontinued. If the head is movable over the pelvis, or there is cross birth, while the os is fully dilated, then version and extraction are carried out under deep anæsthesia.

With breech presentations a foot is drawn down and extraction performed as in foot cases. If the os is not fully dilated it should be artificially dilated. This is accouchement forcé, but the results are good for mother and child, when it is carried out with strict antisepsis, with suitable methods, under deep anæsthesia and early (not on a moribund woman).

In 80 per cent. of the cases dilatation may be gained at once by deep cervical incisions, and in 10 per cent. mechanical or combined mechanical dilatation and incisions must be considered (for technique see below). This combination consists in dilating the cervix under deep anæsthesia by dilators, or by the finger, in rupturing the membranes, in further dilating mechanically with the kolpeurynter, then incising the margin of the cervix, and finishing as a rule with version and extraction. This is suitable for the treatment of primiparæ with eclampsia in the last three months of pregnancy.

This combination of mechanical and surgical dilatation

is a substitute for induced premature labour, which, on account of its tedious course in these cases, instead of bringing succour may produce death directly, and has therefore properly fallen into disuse.

These three methods recommended by the author and already proved by eminent obstetricians (Fritsch, Schauta, Zweifel), render it possible, in the last three months of pregnancy, and at the onset of labour, to deliver the eclamptic mother *per vias naturales* of a living child, easily and without danger. They therefore render Cæsarean section, which has of late been done for eclampsia, unnecessary. Cæsarian section is only indicated in moribund patients, and with undilatable cervix, and may with advantage be replaced by the author's vaginal method of Cæsarean section.

The power of later conception is increased by these methods, and the later labours take place with striking facility.

If the obstetrician cannot and dare not use these methods from want of experience, then he must puncture the membranes in every case under deep anæsthesia, insert the kolpeurynter into the uterus, fill it with water up to the size of a child's head, and draw on the tube of the kolpeurynter by means of a loop fixed to the end of the bed, so that a continuous traction is exerted upon the kolpeurynter. In spite of continuance of anæsthesia strong pains will come on and expel the kolpeurynter, whereupon the delivery may be terminated with little difficulty.

If the child is evidently dead, it would be bad practice when the os is not well dilated to await delivery. Here we have in perforation and craniotraction a method of bringing the child through the insufficiently dilated os; incision of the cervix is often very applicable in these

cases in order to avoid deep bleeding lacerations of the cervix.

If the child still lives—but further delay will certainly lead to its death, and this is always the case when eclampsia breaks out in the first seven months of pregnancy—then here also in the interest of the mother is evacuation of the uterus indicated. In eclampsia in the first seven months, emptying the uterus as quickly as possible is likewise indicated. The specialist can effect this in half an hour by means of dilatation with sounds, combined version, extraction, and manual separation of the placenta. For the general practitioner the author recommends in these cases the puncture of the membranes under deep anæsthesia (with a boiled knitting needle) and the plugging of the uterine cavity with iodoform gauze (see p. 197). After twelve to twenty-four hours, as a rule, the tampon, fœtus, and placenta are all expelled together.

Prolonged anæsthesia in eclampsia is, in the author's view, only a makeshift, since it perhaps symptomatically suppresses the spasms, but it gravely injures the body in other already described ways, so that, as the author has proved, many eclamptic patients die not of eclampsia, but of protracted narcosis. The least dangerous, and for the practitioner most handy, method of narcosis is that by morphia (0·03 grm. pro dose, 0·1-0·2 grm. pro die) in the form of subcutaneous injection. This is indicated in all eclampsias of the lying-in period, and in cases where the accoucheur will not undertake immediate delivery. In this way, and by means of hot baths with packing afterwards (Breus), or by wet packs alone (Jacquet), diaphoresis is excited, while diuresis may be induced by giving Wildunger water or acetate of potash. Evacuation of the bowels is obtained by drastic purgatives. Winckel

orders for this Extract Aloes, Extract Colocynth, ana 1·5 grm. Mf. pil. No. 30, 1 to 3 pills every morning.

If the patient cannot swallow, feeding by the mouth must of course be forbidden.

Hæmorrhage Before and During Labour.

(1) Bleeding from a ruptured varix of the vulva or vagina. Treatment : ligature, or if necessary compression, by plugging vagina.

(2) Bleeding as a result of cancer of the cervix ; this is often mistaken for placenta previa. Treatment : see p. 141. When delivery is not immediately undertaken the vagina is temporarily plugged with iodoform gauze.

(3) Bleeding from *premature separation of the placenta*.

(a) In its normal situation. Causes : tardy rupture of the membranes, nephritis (Winter), traumatism, strong contraction of the uterus after puncture of the membranes in hydramnios and after birth of the first twin.

The bleeding may be *internal* or *external*.

In the first case it is only with an abnormally lax uterus that such a quantity of blood is lost before the membranes are ruptured that the woman dies from internal bleeding. There are only 200 such cases known in literature, of which half the mothers and almost all the children died.

The cause of premature separation of the placenta was, in the cases examined, found to be endometritis, which was generally due to nephritis. In two cases v. Weiss chiefly met with inflammatory degeneration of the uterine muscle. In both cases secondary hæmorrhage ensued in spite of iodoform gauze tamponade so that one case sank from the hæmorrhage, and the other case was only saved by a Porro operation (von Koffer). (The author would have

advised simple wool tamponade in both cases, but agrees that Porro's operation is indicated in very rare cases since he himself has operated with success under these conditions).

The symptoms are those of internal bleeding. Without any visible reason, or after only slight trauma, symptoms of severe collapse, pallor, pulselessness, gaping, dyspnoea, and vomiting come on. With these there is severe abdominal pain and generally a sensation of bursting, the uterus is tense, distended, and very tender, the parts of the child are scarcely if at all perceptible, the pains cease. If these signs come on delivery should be proceeded with by the aid of deep incisions in primiparæ and with mechanical dilatation in multiparæ, followed by combined version and slow extraction.

If delivery is impossible, ergot, friction of the uterus, hot douching, and rupture of the membranes are used.

As the *prognosis* is very unfavourable because rapid delivery *per vias naturales* is often impossible, such cases, if in a hospital, may be submitted to Cæsarean section, as first recommended by the author and accepted by Kaltenbach. Or the author's vaginal Cæsarean section may be performed. If the external bleeding is due to delay in rupture of the membranes and hæmorrhage continues after full dilatation of the cervix, the membranes should be ruptured.

Further separation of the placenta then ceases; the bleeding is never greater, but stops as a result of the retraction of the uterus after the membranes are ruptured.

If the os uteri is imperfectly dilated, and the membranes remain unruptured, vaginal tamponading is performed for external hæmorrhage, but any signs of internal bleeding should be watched for; this demands immediate removal of the tampon.

After rupture of the membranes separation of the placenta can only take place when diminution of the size of the uterus is very marked, as in hydramnios or in twins after the birth of the first child.

Tamponading is always contraindicated after rupture of the membranes. The treatment here consists in hastening labour as much as possible when the bleeding is severe.

(b) With insertion of the placenta into the lower uterine segment : *Placenta Previa*.

Placenta Previa.

By placenta previa we understand the insertion of the placenta upon or quite near to the internal os. Without rational treatment this anomaly constitutes one of the most dangerous conditions for the pregnant woman and her child. Since the placenta forms the lower pole of the ovum, and this is separated by the onset of pains, therefore at the beginning of labour separation of the lower portion of the placenta takes place. With each pain a further portion of placenta is separated, and thus a constantly increasing hæmorrhage is set up from the former site of attachment of the loosened flap of placenta, for the contraction and retraction of the placental site sufficient to stop the bleeding takes place only after birth of the child. Women with placenta previa are therefore exposed to the danger of bleeding to death.

We distinguish placenta previa totalis, lateralis, and marginalis. In the first form the internal os is completely, and in the second only partly covered by placenta, and in the third the placenta extends to the internal os. If these distinctions are used it is indispensable for clearness to add the size of the os. For instance, if only a

little tip of placenta overlies the os internum we get total placenta previa when the os is slightly dilated, which as the dilatation continues becomes lateral and finally marginal, since with dilatation of the os an always increasing section of the lower pole of the ovum is engaged in the os, and the placenta only forms a part of the lower pole. Placenta previa centralis forms an exception, its centre lies near the internal os, and thus it forms the inferior apex of the ovum. In this case the completely dilated os is also fully covered with placenta. The greater the os is when a total placenta previa is found, the greater is the certainty that this is also a central one. Naturally central placenta previa has the most unfavourable prognosis.

The *cause* of placenta previa is to be sought in endometritis, which leads to a lower insertion of the ovum.* Why we know not. Women with placenta previa have usually suffered from leucorrhœa and very copious menstruation.

There is also found abnormally firm adhesion of the placenta and the membranes in these cases, as well as inflammatory changes in the placenta, abnormalities which all depend on endometritis.

Since multiparæ more often suffer from endometritis, therefore placenta previa is three times as frequent in them as in primiparæ. As regards frequency, Winckel gives one case of placenta previa in 1,500 labours.

The *symptom* of placenta previa is repeated hæmorrhage. This comes on very often in the last month of pregnancy, and leads in half the cases to premature

* The theory of Hofmeier-Kaltenbach, according to which the placenta develops lower down upon the decidua reflexa, and only secondarily becomes previa, has lately been actively supported by Keilmann.

labour. These floodings during pregnancy depend upon the development of the lower uterine segment in the last months of pregnancy. By this the site of the placenta is so extended that the placenta becomes separated. Owing to abnormally firm union between the placenta and the uterine wall, the expansion of the lower uterine segment may be entirely prevented (Bayer), and then all flooding is absent until the onset of labour at term. This is, of course, better for the mother than when she comes to labour weakened by repeated flooding in pregnancy.

These losses during pregnancy may reach a considerable extent. The mother often wakes from sleep and finds herself swimming in blood—indeed, death from bleeding may occur without a single pain.

If the placenta is first separated at labour, then bleeding comes on with the first pain, and becomes more and more severe, since each succeeding pain separates the placenta more, and thus increases the bleeding surface of uterine wall. Death from bleeding may thus occur before birth of the child. But spontaneous stopping of bleeding may take place during labour in the lateral and marginal forms owing to the further separation of the placenta ceasing after rupture of the membranes.

The bleeding from the vessels already opened is stopped by the descending head pressing the loosened placental flap against its former attachment site. In central placenta previa spontaneous cessation of bleeding is much rarer during labour. In favourable cases it comes on when the placenta is fully separated from the uterine wall and the mother has nearly bled to death. In this case the placenta may be born before the child (prolapsus placentæ). The descending members of the child then plug the placental site.

Naturally the child is much endangered by placenta

previa. Through the fall in the maternal blood-pressure the placental exchange of gases suffers disturbances (Runge), and the child often dies of asphyxia before the mother shows ominous signs of anæmia. If a third of the placenta is separated the child dies because its breathing area is too small to cover its requirements in oxygen. The remaining breathing area may become still more limited by the presenting part of the child so compressing the yet adherent placenta, in addition to the loose placenta, that the circulation of blood in large districts is cut off (suicide of the fœtus). Exceptionally the fœtus bleeds directly to death, when the placenta is lacerated owing to its separation by the pains, or is torn by examination or by combined version. The *diagnosis* of placenta previa is easy. With bleeding in the latter months of pregnancy, and at the beginning of labour, it is always necessary to think of placenta previa. A certain conclusion may be obtained by internal examination, which is always to be carried out in such cases, if it be possible to pass the finger up to the internal os. One feels, instead of the smooth elastic membranes, the rough placental tissue, and in placenta previa lateralis one feels both. If the os is closed we may suspect placenta previa when the portio feels very strikingly soft, and the presenting part remains high, and can only be felt from the vaginal fornix as if through a thick cushion.

The author has often been sent for to cases of supposed placenta previa, which really were cases of carcinoma of the cervix. In one case he found hemicephalus, where the bleeding spongy remnants of brain had been taken for placenta previa.

The *prognosis* of placenta previa, both for the mother and the child, depends upon the timely interference and skill of the obstetrician. The author only lost one mother in 50 cases (2 per cent. mortality), and she was pulseless

when she came under treatment. The midwife had plugged, with the os closed, after puncturing the membranes, and the mother had literally bled to death into her uterus. The uterus was tightly distended with blood, so that combined version was impossible owing to its distension.

Perforation and extraction with the cranioclast were rapidly done. The placenta was removed as quickly as possible, the uterovaginal canal tamponaded, and a subcutaneous injection of normal saline given. The woman did not lose a drop more blood after delivery, but still she died half an hour later from the effects of the loss already sustained.

Treatment.—For bleeding during pregnancy with the os closed, which we only suspect to be due to placenta previa, absolute rest in bed and Dover's powder should be ordered. If the bleeding still continues or increases then plugging the vagina is indicated. Certainly this often leads to premature labour, but this is the best thing for the mother, since she thus avoids further bleeding during the pregnancy. If we find the os passable for one finger we can stop the bleeding—

(1) By simply rupturing the membranes.

The further separation of the placenta then ceases, and the bleeding from the point of attachment of the separated flap of placenta is also stopped when the presenting part comes down and compresses the flap of placenta against its seat of attachment, and this again against the pelvic wall. For this, however, pains are necessary, and they are often wanting. And even when pains are present total placenta previa offers a mechanical obstruction to the advance of the presenting part. The treatment is, therefore, only advisable in marginal placenta previa where the placenta reaches to the margin of the os.

(2) By firm tamponade of the vagina.

(This, however, should not be done after rupture of the membranes for fear of internal hæmorrhage).

The dangers of septic infection by the tamponade, which were formerly very great, are completely avoided by antiseptic procedure (see paragraph), and the hæmorrhage may be stopped for a time in this way, because the lower segment of the uterus is firmly pressed against the ovum and the flap of separated placenta; but while the tamponade is being changed the patient may lose much blood, and the change must be effected from time to time in order to see if the os is sufficiently big for delivery. Tamponading may easily lead the accoucheur on external grounds to undertake delivery with an incompletely dilated os. Lacerations arise in this way in the abnormally vascular lower uterine segment, which expose the woman to the danger of fatal bleeding.

(3) By combined turning with one foot (Braxton Hicks).

As a result of rupture of the membranes the further separation of the placenta ceases, and the bleeding from the already opened vessels of the uterine wall is stopped through the tamponade exercised upon them by means of the breech. The operation is markedly facilitated by anæsthesia. Ether is to be preferred as an anæsthetic in anæmic parturient women (see Anæsthesia).

For the combined version it is very rarely necessary to perforate the placenta in order to reach the amniotic cavity. Generally one can reach the membranes at some spot or other without this, or one may separate a bit of placenta.

The advantages of combined version are as follows:—

(a) This can be done as soon as the patient is seen. (The internal os uteri will allow a finger to pass as soon as any rather severe bleeding from placenta previa occurs.)

(b) From this moment there is no more bleeding. (If any bleeding does take place after combined version traction can be maintained for some time on the foot.)

(c) The danger of septic infection is reduced to a minimum since the manipulation is very short.

(d) After turning, nourishments administered at once enable the patient's strength to increase, as a result of which the woman bears the physiological loss of blood in the third stage much better.

(e) Since extraction is only carried out on the living child, and then only after complete spontaneous dilatation of the os, the after-birth period progresses much more smoothly than in the old method of tamponade, and consequent rapid emptying of the uterus with an incompletely dilated os.

(f) The treatment takes but little time, and has above all the very striking moral effect that after the short and single manipulation by the practitioner the bleeding is definitely stopped.

The *maternal mortality* by the old method described under heads 1 and 2 was about 30 per cent.; by the *new method of combined version* which is specially cultivated in the two Berlin clinics, it is 4·5 per cent.! (The author did not lose a single one out of 35 cases of combined version.) The *mortality of the children* is the same under both methods, namely 60 per cent.

This high mortality of the children is a disadvantage of combined version. The second drawback consists in the fact that the practitioner is often not well up in combined version. When the os is only passable for one finger the foot can only be got down by this finger as follows:—The finger is passed behind the foot, and this, together with the cervix, is pressed against the symphysis, then by con-

stant fixing of the foot against the symphysis both finger and foot are brought through the cervix. The symphysis thus takes the place of a second finger.

The drawbacks mentioned are avoided by a method which the author has only tried in six cases, with the result that all the mothers passed through a normal puerperium, and five children were born alive, only one of them, a premature child of 1,400 grm. weight, dying of low vitality.

The method consists in the introduction of a thin-walled kolpeurynter into the uterus, and it differs from its precursors (Madurwicz, Schauta, Mäurer) in that the membranes are ruptured and the kolpeurynter is introduced into the amniotic cavity, and secondly by the keeping up of a permanent automatic traction on the tube of the kolpeurynter.

The arrest of bleeding takes place on the principle that the kolpeurynter compresses the separated flap of placenta upon its former site just as well as the descending foetal parts.

The rupture of the membranes is often not easy. When the condition is total it is better not to perforate the placenta, but to separate a bit of placenta until the membranes are reached, and then to open these with a boiled knitting needle or a pair of volsella. The folded up kolpeurynter is grasped in bullet forceps, and it can then be introduced into the amniotic cavity in any case where the cervix will allow one finger to pass.

The nozzle of the kolpeurynter is then attached to an irrigator tube, and half a litre of water is driven into the kolpeurynter by elevating the irrigator. Then the end of the tube of the kolpeurynter is tied to the bottom of the bed by means of a loop, and stretched and extended as much as the patient can bear without severe pain. Both

limbs of the kolpeurynter are attached to the loop by means of catch forceps.

Soon after introduction of the kolpeurynter smart pains come on, which in three of my cases expelled the kolpeurynter within three hours. In two of these cases the child was born immediately after, and in the third case internal version and extraction were performed on account of the recurrence of bleeding. In this method of kolpeurynter the physician must be at hand all the time in order to be able to stop the bleeding after expulsion of the kolpeurynter by delivery at the right time.

If the kolpeurynter is not expelled it is allowed to remain for twelve hours, and it is then removed by pulling on its lower end, after which internal version and extraction are done at once.

The arrest of hæmorrhage by this method is an absolutely safe one, and further it renders version unnecessary in many cases. If, however, interference is necessary, then after extraction of the kolpeurynter the cervix is so dilated that internal version can be done, and the child extracted at once, whereby its chances of living are much improved.

By boiling or brushing with corrosive sublimate solution the kolpeurynter can be so safely disinfected that there is no danger of septic infection from the long stay of the kolpeurynter in the uterus.

In the period after delivery the already anæmic mother must be saved as much loss as possible.

This rule is all the harder in that the muscularly weak lower uterine segment physiologically contracts less than the other segment, and therefore in placenta previa even with normal contraction of the uterus, the loss of blood is greater from the abnormally vascular lower uterine segment during the period after labour than when the

placenta is normally situated. By giving an injection of ergotin towards the end of labour we secure as firm contraction of the uterus as possible. By this means the arterial branches supplying the lower uterine segment which enter the uterine wall at the level of the contraction ring are compressed and the blood supply of the placental site is lessened (Hofmeier).

The emptying of the bladder should be seen to, the uterus carefully controlled by the superimposed hand. Friction is only used when there is bleeding, and the placenta should not be expressed until half an hour after delivery. If expression is unsuccessful and bleeding goes on in spite of massage, then manual separation of the placenta is performed under strict antiseptic precautions.

Neither this nor combined version in placenta previa should be done in the lateral position, since fatal air embolism may thus occur (Olshausen).

If bleeding keeps on after separation there should not be much delay in plugging the uterovaginal canal, in order to spare the exsanguined mother any later small loss. For this the vagina must be packed firmly with wool (see bleeding after labour).

For performing combined version narcosis is undoubtedly necessary, and it is very helpful for separation of the placenta.

On principle ether narcosis is certainly to be preferred in these cases; but in practice difficulties arise in using it (danger of fire, longer duration of the stage of excitement, larger inhaler and ether bottle).

(4) Hæmorrhage from rupture of the uterus or perforating vaginal rupture (Kolpaporrhæxis).

The signs of severe distension of the lower uterine segment may be regarded as premonitory. Rupture occurs either spontaneously or on attempts at delivery

(version in cross births). Sure signs of rupture in addition to the bleeding are collapse, and mobility of the previously fixed presenting part. The diagnosis is further confirmed by feeling near the child which has passed into the belly cavity the empty uterus diminished in size. Complete and incomplete ruptures are differentiated. In the latter the peritoneum is not torn through, but still in this form fatal bleeding may ensue (Leopold).

The prognosis is absolutely bad unless quick assistance be given. The mother dies of shock, bleeding, or sepsis.

The *best treatment* on principle is laparotomy for removal of the foetus and after-birth, for suture of the tear, for search for bleeding vessels, and for amputation of the body of the uterus. Less severe and quicker of expedition is vaginal extirpation of the ruptured uterus, which the author first performed with success. In practice, these procedures are generally not applicable.

Here we deliver *per vias naturales* by version or perforation, and plug the abdominal cavity as high as possible through the laceration; if atony of the uterus exists, then the uterus and vagina are also plugged with iodoform gauze. This procedure first practised by the author has been successful in many cases. Afterwards the tampon, which is easily felt, is pressed from the abdominal walls against the uterus.

By this means complete arrest of very severe bleeding may be obtained, and the author has from the beginning laid more stress on the arrest of bleeding than upon the drainage action of the gauze, which is of secondary importance. How great a part bleeding actually plays in uterine rupture Leopold has conclusively proved. Mere drainage is a quite insufficient procedure. The gauze is removed in 24 to 48 hours.

(5) In very extremely rare cases bleeding may take

place from foetal vessels when a velamentous insertion exists and the expansion of vessels spreads over the os uteri.

The source of the bleeding can naturally therefore only be detected in those cases where one or more pulsating and undisplaceable bands are felt on the inside of the membranes.

Prophylactically rupture of the membranes must be kept off by vaginal tamponade, but as soon as the os is fully dilated the delivery is undertaken. If the membranes rupture with the os incompletely dilated the quickest method of delivery is indicated, in primiparæ by the aid of deep cervical incisions if the obstetrician is master of the technique.

If one arrives at such a case after rupture of the membranes, the constantly increasing weakening of the foetal heart sounds will give the indication for delivery. In these cases there may be an absence of all bleeding and the child may yet die (of asphyxia) when no vessel is divided by the laceration of the membranes, for the child coming down may compress the vessels coursing on the edges of the torn membranes.

Hæmorrhage after Birth of the Child.

The post-partum hæmorrhages are divided as follows:—

- A. Bleeding from the uterine cavity.
 1. Bleeding before removal of the after-birth (after-birth flooding).
 2. Bleeding after removal of the after-birth.
- B. Bleeding from cervical lacerations.
- C. Bleeding from vaginal lacerations.
- D. Bleeding from perinæal lacerations.
- E. Bleeding from laceration of the clitoris.

- F. Bleeding from inversion of the uterus.
- G. Bleeding into the perivaginal tissues (Thrombus or Hæmatoma vaginæ et vulvæ).
- H. Late hæmorrhages.

A. Bleeding from the Uterine Cavity.

1. Bleeding before removal of the Placenta.—Bleeding from the uterine cavity before removal of the placenta is due to weak labour pains which only separate part of the placenta. The hæmorrhage comes from the attachment site of this portion because the opened uterine vessels only become occluded by the firm contraction and retraction of the uterus after expulsion of the placenta.

The after pains are too weak—

1. When they are excited too soon by rubbing, and attempts at expression while the uterus is exhausted.

It is a mistake to use friction with a slack atonic uterus unless when no external or internal hæmorrhage is present.

In this case the placenta is fully adherent. Friction here excites only weak pains, which partially separate the placenta. The exhausted muscle should be given time to gather fresh strength. This atonic condition generally lasts for many hours, even days. Under these circumstances the physician cannot wait for ever with the woman, and, on the other hand, the latter may have severe flooding at any moment. Many accoucheurs escape this dilemma by separating the placenta manually, if within two hours it cannot be expressed by Credé's manipulation.

The author has utilised tamponade of the uterus very often in such cases. In a case of partial separation of

the placenta bleeding occurred in spite of the tamponade. On the other hand, in a case of completely adherent placenta this was easily expressed 24 hours later, when the gauze was taken away, and there had been no hæmorrhage at all during this time.

2. If the uterus has been very distended (hydramnios, twin pregnancy).

3. After rapid operative or spontaneous emptying (precipitate birth) of the uterus.

4. After overstrain of the uterine muscle (continuation of secondary uterine inertia into the after-birth period).

5. From weakness of the uterine muscle (in very young or very old primiparæ, and in multiparæ).

6. From insufficient nourishment (frequency of hæmorrhages in women of the lower orders).

7. From distended bladder.

Diagnosis.—One finds on grasping the uterus a defective contraction of it, and abnormally free external hæmorrhage, or signs of internal hæmorrhage, such as anæmia and great distension of the loose uterus, which may fill the whole abdomen. The well contracted uterus may reach above the navel also, but in this case the uterus is narrow and extends but little on each side of the middle line. If the uterus hardens from massage, after internal hæmorrhage, a large quantity of blood is expelled per vaginam. It should be noticed whether the bleeding does not come partly from a tear of the perinæum or clitoris, and the possibility of a cervical laceration should be borne in mind.

Treatment.—This should keep strictly to a distinct order of procedure, and consist of the following steps:—

1. Emptying the bladder.

2. Friction of the uterus (and the posterior wall) with both hands, and ergotin injections (0·3 gramme).

3. Hot uterine douches (40° R. = 122° F.) with 1 per cent. lysol solution.

4. Ice-cold antiseptic uterine douches (N.B.—When these can be obtained and the bleeding is moderate). If the uterus contracts strongly after this treatment Credé's manipulation is used. But if it still bleeds with defective or weak contraction, so that the mother is in danger of her life, the *placenta must be separated manually*. When this is done under strict antiseptic precautions it is a safe operation, but if not it is an eminently dangerous one.

5. *Operative Separation of the Placenta*.—The patient lies on her back. The hands of the operator and the vulva and vagina of the mother are disinfected. Anæsthesia is induced. While the left hand fixes the umbilical cord and then grasps the uterus, the other hand passes into the uterine cavity along the cord. If it meets a freed flap of the placenta, above the internal os, the separation is begun here by tearing with saw-like movements through the fine union between the uterus and the placenta, the volar surface of the hand being kept continually toward the placenta. While separating the placenta the outer hand should grasp the uterus firmly and press it strongly downward. The hand thus gradually forces its way into the tubal angles where the separation is always most troublesome, and must be aided by counter-pressure with the external hand. If the membranes clog the operating hand they should be torn through. Separation of the placenta from within the membranes, which has been recommended, is as difficult as operating in gloves. One should not pull on the separated portions, but should express the placenta from above.

If the upper rim of the placenta has been completely separated it does no harm if it is adherent in a small

spot lower down. By a half turn of the placenta, which is held in the whole hand above, one easily shells it completely out. If the placenta is on the right side, now and then one can only fully complete the separation with the right hand, by placing the woman on her right side. But in this there is danger of air embolism. It is therefore better to remove the right hand and to use the left hand after disinfecting it. If the separated part lies higher up one goes first to the insertion of the cord and defines from this the periphery of the placenta. If nothing is made out about the separated portion, one begins the separation from the margin after tearing the membranes. If the margin is not clearly felt then one tears through the placenta to the uterine wall at some spot and begins the separation here.

After removal of the placenta with the hand in the vagina, two fingers are passed again to make sure that no remnants are left behind.

In many cases the cervical canal is contracted and only passable for from two to four fingers. The author has always succeeded in separating the placenta manually in these cases with the aid of external pressure suitably applied, and the introduction of the whole hand into the vagina.

2. Hæmorrhage after removal of the Placenta.—

The causes given above continue their action in this case, the uterus remains slack and the freely opening vessel mouths remain patent in the placental site. The treatment is given on p. 194, sections 1-4.

If the bleeding still continues one should again explore the uterine cavity in order to remove any remaining portions of placenta or membranes. If membranes are met with in the vagina they should be seized with dressing forceps, twisted into a rope by rotation, and then

cautiously extracted. If bleeding still goes on when the uterus is empty the uterus and vagina must be tamponaded according to the author's method. This brings about stoppage of hæmorrhage in two ways as many have learnt by experience :—

1. By exciting stronger contraction and more lasting retraction of the uterus.

2. By compressing the bleeding placental site.

Tamponading done antiseptically is quite free from danger. This cannot be said of the injection of liquor ferri perchloride. One should therefore give up looking upon the tamponade as a last resource, but should turn to it as soon as the ordinary means already mentioned have failed to stop the bleeding.

The best material for tamponading is sterilised iodoform gauze (5 per cent.), four fold, a hand's breadth in width and five metres long. This should be kept in a special

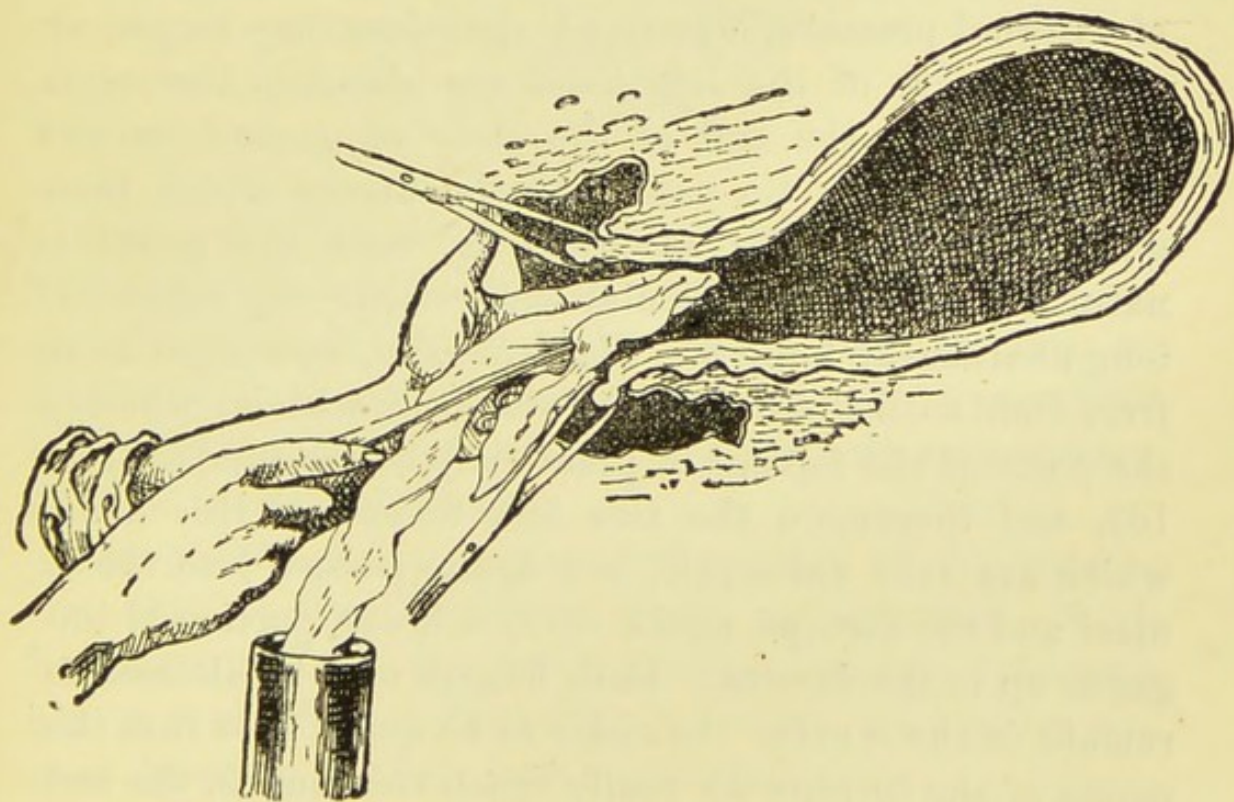


Fig. 15.

tin box (Case No. 1, Fig. 17). It is dangerous to use simply sterilised gauze, as the author has experienced, because germs may be carried with the gauze from the vagina or the cervix to the placental site. These germs are rendered innocuous by the iodoform gauze, but naturally not by simple sterilised gauze, and not even by sterilised salicylic gauze. If the material advised by myself is not at hand, linen strips are used, previously boiled and squeezed out of carbolic acid solution. The vagina should in this case be plugged with salicylic wool because linen has little capacity for absorption.

Technique of the tamponade.—The mother is laid across the bed with the upper body somewhat raised so as to avoid air embolism.

Both lips of the cervix are seized as high as possible with two volsellas under guidance of the fore and middle fingers of the left hand and the os uteri is drawn down to the vulva. If this cannot be done even with the aid of external pressure, a grooved speculum may be passed, or two fingers of the left hand are placed in the cervix (Fig. 15), and the end of the strip of gauze is carried directly from the tin case into the uterus under their guidance. When the speculum is used the gauze is naturally passed under ocular supervision—by means of long anatomical forceps. The left hand, now once more free, feels with its little finger side from without whether the point of the forceps is practically at the fundus (Fig. 16), and thereupon the two first fingers of this hand, which are still antiseptic, are again passed into the os uteri and the forceps again carry a lower portion of the gauze up to the fundus. Both fingers may be allowed to remain in the cervix. In order to be quite sure that the points of the forceps do really reach the fundus, the end of the forceps is placed in the hollow of the left hand,

the forceps is fixed with the fourth finger, and the now released right hand is made to grasp the fundus so as to feel the tips of the forceps. For this purpose the left hand must push the forceps gently against the fundus. In order to insure asepsis the surgeon must be careful that the right hand does not come in contact with the gauze during the further carrying out of the tamponade.

In this way the whole uterus is gradually plugged from above downwards.

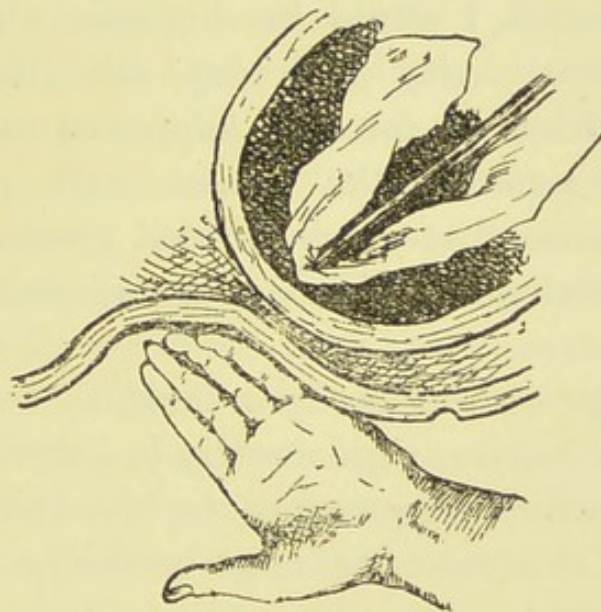


Fig. 16.

If the uterus is carefully pressed into the pelvis by the midwife, the volsella may be dispensed with. One can also use dressing forceps instead of the long forceps, or the strips of gauze may be passed into the uterus with the whole hand—a proceeding which is only seldom very painful and inconvenient.

Tamponade of the vagina follows that of the uterus, and this is done loosely or firmly as required. With hæmorrhage from the lower uterine segment (placenta previa and cervical lacerations) cotton wool plugs are used because of their less penetrability.

In cases of more severe hæmorrhage anæsthesia may

be used with very sensitive women, so that one may not cease plugging too quickly on account of any expressions of pain by the patient. If no contraction comes on after tamponade of the uterovaginal canal in a case of absolute atony of the uterus, and the uterus is becoming distended by internal hæmorrhage, one should compress the uterus from without against the tampon. If bleeding still persists externally in spite of combined gauze and wool tamponade, and after the presence of a cervical laceration has been excluded, I would in this case also completely fill the uterine cavity with dry salicylic wool plugs. Neither condition so far has happened in my practice. But I have removed the uterus with success in a case of immense distension of the uterus in a dying woman and without performing a tamponade first (see p. 197).

Hæmorrhage coming on from half to two hours after the tamponade has its origin usually in a strong contraction of the uterus which is squeezing the blood out of the strips of gauze. In this case one must certainly not plug, but remove the gauze.

About 0·03 per cent. of all parturient women die from atonic bleeding after labour, or in other words in Prussia alone one woman each day dies from bleeding after labour! The great majority of these might be saved by the methods described.

B. Hæmorrhage from Cervical Lacerations.

If the uterus is well contracted, and there are no external injuries, any severe hæmorrhage arises from a cervical laceration,* which is usually lateral, and extends

* If there are no lesions, and the uterus is well contracted, the source of bleeding must be sought in a ruptured aneurysmatic vessel in the uterine cavity. *Treatment.*— Tamponade of the uterus.

above the insertion of the vagina, and often implicates not only the uterine wall but also the parametrium. Consequently large branches of the uterine artery and even the uterine artery itself may be torn into.

Deep lacerations such as these in which at rare times the peritoneum also is torn (perforating cervical lacerations), generally occur only when extraction is performed with rough force and with the os imperfectly dilated. On suspicion of a laceration of the cervix the experienced accoucheur will feel the tear directly. The diagnosis may be difficult when bleeding is taking place at the same time, both from an atonic uterus and from a cervical tear. For these cases tamponade of the uterovaginal canal is of special importance, because it stops bleeding from both sources. It also stops bleeding from any vaginal or perineal lacerations which may be present, and enables us to make out that the bleeding in laceration of the clitoris does not come from the vagina. My method therefore requires only slight diagnostic capacity. This easily forsakes the beginner at the time of severe bleeding. If the bleeding from the uterine artery does not stop after plugging with gauze and wool, it is at any rate much lessened, so that one can proceed with more leisure to prepare for suture or the passing of a deep ligature round the vessels. In practice the latter is more advisable than suture when carried out by drawing down both cervical lips with volsella under guidance of the fore and middle fingers of the left hand. A Deschamp's needle is most suitable for passing this deep stitch.

With cervical lacerations opening far into the parametrium, suture is of no avail even in the hands of a skilled obstetrician, but will merely change the bleeding into a hæmatocele.

If one plugs in such cases the gauze must of course be

carried through the tear into the cavity of the parametrium. The author has in this way always been able to stop the bleeding by simple plugging without recurrence of the hæmorrhage when the strips were removed 24 hours later.

C. Bleeding from Vaginal Lacerations.

This is usually of very little importance. It is to be remembered when there is bleeding in spite of good uterine contraction and cervical tears cannot be felt nor external injuries seen. If the laceration is within reach it should be stitched, or the bleeding may be stopped by plugging the tear.

Severe bleeding from vaginal tears only occurs when there is a perforating vaginal tear or a ruptured varicose vein. In both cases the laceration should be stitched when possible or else tamponaded.

D. Bleeding from Perinæal Lacerations.

This may be very smart at the onset. The diagnosis is made by inspection of the external genitals.

Treatment.—Provisional tamponade and suture after expression of the placenta (p. 45).

E. Bleeding from Tears of the Clitoris.

From a tear of from $\frac{1}{2}$ to 1 cm. long the bleeding may be so profuse as to cause dangerous hæmorrhage.

Diagnosis.—Inspection of the external genitals and introduction of a strip of gauze into the vagina. It is then evident that the bleeding comes from in front and not out of the vagina.

Treatment.—Suture or provisional plugging.

Resumé.—*If bleeding comes on after removal of the placenta in the vast majority of cases the practitioner has a safe and certain means of preventing the bleeding, let it arise from whatever cause it may, or of learning its source (as in tears of the clitoris), by antiseptic tamponade of the utero-vaginal canal with sterilised 5 per cent. iodoform gauze.*

About 0·1 per cent. of all women having children succumb from dangerous bleeding in the after-birth period.

F. Bleeding from Inversion of the Uterus.

Causes of inversion :—

1. Pulling on the cord (old method of removing the separated placenta) while the placenta is still adherent.
2. Using Credé's manipulation with a relaxed uterus.
3. Excessive action of the abdominal pressure.
4. Precipitate labour.

Symptoms.—Signs of shock, and severe bleeding in case a portion of the placenta is already separated.

Diagnosis.—A tumour is found at the external genitals or in the vagina, while the uterus is wanting in its normal situation.

Prognosis.—This is very serious without quick help.

Treatment.—Reposition, then manual separation of the placenta and tamponade of the uterus in order to prevent relapse.

G. Hæmorrhage into the Perivaginal Tissues.

(THROMBUS VEL HÆMATOMA VAGINÆ ET VULVÆ).

Ætiology.—The dragging down of the vagina by the descent of the head leads to laceration of the vessels of the perivaginal tissues. The head acts as a plug at the time, so that blood can only collect after delivery.

Symptoms.—Smart pain in the labia or vagina, and, in the worst cases, anæmia.

Diagnosis.—A bluish tumour is visible at the vulva, or may be felt in the vagina. This is elastic or fluctuating. It reaches to the lateral angles of the uterus in rare cases, and even as high as the kidneys.

Prognosis.—This is favourable with suitable treatment.

Treatment.—Ice packs, firm vaginal tamponade with a kolpeurynter filled with ice water. If the swelling increases and threatens to burst, or if signs of critical anæmia appear, or absorption is protracted, or suppuration comes on, then free incisions are made, and washing out with lysol, carbolic, or salicylic acid lotions and tamponade with iodoform gauze are carried out. If the swelling extends higher in the abdominal cavity, and the internal bleeding continues, laparotomy and search for the bleeding vessels may be indicated, as recommended by Leopold for hæmatoma in incomplete rupture of the uterus. If this is impossible a firm abdominal binder and pressure upon the aorta are advisable.

H. Late Hæmorrhages.

The hæmorrhages which take place in the course of the puerperium are called "late bleeding." They depend upon defective retraction of the uterus, upon retention of bits of after-birth or of blood clots, which are deposited on the placental site (placental polyp) upon the presence of new growths (myoma, carcinoma), or malpositions of the uterus (retroflexio uteri, inversio uteri chronica), and upon the rupture of aneurysmatic uterine vessels.

The treatment consists in the removal of the abnormal contents of the uterus or of the tumours, in replacing the

uterus when malpositions are present and inserting a ring for retroflexion, and in opposing the atonic and the aneurysmal bleeding by tamponade of the utero-vaginal canal when ergot and hot douches remain unsuccessful. If the atony outlasts the lying-in period (chronic atony of Somer) the use of the constant current, with introduction of the positive pole into the uterus, is indicated.

Treatment of the Consequences of Hæmorrhage, of Anæmia.

This consists in the first place simply in replacing the lost fluid. This is done most quickly by injections of warm water into the large intestine. The water is sucked up by the mucous membrane like a sponge, and the pulse improves in a few minutes. This procedure fails in its object, according to the author's experience, in isolated cases of anæmia, in which, while the patient is not faint, the sphincter ani is temporarily paralysed. Here a subcutaneous infusion of 1-2 litres of a 0·6 per cent. solution of common salt is given (Münchmeyer-Leopold). For this all one requires is a largish canula, which fits the irrigating tube, and a few common salt powders of 6·0 grammes each. The skin between the shoulders is selected as the point of injection.

Further measures.—Fresh air, laying the head low, bandaging and elevation of the extremities (autotransfusion), the use of hot water, and the administration of strong wine, champagne, brandy, rum, or strong coffee (one spoonful to the cup)—all of these to be given only in teaspoonfuls, because there is a tendency to vomit in anæmia. After these procedures subcutaneous injections of ether, which are very painful, appear almost superfluous.

Compression and Prolapse of the Umbilical Cord.

The umbilical cord is, as a rule, compressed only when it is prolapsed, that is when it can be felt after the rupture of the membranes near or beneath the presenting part.

Exceptions.—The cord coiled round the foetal neck may become compressed between the neck and the symphysis towards the end of the expulsion stage (G. Veit). In these cases, as a rule, the child is born simply asphyxiated, but not dead. The coiling round the neck is more dangerous when the forceps are applied, because of the compression of the cord by the tips of the blades of the forceps (Hecker).

The *ætiology of presentation and prolapse* of the cord depends upon the presenting part filling the pelvis imperfectly, as happens in contracted pelves, cross-birth, breech cases, pendulous abdomen, and hydramnios. Of course, under these circumstances, a long cord will descend more easily than a short cord, or one much coiled up. By *presentation* of the cord is understood the position of the cord near or beneath the presenting part while the membranes are intact.

The diagnosis rests on the presence of a pulsating and movable band behind the membranes.

Presentation of the cord is only dangerous in that the presenting cord may prolapse on rupture of the membranes. A pulsating prolapsed cord cannot be mistaken for anything else. The child dies in prolapse of the cord as soon as the presenting part engages in the pelvis, unless the child is born within a few minutes. The latter often happens with breach presentations, but rarely in head cases. The prognosis, therefore, with a head presentation is less favourable.

Treatment.—When the cord is presenting the patient should be placed upon the side toward which the presenting part has receded. If owing to this the part enters the pelvis it usually pushes the cord, which is floating in the amniotic sac, in favourable cases away from the os uteri. One also tries to avoid premature rupture of the membranes by tamponading the vagina.

When the *prolapsed cord* is pulseless no operation should be undertaken unless danger to the mother affords an indication. In *head presentations* with *prolapsed pulsating cord*,* version and extraction, carried out by an experienced hand, is the best procedure, provided that the os uteri is fully dilated (in primiparæ this dilatation may be obtained by incisions). If the os uteri on the other hand is imperfectly dilated, the skilled accoucheur should turn by combined version as proposed by Fehling, but without bringing the foot lower down into the vagina (the foot must be put into a noose to prevent its slipping right back).

The beginner may try reposition of the prolapsed cord at first. This must be done quickly, when possible, and with the whole hand. The patient is laid on the side of the prolapse for this, and after successful reposition upon the opposite side. Olshausen advises the knee-elbow position for reposition. After successful reposition the heart sounds must be carefully watched, because a loop easily slips down and is again compressed. If flattened pelvis, or prolapse of an arm, or an unfavourable head presentation, complicates the prolapse of the cord, version should be performed without attempting reposition beforehand. The same is done in case of cross-birth. In breech cases the anterior foot is brought down, and the

* The student must in this case place the woman upon the side of the prolapse, so that the head may recede still more and the umbilical cord be saved from compression.

child extracted if the cord pulsates slowly and weakly. If the head is impacted in the pelvis and the cord still pulsates—a rare case—forceps are indicated.

Asphyxia of the Child.

By *asphyxia* or apparent death we mean the condition in which no breathing takes place, but the heart still beats. Asphyxia arises within the uterus, as a result of lessened carriage of oxygen to the foetal blood. As a result of the irritation of the respiratory centre by the blood rich in CO₂ (carbonic dioxide), the child begins to breathe prematurely. Gradually, however, the respiratory movements cease again because the irritability of the respiratory centre is depressed by the lessened supply of oxygen, and consequently the blood poor in oxygen, and rich in carbon dioxide, does not excite any more respiratory movements. If the child is born at this stage of apparent death there are three indications to be met in treatment:

1. Removal of the matters aspirated into the lungs.
2. Supply of oxygen.
3. Forcible stimulation of the circulation.

These three conditions may be fulfilled in various ways according to the degree of the asphyxia.

If it is the *first stage of apparent death*, the so-called blue asphyxia, in which the face looks blue, and the muscle tonus and reflex irritability are retained, breathing may be set going reflexly by strong stimulation of the skin.

By the supply of oxygen the energy of the circulation is increased, and the aspirated matters are ejected by the child's own movements (vomiting and coughing). Every asphyxiated child should have its cord tied at once and its mouth cleared of the aspirated matters with the finger. If the child now reacts by attempting to vomit we are

dealing with the first stage of asphyxia. Such a child should be dipped into a warm bath. If this is still insufficient to excite strong inspirations, the chest is sprinkled with cold water from a slight height, or the child is dipped for a second into a pail containing cold water. If this also fails one gives the child a few smart slaps on the buttocks.

We must here remember that in many children the reaction to the slaps is much more distinct than to cold water. If breathing is going on, the throat should be cleared from time to time of masses of mucus. If large crepitation is present, two swingings by Schultze's method will as a rule bring the lumps of mucus away, so that catheterising the trachea is but seldom required for this purpose. This latter is a very difficult procedure for the beginner when the child is in the blue asphyxia stage.

In the *second stage of asphyxia* (pallid asphyxia) both muscle tonus and reflex irritability are extinguished. As a consequence no stimulation can bring on respiration, but artificial respiration must be performed at once. The best method of artificial respiration is that of B. S. Schultze. By the Schultze swingings the movements of the thorax are the freest. The method also begins with a movement of expiration which brings out the aspirated masses, when they are not too tough, and thirdly it increases the action of the heart by driving the blood, during the inspiration movement, from the veins into the heart, and during expiration from the heart into the arteries.

The deeply asphyxiated child is placed for a moment in the warm bath in order to clean it superficially from blood and meconium. It is then grasped with both hands by the shoulders in such a way that the thumbs lie on the anterior surface of the thorax, the forefingers are laid

from behind into the axillæ, and the other three fingers are laid obliquely on the back of the child's thorax. The head thus finds its support from the ulnar margins of the hands. The physician now stands with his legs somewhat separated, holding the child as described, his arms pointing down in front of him, and he swings the child up, so that through flexion of the vertebral column in the lumbar region, the pelvis and lower extremities fall over forward—expiration. If the child is slightly shaken in this position the aspirated masses very often come out of the nose and mouth. Then the physician swings the child back to its first position with a certain force—inspiration. The air often enters the trachea with an audible sound when this is done. Neither by in- nor by ex-piration may the thorax be compressed by the hands laid upon it, and the neck must be kept extended. If these cautions are not attended to the child may suffer serious harm. After about six swings the child must be put into the warm bath again in order to avoid any severe loss of body heat.

If these swinging movements have no effect, and spontaneous breathing does not come on, and the heart's action becomes weaker, the trachea should be catheterised and aspiration performed. The reason for the failure of the swingings will then be often found in the consistence of the aspirated masses, which may be so tough that the physician himself cannot blow them out of the catheter, but has to force them out with a stream of water. If the "swingings" are now repeated their result may be a brilliant one, that is, the skin colours, the heart's action becomes stronger, slight spontaneous attempts at respiration come on, in short, the asphyxia of the second degree passes into that of the first, for which the treatment already described is then indicated.

Olshausen aspirates first in deep asphyxia, and then brings about artificial breathing by grasping the sternum with the thumbs, the back with the eight fingers, and pressing the sternum backwards and suddenly ceasing the pressure. If this method does not act then he proceeds to blow air into the child or to use Schultze's method of swinging. The blowing in of air has according to Schultze a disadvantage, in that the fluctuations of pressure, which are so stimulating to the heart's action, are very small.

Commonly the catheter is passed into the œsophagus instead of the trachea.

The whole secret of passing the catheter consists simply in bringing the tip of the catheter, with the forefinger of the left hand, into the entrance of the trachea, in pressing it somewhat forward, and then, while somewhat retracting the forefinger, in pushing the catheter forward well in the middle line with the right hand.

One must not stop the attempts at resuscitation as long as a trace of heart action is left, and they should be kept up until the child cries continuously and loudly, the skin is tinted rose colour, the extremities move freely, and the eyes are opened.

As regards **prognosis**, this is favourable from the first, when the heart beats regularly, and even when it beats weakly and slowly. Those cases are unfavourable where the heart's action is irregular and weak, even when there is now and then observed a spontaneous attempt at respiration.

The cords of asphyxiated children should be tied with special care, because the blood pressure in the umbilical arteries in these cases is increased. The attacks which have been made upon the swinging method have been controverted by Runge, as well as by B. S. Schultze.

Pathology of the Puerperium.

The most important and most dangerous disease of the lying-in period is *puerperal fever*. About 0·5 per cent. of *parturient* women die of this fever, and a much greater number, after a feverish lying-in, are left with all sorts of diseases of the genital organs, which may damage the patient very severely.

Puerperal fever is a disease of wound infection (Semmelweis) produced by the entrance of micro-organisms (streptococcus and staphylococcus pyogenes) into those wounds of the uterus, cervix, vagina, or perinæum, which may be present in parturient lying-in women.

It is still an open question as to how far the various pathological processes of puerperal fever are caused by the micro-organisms themselves, or by their products the ptomaines. The inoculation of the cocci is produced by irritation of the wounds with dirty fingers or instruments, and this generally takes place during labour.

By strict antisepsis puerperal fever may be prevented. Even if the introduction of antisepsis has so far only lowered the mortality in lying-in institutions—in these to a minimum—and has not done so in general practice (Hegar, Dohrn), this regrettable state is due to the fact that practical antisepsis has not as yet become a general characteristic of doctors and midwives.

Views are divided concerning the question of auto-infection. True auto-infection, that is a penetration of the living tissues by the germs present in the vagina, is altogether non-existent, according to Bumm. These organisms can excite decomposition of dead tissues and ptomaine intoxication, but they cannot excite puerperal infection of the wounds. Thus febrile diseases do occur

during the lying-in in women who have not been examined per vaginam during labour, but their course is mild.

According to Ahlfeld, there occur single grave, even fatal cases of puerperal fever, which are caused by auto-infection. Ahlfeld understands by the term auto-infection both ptomaine intoxication as well as wound infection by the putrefactive and inflammatory micro-organisms constantly present in the vagina. Ahlfeld's views have lately received weighty support from the investigations of Walthardt, which show that the vaginal streptococci may become pathological owing to the lowered resistance of the tissues.

Another question which has been much ventilated in recent years is the identity of the cocci of erysipelas with the streptococci of puerperal fever (Winckel). This identity can no longer be doubted. The relation between scarlet and puerperal fever is also frequently discussed.

Scarlet fever cannot produce puerperal fever, but it can cause diphtheritic or membranous diseases of the mucous membrane of the genital tract. Most of the cases described as scarlet fever in the puerperium are to be considered as septic exanthemata (Ahlfeld). Even when the infecting agent is the same, the pathologico-anatomical changes excited by it can be differentiated from one another, and they have completely different prognoses, since the puerperal ulcerations, colpitis, endometritis,* endo-salpingitis, para- and perimetritis form local diseases, while by the lymphatic (septicæmia, septic peritonitis), and phle-

* Two forms of endometritis must be distinguished, namely, the putrid and the septic forms. The first is due to putrefactive changes in the disorganised decidua layers; the second is due to streptococci, which quickly penetrate into the deeper veins and lymphatics, but in favourable cases are prevented from passing further in by a wall of granulation tissue (Bumm).

bothrombotic (pyæmia) forms of puerperal fever the whole organism is affected.

True septicæmia appears undoubtedly to be caused by absorption through the lymphatics of the products of bacteria. Only cloudy swelling of the heart and of the large hypo-gastric glands is found post-mortem.

In addition to septic infection, to the penetration of micro-organisms into the veins and lymphatics, there is a *putrid intoxication*, called *sapræmia*.

Here we have to do with the settling of putrefactive fungi in the dead tissues (placental and membranous remnants, blood clots, dead ovum) lying in the genital tract, and the absorption of the products of these germs, certain ptomaines which have been studied by Brieger. The prognosis here depends upon the amount of poison absorbed and upon the quick removal of the decomposing masses. Mixed varieties with septic infection often occur.

The commonest symptom of the above diseases is fever. It usually comes on the third day after labour, and in septic infection is accompanied with a rigor. The pulse is quickened, becoming 120 or over in severe cases.

Fever occurring during the puerperium should therefore lead to fresh examination, because it is only in pyæmia that we can establish the diagnosis from the fever alone (remittent or intermittent fever, erratic rigors). For this purpose the abdomen is palpated. When peritonitis is present the belly is distended and tender.

An examination is made as to the condition of the fundus uteri, whether this or the parametrium is tender on pressure, and whether any exudation can be felt in the neighbourhood.

The external genitals are also inspected. Any greyish yellow-coated puerperal ulcers, if present, will thus be discovered.

A pledget of wool is used to pick up some of the lochial secretion pouring out of the vulva, and this is examined as to smell and colour.

If the lochia are foul local treatment is indicated. This is specially successful in putrid endometritis. First complete irrigation of the vagina with 3 per cent. carbolic or 1 per cent. lysol solution is carried out, and then the uterus is washed out with 1-2 litres (1·8 to 3·6 pints) of the same solution. This may be repeated in 24 hours; if the temperature does not fall it shows that the infection has passed beyond the uterus (*septic endometritis*), or that large masses are decomposing in the uterus. The latter—placental or membrane remnants—should be removed with the fingers after previous washing out of the uterus, unless para- or perimetritis is present.

If this is difficult, as happens when the whole of the decidua is left behind, the decomposition can scarcely be removed by irrigations, but may be by tamponade of the cavity of the uterus with 10-20 per cent. of iodoform gauze. This disinfects the secretion at the moment of its origin and removes it quickly outwards. The tamponade also dilates the cervical canal, so that after 24 hours one can examine the uterine cavity with the finger. Curetting, which has lately been so strongly recommended in France and Vienna, is generally used by the author only after the tamponade. It is especially urged that beginners should not practise it, since a perforation of the puerperal uterus is easily made and this brings infectious germs into the peritoneum.

Local treatment is indicated only so long as the internal surface of the uterus alone is implicated. Ergot or subcutaneous injections of ergotin are given in order to stop absorption by the uterus itself.

When the cause of the fever is doubtful, carefully

carried out antiseptic irrigation of the vagina and uterus can do no harm and may do much good. Lochiometra, that is, the retention of decomposed lochia in the uterus, may be relieved in this way, even when it has not been previously diagnosed.

When a parametritic exudation or general peritonitis or pyæmia coexists with stinking lochial discharge we should limit ourselves to washing out the vagina. Moreover general constitutional treatment is indicated here to keep up the strength of the patient as long as possible. Unless uncontrollable vomiting renders every form of feeding impossible, alcohol, of all varieties, and given in the largest possible doses, does good according to Runge. This often brings on a good appetite, so that one can give the patients easily digestible food. If somnolence comes on baths at 30° C. (86° F.) are given.

Runge has seen good results from these baths even in pyæmia.

Antipyretics have been given up by most obstetricians because they so easily derange the stomach. An ice bag is often of great service for the relief of pain. Except in those cases of acute peritonitis in which opium is given, a regular action of the bowels is maintained (by the administration of calomel 1-3 grains). For the resorption of any exudation the moist warm hydropathic pack and ichthyol treatment may be employed later on. Suppurating exudations and the various abscesses of pyæmia should be treated on surgical principles. In cases of suppuration in the pelvic articulations the author has shown that the prognosis is especially good when they are incised early, and there is no marked septic disease. In suppuration of the symphysis pubis the incision is made on its anterior surface. A counter opening at the inner surface of the thigh is often necessary. For suppuration of the sacro-

iliac synchondrosis the abscess should be opened wherever possible.

If, however, it points strongly internally without being attainable from the vagina, Sanger's incision for these cases should be made laterally from the vulva and anus, going through the ischio-rectal fossa and dividing the levator ani.

Lately in severe puerperal fever the uterus and the suppurating adnexa have been often extirpated with success (B. S. Schultze, Landau, Sippel).

Olshausen specially selects ulcerative endocarditis out of the various septic disorders as often the only localisation of the sepsis. Renal symptoms and retinal hemorrhage are almost always present. The prognosis is absolutely bad. As an etiological factor it is well to remember that old gonorrheal tubal diseases or fresh gonorrheal infection, from the first connection in the later lying-in period, may lead to peritonitis (usually circumscribed).

Phlegmasia alba dolens consists in a severe swelling of the legs, which feel firm and are very tender to pressure. The strongly stretched skin is whitish, movement of the legs is unusually painful, at certain points continuous smart pain is present, and at these one generally feels hard tender strands which are formed by thrombosed veins, while in their vicinity the superficial veins are dilated. Under the name "Phlegmasia alba" various conditions have been thrown together.

1. The extension of parametric phlegmon to the thigh. In this way a secondary inflammation (phlebitis) and thrombosis of the femoral veins may arise.

2. Primary venous thrombosis of the lower extremities with simple edema of obstruction.

3. Secondary venous thrombosis of the deep pelvic and

femoral veins extending from the placental site, and from infected perinæal or cervical tears, with or without a tendency to puriform degeneration.

The **prognosis** depends upon the septic origin of the disease, and in phlegmon of the thigh and in pyæmic fever upon the general condition—for instance if septic peritonitis is present the prognosis is very unfavourable. It is always doubtful, since there exists the risk of embolism of the lung. This may come on a week after all symptoms have disappeared, and may often be induced by rubbing or the getting up of the patient.

The **treatment** consists in (1) of incisions, in (2) and (3) of absolute rest and elevation of the foot. For the pain hydropathic packs and ichthyol applications may be used.

Tetanus is a peculiar but rare wound infection in the puerperium and in the newly born. In a case which ended fatally Heyse was able to grow from the secretion of the uterus taken during life, the tetanus bacillus, in addition to the *Staphylococcus aureus albus*.

The woman was delivered operatively by the district officer. In the dirt on the floor under her bed were found these micro-organisms. The doctrine that tetanus can only arise when other fission fungi have prepared a nidus for the tetanus bacillus by setting up a necrotic inflammation and a great collection of leucocytes, was proved again in this case. The prevention of tetanus is accordingly bound up with the prevention of septic infection. So long as there exists endometritis with foul lochia, energetic topical treatment and perhaps curetting are indicated.

Puerperal tetanus nearly always begins with trismus.

Insanity may arise after the patient has recovered from sepsis (Hausen, Olshausen).

It is only when the vaginal examination does not give any

ground for explaining the fever that we look for other fever-exciting agents. Fæcal stasis is to be considered as such, and in order therefore to exclude this as a cause in a doubtful case of fever a purge is given.

In women who have lost much blood during labour one sees passing elevations of temperature, and this also occurs after psychical excitation.

Very frequently the fever arises from the condition of the breasts.

Through cracks in the nipples micro-organisms invade the interstitial tissues. An abscess thus forms. This interstitial mastitis corresponds to the parenchymatous mastitis which is produced by the entrance of cocci into the milk passages.

The treatment is antiphlogistic. If an abscess forms it is incised.

Fissures of the nipple are treated with dressings of 3 per cent. carbolic lotion. With simple fissures of the nipple, the child is allowed to go on suckling with a nipple shield, but in mastitis the child is removed from the diseased breast at once.

Severe bleeding during the lying-in is treated just as during labour. Remnants of the ovum, and the placental and decidual polypi which grow on them, should be removed by hand. If bleeding is severe from the uterus, ergotin injections and hot uterine douches are used.

If the bleeding still goes on, the uterine cavity should be tamponaded with iodoform gauze, and in case of defective contraction of the uterus the vagina is plugged with salicylic wool.

Bleeding often occurs in subinvolution of the uterus,*

* Hyperinvolution of the uterus takes place either from the physiological atrophy of lactation from over suckling, or from severe diseases of the genitals, or from general wasting diseases.

and weakens the patient less by its amount than by its duration. This is most quickly cured by curetting. But curetting may set up profuse bleeding and lead to perforation of the uterus.

If these cases are tamponaded the uterus and vagina must be carefully plugged (the vagina with salicylic wool) since the bleeding can only be arrested by compression.

The non-specialist would perhaps do better to order ergotin—Liq. Extract Hydrast. Canad. or Hamamelis Virg.—and hot vaginal douches. Hæmorrhages from retroflexion of the uterus are stopped by replacement of the uterus and insertion of a ring.

This may be undertaken even 14 days after labour. If cold vaginal douches are also used, retroflexion of the uterus which was present before (pregnancy) is very often permanently cured in a short time. The vaginal fixation of the author, which permanently cures cases with retention of the power of conception, is not applicable until some time after delivery. It is only technically performable three months after delivery.

Myomata and cancer can also lead to hæmorrhage and putrefactive decomposition during the puerperium. In these diseases extirpation of the myoma or of the uterus is indicated.

Sudden Death in Pregnancy, during Labour and the Puerperium.

During pregnancy death may occur very suddenly as a consequence of bleeding from a varix in the leg or vulva, or from placenta previa.

Sudden deaths may be observed during labour from rupture of the uterus and inversion of the uterus. These are caused partly from severe hæmorrhage and partly

from shock. Other fatal cases occur which are due to severe heart or lung diseases. In these cases the diagnosis is usually easy.

There is, however, a series of fatal cases which occur in women apparently sound, where at first a cause of death is not absolutely clear, and in which formerly we were contented with a diagnosis of "death as a result of exhaustion." Pathological anatomy has in many cases given the clue to these fatal cases.

In connection with the enlightening researches of Virchow upon thrombosis and embolism, Hecker was the first to find thrombosis of the crural vein, and embolism of both branches of the pulmonary artery in a lying-in woman who died suddenly. Thrombosis of the deep pelvic and crural veins always arises from the placental site (Sperling), and, as the author has many times observed, from infected perineal and cervical lacerations. The thrombi on the placental site arise during pregnancy from premature spontaneous or artificial separation of the placenta (introduction of a catheter for induction of premature labour), while during and after labour they arise from atony of the uterus. On account of the defective uterine contraction, the thrombi, according to Frankenhäuser, enter deeper into the uterine wall, and are then easily propelled by uterine contractions into the venous circulation. Thus even during pregnancy and labour fatal embolism of the lungs may occur. Certainly most cases occur only in the puerperium, and thus it is as Sperling (a pupil of Dohrn's) declares, a matter of great importance that the thrombosis should be recognised early so that embolism may be prevented in such cases by ordering absolute rest in bed. The thrombosis of the placental site or of the vaginal veins extends without exception to the deep pelvic or crural veins, and produces

in the latter case the symptoms of phlegmasia alba dolens (see p. 217). In thrombosis of the deeper pelvic veins alone there will scarcely ever be wanting a pricking tearing pain in the lower pelvis as well as marked distension of the superficial veins of the limb of the implicated side.

A very important sign is the increase of the pulse frequency with a normal temperature (Leopold, Wyder). If embolism occurs, death either ensues in a moment (on movement of the patient, on rubbing the swollen limb) or the patient has hours or even days of struggling with marked dyspnoea and symptoms of failure of the heart. In the latter condition, by treatment with excitants and expectorants, recovery has been observed (Ahlfeld, Dohrn and others).

An analogous accident is air embolism, which Olshausen believes to be the cause of many puzzling cases of death. Certainly the proof of air embolism can only be ascertained in those cases where the autopsy is made immediately after death, and when the post-mortem origin of gases from putrefaction in the vascular system appears to be excluded. The clinical signs of air embolism are the same as for embolism of the pulmonary artery from a detached blood clot. The point of entrance of the air is the site of the placenta, and the entering of the air is permitted into the open vessels of the placental site, when the abdominal pressure becomes negative (in the lateral and knee-elbow positions, in low position of the head), and also when the operating hand makes a free passage for the air, to the placental site. Thus death from air embolism may occur in placenta previa and rupture of the uterus where the placenta is partially or completely separated (Olshausen). Under these conditions it is therefore better to turn in the dorsal position. Air can get into the uterus during uterine douching also, if the first air-containing fluid is not allowed to run out of the

tube before placing this in the uterus. The author further observed a fatal case of air embolism in a premature labour, in which the practitioner had endeavoured in vain for over an hour to separate the placenta by hand, and thus had practically massaged the air into the widely gaping vessels of the placental site.

Internal hæmorrhages add a large contingent to the cases of sudden deaths. I count under these the bleeding into the uterus from premature separation of the placenta, the bleeding from ruptured tubal pregnancy—with which intrauterine pregnancy may coexist—the bleeding from ruptured peritoneal adhesions (Holowko), the bleeding from rupture of the heart consequent to recent latently progressing myocarditis during the puerperium (Spiegelberg), from rupture of the aorta (Heinricius), from apoplexy, especially in eclampsia, when soon after a fit fatal apoplexy has been observed (Pfannenstiel and Dührssen), and hæmorrhage from gastric ulcer. A case of this kind was seen by the author, in which on the 16th day after labour death occurred, with signs of internal hæmorrhage, severe gastric pain after labour and one passage of blood per rectum. The ulcer was probably caused by a septic embolus, since fever and foul lochia were present.

The cases mentioned remain unexplained without autopsy, but it must be noticed that there are also cases described where the autopsy itself has given a negative result (Netzel), except for marked overfilling of the chest and belly with blood, and anæmia of the brain. These cases make it probable that the partial or total emptying of the uterus, analogous to the tapping for ascites, may lead to such anæmia of the brain that sudden death is the result.

Strack observed death from uræmia, with a negative result on autopsy. That protracted deep chloroform

anæsthesia, such as is still used by some in the treatment of eclampsia, may cause death by inducing fatty degeneration of vital organs, has been proved by Dührssen.

A short, deep, or long, quite superficial anæsthesia, is valuable for the operative termination of labour, or for treatment of painful contractions, but protracted deep anæsthesia should certainly be avoided.

Treatment.—The prophylaxis of embolism has been already mentioned. The treatment of air embolism, as far as any treatment avails, consists in the administration of excitants, as in embolism of the pulmonary arteries.

In cases of internal bleeding into the peritoneal cavity laparotomy is indicated when favourable conditions are met with as in hospital. By means of this both mother and child may be saved sometimes.

In order to avoid long anæsthesia and cerebral hæmorrhage in eclampsia, and to most quickly remove the attacks, and with these the uræmic condition, speedy delivery is indicated, and this can be done rapidly under deep anæsthesia.

If the mother is apparently lost or already dead, then with a living and viable child immediate delivery is needed to save the child. If the parturient canal is not prepared, and if it cannot be rapidly dilated by means of the methods given above (incisions or mechanical dilatation), Cæsarean section is indicated, or the author's method of performing this *per vaginam* (see below). This must be done with all skilled precautions, and the resulting wounds carefully reunited by sutures. The child may sometimes be expelled from the genital canal after death of the mother through formation of gases of decomposition (corpse-births). In this way also, post-mortem inversion of the puerperal uterus may occur.

APPENDIX.

A FEW RULES ON THE PREPARATION OF THE HISTORY OF A CASE OF LABOUR.

ANYONE who has perused the chapter on obstetrical examination will be able to form from it the rules for preparing the history of a case of labour. We, however, once more reproduce the most important.

The following points must be given in the journal:—

History or Anamnesis.

- (1) Last menstruation.
- (2) Age, number and course of former labours, whether the children are alive (when the course has been unfavourable rickets should be looked for and the pelvis measured).
- (3) Whether the patient is already at term or in which month of pregnancy.
- (4) Onset of labour, character and action of the pains up to the accoucheur's arrival.
- (5) Whether and when the presumed rupture of the membranes has taken place.

External Examination.

- (6) State of the patient when labour begins (temperature, pulse, height of the contraction ring; any specially

striking symptoms, such as hæmorrhage, cramp, dyspnœa, etc.).

(7) Position and condition of child (alive or dead). Frequency and situation of the foetal heart sounds, any great distension of the bladder.

First Internal Examination.

(8) Any marked overloading of the rectum.

(9) The size of the os uteri on the first internal examination, whether the cervical canal is obliterated, or if not, its length?

(10) The consistence of the lips of the os (rigidity in old primiparæ, striking softness in placenta previa, carcinomatous degeneration).

(11) Whether the membranes are still intact.

(12) What part presents, and how far down it has descended.

(13) Position and attitude of the presenting part (marked descent of the small or large fontanelle, anterior and posterior parietal positions).

(14) Whether there is prolapse of the small parts or cord, and whether this pulsates or not.

(15) Whether palpation points to contracted pelvis, or the promontory can be easily reached with one finger, or the lateral walls can be easily touched.

(16) Whether the lower third of the vagina is strikingly narrow, and the perinæum tense.

Description of the Course of Labour.

(17) Time of rupture of membranes.

(18) Time of full dilatation of the os.

(19) Time when any danger threatened the mother or child (to be found by repeated taking of the temperature, auscultation of the foetal heart).

The student in an obstetric polyclinic or clinic should also note the following :—

(20) The results of examination made by any of the staff called in (pelvic measurements).

(21) The kind of any operative interference undertaken.

(22) What state of dilatation of the os was present, and whether the membranes were ruptured or not when the operation was undertaken.

(23) Whether the child was still alive when the operation began, was born living and lived on,—size and, when possible, weight of child.

(24) When and how the placenta was removed, whether it was born spontaneously, and whether it was complete with the membranes.

(25) Condition of the mother, and any further treatment after delivery (repeated attempts to resuscitate the child, suture of perineal rupture, friction of the uterus, etc.).

A second case-book is necessary for the puerperium in which all disorders of the lying-in, their course, and their treatment are to be registered. The date of discharge from treatment is to be given, and with it a special note as to the condition of the mother and the child on this day, stating how and with what food the child was fed, whether the uterus was still to be felt from outside, and whether it was found on combined examination to lie in normal anteflexion.

It is only a case-book made up on these principles which is of any value for scientific purposes, and it is only such note-taking which habituates and accustoms the beginner to methodical examination, and to the right value of simple observation.

OBSTETRIC OPERATIONS.

The Obstetrical Instrumentarium.

THE instruments, which are best made entirely of metal, should be contained in a suitable holder or case; the dearest are the metal cases made for disinfection by dry heat. The instruments in these lie on a shelf, and when this has been taken out the case can be filled with antiseptic solution, and serves as an antiseptic tray for the instruments which are required for immediate use. The shelf is placed on the inner surface of the lid, which has been turned back so as not to soil the other instruments.

In a case like this the instruments can also be boiled. The disadvantages of metal cases are, in addition to their greater cost, their heaviness, and the discomfort of having to carefully put each instrument back again into its special place in the shelf.

Linen bags are to be recommended next to metal cases; they can be boiled and also sterilised by steam (Fritsch). Leather bags cannot be recommended on account of the difficulty of cleaning them, and cannot be used with safety unless the instruments are boiled immediately before use.

Since the bag shape is always the most comfortable for rapid taking out and repacking of the instruments, I have lately had made for myself an asbestos bag, which can be dry sterilised with the instruments.

For the last two years I have used aluminium boxes,

which are light and cheap. In the one case are the instruments, in the other the rest of the materials are carried. Both are packed into a bag made of brown sail cloth. In the bag,* which weighs eight kilogrammes, are the following instruments:—

One Naegele's forceps, one kranioclast after Auvard-Dührssen,† two volsella with catch, one fine Muzeux forceps, two curettes, one Dührssen tamponade forceps, one strong Fritsch Bozemann catheter, one glass tube, one Deschamp's needle, one new silver male catheter, one Hegar needle holder, one box of strong half curved needles, one Siebold scissors, one long ovum or bullet forceps with catch, one Cowper scissors, one tenaculum forceps, two dressing forceps, one scalpel, one blunt pointed knife, one razor with metal case, one canula $\frac{1}{8}$ inch thick for subcutaneous infusion, one canula for intravenous infusion, one Pravaz syringe of metal and with asbestos or metal piston.

The second box holds three big bottles for lysol, carbolic acid, and chloroform, four small bottles for ether, morphia, ergotin (Erg. dialys., Aq. destil., Glycerin aa. 2·0 gr.) and 66·6 per cent. soda lye, two boxes of No. 1 and 2 of Dührssen (see Fig. 17), one kolpeurynter with cock, one syphon tube of Zweifel, one maximum thermometer, one bath thermometer, one box of tracheal catheters (No. 12

* The bag is made by Herr Engmann, 4, Charité Street, Berlin.

† This suffices in the author's experience for all operations of lessening the foetal mass and is sold with his modifications. Gömann's pelvimeter is the best for complete measurements, but is somewhat clumsy. The hot air and steam sterilisers which I use are constructed by Lautenschäger on improved principles. The instruments may be sterilised in the baking oven of the kitchen range. One only requires a thermometer graduated to 200 deg. C. to prevent the temperature rising over 170 deg. C. The asbestos bag is made by Herr Schmidt, Ziegel Street, Berlin.

Charrière), one stethoscope, one plessimeter, one hammer, one tape measure, one chloroform mask and bottle, one measuring glass, two nail brushes, one glass tube, one nail trimmer, one Schimmelbusch box with silk sterilised by

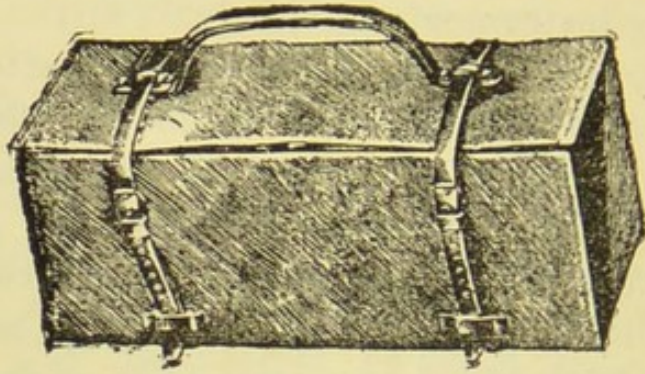


Fig. 16a.

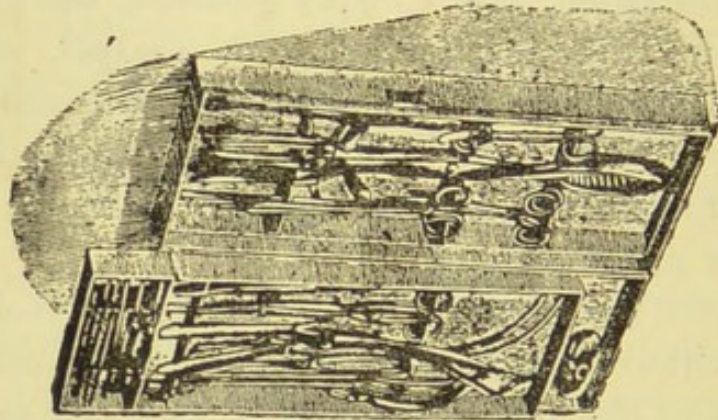


Fig. 16b.

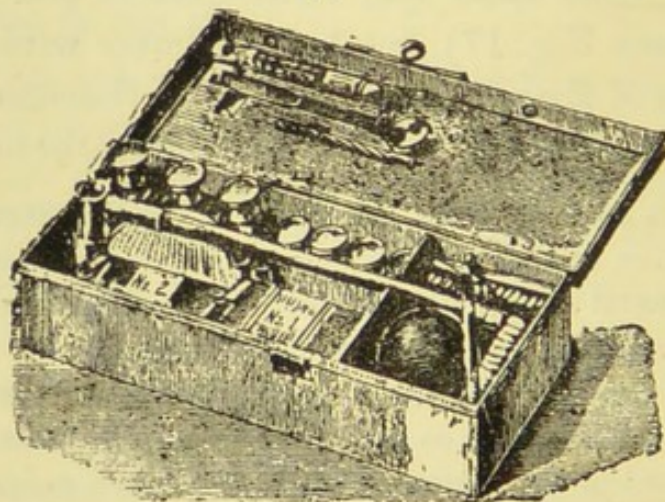


Fig. 16c.

current of steam, one envelope with catgut No. 3 sterilised by dry heat, one box with a few common salt

powders of 1 drachm for making normal saline solution, which can then be rendered alkaline by a few drops of the soda solution.

In the covering of the boxes one finds room for a pelvimeter (Collin), a rubber apron, a cloak, a spirit apparatus for boiling the instruments, and a list of the instruments.



Fig. 17.

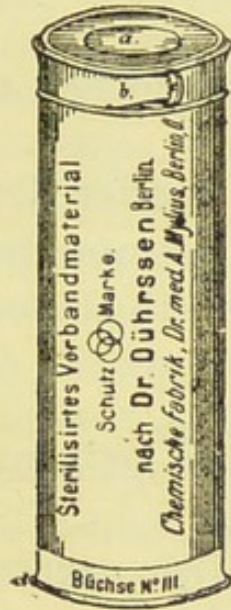


Fig. 18.



Fig. 19.

Fig. 17.—Box No. 1, for uterus tamponade, is seen in section.

Figs. 18 and 19.—Box No. 3, for vaginal tamponade by the midwife, for diapers and plugs.

b, tin strip by which the lid is soldered fast.

c, ring by which the tin strip is torn off.

Classification of Obstetric Operations.

1. Preparatory operations.

(*a*) Artificial abortion and induction of premature labour.

(*b*) Artificial dilatation of the parturient canal.

(1) of the os uteri.

(2) of the lower third of the vagina.

(3) of the vulva.

(*c*) Turning.

2. Operations for rectifying position.

(a) Version.

(b) Manual correction of unfavourable head positions.

(c) Reposition of the prolapsed funis and of prolapsed extremities.

3. Operations for delivery.

Per vias naturales.	{	(a) Extraction by foot or breech.	}	With preservation of the child's life.
		(b) Forceps.		
		(c) Expression after Kristeller. (This comes into consideration chiefly in combination with other operations).		
Per vias naturales.	{	(d) Perforation and craniotraction or cranioclasis.	}	With destruction of the child.
		(e) Decapitation, exenteration.		
		(f) Cæsarean section.		

4. Operations in the 3rd stage and later.

(a) Removal of the after-birth.

(b) Washing out of the uterus.

(c) Tamponade of the uterovaginal canal.

(d) Suture of lacerations of the perinæum and clitoris.

(e) Secondary suture of perinæal wounds.

Preparations for an Obstetric Operation.1. *Anæsthesia.*

In obstetric practice anæsthesia is generally induced by chloroform. It was the renowned English obstetrician Simpson who first used chloroform as an anæsthetic for the immediate object of removing pain in obstetric cases.

As regards administration, mistakes which beginners

make are the pouring of chloroform on in drachms instead of drops, and the removal of the face-piece as soon as touching the eyelids does not cause closure of the lids. The chloroform should be poured on drop by drop, about 30 to the minute, until the corneal reflex is completely abolished. Then 6 to 10 drops a minute are sufficient for keeping up the anæsthesia. The precautionary steps of anæsthesia are removal of any foreign body from the mouth (false teeth), and the continuous control of the pulse and respiration. If respiration stops, the tongue must be drawn out at once with tongue forceps. If, nevertheless, the breathing remains superficial, or ceases entirely, if the pupils are dilated widely and do not react, instead of being quite narrow and not reacting, as in good anæsthesia (Strasmann), if the face has a deathly hue, and the lips are cyanotic, then artificial respiration must be performed at once by the method of Silvester. For this purpose the head is lowered, the operator seizes both forearms near the elbows and extends both arms over the head and shoulders as wide as possible—inspiration; after which by rectangular bending of the forearms the arms are pressed against the sides of the thorax—expiration. These movements must not be performed too rapidly, but about 20 times a minute. If the heart's action is weak, as is usual in these cases, an injection of ether is given. Artificial respiration must be kept up until regular spontaneous breathing ensues.

The stoppage of breathing, which occurs often in the stage of excitement, is of less importance. In this "spastic asphyxia" the larynx is blocked by the falling back of the tongue. This accident occurs even while reflexes are still present. The breathing is at once resumed when the tongue is drawn forwards. If the jaws are firmly closed the lower jaw must be pushed

forward in order to open the mouth. This is done by the Esmarch-Heiberg manipulation. Both forefingers are placed behind the ascending rami of the jaw, and then are pressed strongly forward. If this manipulation does not succeed a mouth gag must be pushed between the teeth, and the lower jaw depressed by opening the blades.

Most cases of "chloroform asphyxia" are primary disturbances of respiration.

If the onset of the trouble is noticed death does not happen. In rare cases heart paralysis is primary, and this generally leads to death. In these cases, in addition to the methods already described, the direct heart massage of Maass should be performed. This consists in sharp compressions of the cardiac area (about 120 a minute).

If vomiting comes on during anæsthesia the head should be pulled on one side at the first heaving, so that the vomit may not enter the larynx. The head should also be pulled on one side after anæsthesia. In order to prevent vomiting during anæsthesia the chloroform must be poured freely on the mask, and this again applied as soon as the head has been turned to one side. The vomiting after anæsthesia ceases soonest when the patient takes absolutely nothing, not even any fluid. For very great thirst simple washing out of the mouth, a gulp of tea, or bits of ice may be ordered. Restoratives are only given in acute anæmia, and always in small doses.

Practical Application of Anæsthesia.

It is a fact that practitioners almost never use anæsthesia in obstetrics, and this is explained by the fear of superintending both the anæsthesia and the operation, and by the difficulty of obtaining a colleague quickly. But one

does not need on these grounds to deprive the woman in labour of the benefit of anæsthesia.

The patient is placed across the bed, the accoucheur disinfects himself, then the patient, and then proceeds to anæsthetise. When the corneal reflex is lost the parts are once more brushed, and the operation begun.

The shortness of most obstetric operations often permits the whole operation to be finished under the anæsthesia thus obtained. If the operation is expected to last longer the tongue is drawn out with forceps, and the midwife is taught to put 1 to 2 drops of chloroform on the face-piece, and not to repeat it until all smell of chloroform has left the face-piece. Thus we avoid the grave asphyxia which occurs after the stage of deep anæsthesia from the free administration of chloroform—and one is fully prepared for the asphyxia at the beginning of anæsthesia (heart paralysis) so long as one devotes oneself exclusively to the anæsthesia.

The value of anæsthesia in midwifery is as follows:—

1. In very sensitive patients, worn out by the lasting pains, anæsthesia, which in these cases only requires to be superficial, enables an exact diagnosis to be made. It permits the counting of the maternal and foetal pulses, and the former is then uninfluenced by psychical disturbance. It permits a full examination of the pelvis, its practical measurement, and the making out of the descent and engagement of the head even when the passages are tight and narrow. The possibility of examining the head carefully under anæsthesia allows the sutures and position of the fontanelles to be ascertained even when there is a large cephalhæmatoma. The points thus gained, which often differ much from the previous diagnosis, give weighty indications for the correct treatment.

2. Anæsthesia supports the true obstetric treatment.

In this respect the cessation of uterine pains is very important as it permits the outer hand by counterpressure on the uterus to support the inner hand, and thus facilitates or allows of internal and combined version, and of separation of the placenta in abortion or after normal labour. The arrest of abdominal pressure under anæsthesia also permits the reposition of tumours obstructing the pelvis—and in breech cases it allows the breech to be expressed from the pelvis in all those cases where the breech is not low enough to allow of manual extraction. If the breech is fixed, and extraction is indicated, deep anæsthesia enables the dangerous and difficult use of the blunt hook, or fillet, or other instrument for extraction, to be dispensed with, since one can change the breech into a footling and then extract easily.

Deep narcosis likewise facilitates the insertion of a single finger or the whole hand into the uterus when the os is imperfectly dilated. One often feels under these conditions that the anæsthesia has removed a spasmodic contraction.

3. Anæsthesia acts itself as a true therapeutic agent by hastening labour. The investigations undertaken in normal labours by Winckel, Poulet, and Dönhoff arrive at the opposite result because the women were of the lower orders.

I have a whole series of observations where with sensitive primiparæ of the higher classes the labour came to a standstill towards the end of the expulsive stage in spite of good contraction because the patient from agony at the increased pain would not utilise the abdominal pressure. A quite light anæsthesia—consisting in the use of a few drops of chloroform at the onset of pains—which never reached complete analgesia, sufficed to bring the abdominal pressure into action and to quickly end these labours.

For such cases which stand on the frontier of normal labours the author recommends anæsthesia toward the end of labour for effacing labour pain and thus hastening the labour. On the same account the author uses the already described interrupted light anæsthesia during the contractions in cases where these are too weak but very painful, and when the uterus does not relax between the pains. In these cases the os of half an inch dilates within two or three hours with minimal use of chloroform, and the labour follows quickly, although it may have made no progress for days.

Anæsthesia should only be used for the relief of labour pain, under normal action of the uterus and good exercise of abdominal pressure, when good advice and exhortation and the use of morphia, opium, or chloral afford no relief. Narcosis in these cases must not be prolonged over four hours, for the author has often noticed sudden failure of the heart sounds of the foetus after longer anæsthesia, and has extracted (with forceps) children deeply comatose. This result is not to be wondered at since Zweifel proved the passage of chloroform into the foetal blood. It necessitates careful watching of the foetal heart-sounds when anæsthesia is prolonged.

To recapitulate, the author recommends a short but deep anæsthesia for most obstetric operations and for repeated internal examinations, in order to make a full diagnosis. For forceps at the pelvic outlet a light anæsthesia is often enough. A longer but only superficial and interrupted anæsthesia is required for hastening labour in certain anomalies of the expulsive forces, or for relief of very excessive labour pains in otherwise normal labours. Heart failure, lung and kidney diseases as a rule contraindicate anæsthesia, and special contraindications are sepsis, eclampsia, tetanus uteri, and acute anæmia. In

all these cases a very carefully induced short anæsthesia for aiding quick delivery is all that can be recommended. Ether anæsthesia in labour must not be carried out at night in small rooms on account of the danger of explosion. Chloroform yields chlorine and hydrochloric acid (Stobwasser Kyll) in gas or petroleum light, and these products may set up pneumonia (Zweifel). In small rooms, therefore, free ventilation must be insured after delivery.

2. *Disinfection, Position, etc.*

The disinfection described on pages 40 to 43 must be always repeated before an obstetric operation after the rectum (when distended) has been cleared out by an enema.

The bladder is first emptied after the disinfection of the vulva. When precautionary incisions of the vaginal introitus are necessary the author shaves the perinæum and the lower half of the vulva beforehand during anæsthesia. The best position for most operations is the dorso-coccygeal position, because the accoucheur can move his arms freely to the sides in this position. Anyone sitting on the bed near the patient can hold with one hand the patient's legs, which are bent at the knee and opposed to the belly. The midwife is best seated on the right near the patient, holding the left foreleg and thigh with her left hand against the patient's abdomen, while the right leg is fixed against the patient's abdomen by the midwife's arm and the left side of her chest. The midwife has thus her right hand completely free.

To prevent uterine atony it is very advisable to give an injection of ergotin previous to the operation. Immediately before the operation a full examination is made once again.

After the operation the author always washes out the

uterus as soon as the placenta is delivered, whenever there has been a previous internal examination of a doubtful nature.

Artificial Abortion and Induction of Premature Labour.

Artificial abortion is best induced by passing a small strip of iodoform gauze, with a sound or long dissecting forceps, into the uterus, and leaving as much in as will enter. In 24 to 48 hours the whole uterine contents are spontaneously expelled by strong pains, or the cervix is conveniently passable for one finger. In abortion the cavity is at once emptied (see p. 122); in miscarriage, from the fourth month on, the spontaneous birth of the foetus is awaited, and the placenta is removed manually. The best method of inducing premature labour is that of Krause. This consists in placing the patient in the dorso-coccygeal position, and then passing an elastic bougie, which has been disinfected by lying for some hours in a 0.1 per cent. solution of sublimate, along the anterior wall of the uterus in different directions and as high as possible. This is facilitated by placing one finger in the cervical canal. Some iodoform gauze placed in the cervix and vagina prevents the bougie from slipping out. In 12 to 24 hours pains come on.

If this procedure of Krause's does not attain its object the membranes are ruptured (Scheel's method). If the labour proceeds but slowly the practitioner should perform combined version by Fehling's advice, but he should bring the feet only as far as the vagina, not lower.

The author has found a modification of the methods of Barnes and Farmer very good. The kolpeurynter is introduced into the uterus, filled with water gradually, and so fixed at the end of the bed by its tube that a small but

permanent traction is exercised upon the kolpeurynter. In order that the induction of premature labour may be followed by the birth of a living child this should not be undertaken before the thirty-fourth week of pregnancy.

According to P. Müller one can wait longer if the head can be easily pressed into the pelvis bimanually.

Artificial Dilatation of the Os Uteri.

This should not be undertaken except in conglutination of the os, unless danger to the mother or child demands the hastening of delivery.

Dilatation by Incision.

This should be performed when the whole supravaginal portion of the cervix is already fully dilated and the defective dilatation is limited to the portio vaginalis.

The portio forms under these circumstances a more or less thick and broad margin to the os uteri (Fig. 21 ;

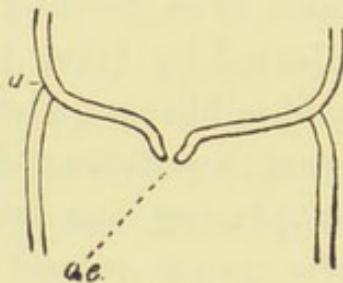


Fig. 20.

o. c.), which margin takes its origin from the vaginal walls. This margin or rim has, in a few cases, a small projection, which is the still unflattened part of the portio (Fig. 20). This kind of dilatation only occurs, as a rule, in primiparæ; in multiparæ the defective dilatation lies most commonly at the narrowest spot above the vaginal insertion (Fig. 22). As regards superficial incisions see pp. 139, 140. In all cases where the defective dilatation concerns only the portio vaginalis, and where serious danger exists for the mother or child, the author

considers it to be a duty nowadays for the accoucheur* who has experience in diagnosis, who is technically skilled, aseptic in practice, and who is provided with the

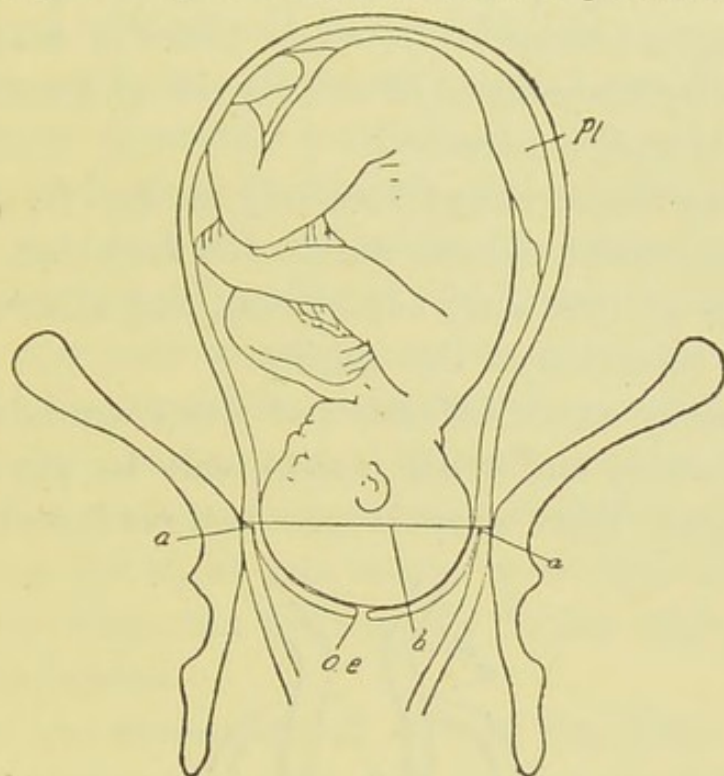


Fig. 21.

instruments already mentioned, to fully dilate the os by four deep incisions, reaching up to the insertion of the portio into the vagina, and to deliver the patient.

By the aid of this procedure, which limits perforation and the leaving of a living child to die, which preserves the mother from forcible attempts at extraction, and which was recommended by Skutsch, and first performed by Dührssen, one can undertake delivery even when the os is completely closed, and, if necessary, as in grave eclampsia, during the latter weeks of pregnancy.

As the author has shown, severe hæmorrhage does not

* The author is convinced that the beginner or the practitioner who does not act up to all the modern demands as regards asepsis can cause grave disease with these incisions, and he therefore holds it to be the duty of the general practitioner to call in the help of a specialist in such difficult cases.

result from this procedure, and therefore secondary suture of the cut surfaces is superfluous.

Any hæmorrhage present after labour may be stopped by utero-vaginal tamponade when there is atony of the uterus, and by tamponade of the cervix and vagina when the uterus is well contracted.

The severe hæmorrhage formerly noticed in connection with cervical incisions was due to the fact that these incisions were at first only superficial, and afterwards tore beyond the insertion of the vagina.

The primary septic infection of deep wounds formerly feared so much, and with reason, can be prevented by strict asepsis. With aseptic precautions infection of the

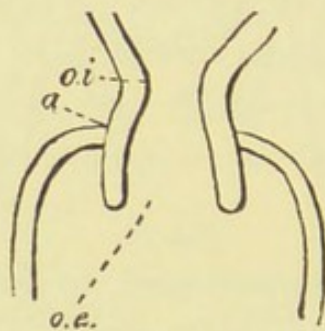


Fig. 22.

wounds is only conceivable as secondary to decomposing uterine secretion. This danger can be diminished by careful antiseptic washing-out of the uterine cavity after the labour, or by tamponade of the utero-vaginal canal with 20 per cent. iodoform gauze (see p. 121).

If one delivers with decomposed uterine contents, and defective dilatation of the os, without incisions, greater lacerations are apt to arise, and these, as irregular wounds, favour the entrance of septic virus more than smooth incised wounds.

Technique.—The margin of the cervix is seized at the site of the incision between the index and middle fingers of the left hand above; if the margin is yielding, two

volsellas are used, between which one cuts, pushing the blades of Siebold's scissors upon the two fingers up to the vaginal insertion, and as a rule cutting through the rim in two cuts. First one incises behind, then to the sides, and then in front. I scarcely need mention that for the anterior and posterior incisions the volar side of the fixing finger is turned to the left, and for the incision on the left side to the front. Also for the incision on the right side I turn the volar side of the finger to the front. For this purpose it is necessary to stand on the right of the patient, who lies across the bed with the thighs flexed on the abdomen, and to twist the left hand before passing the two fingers in so that the thumb is downwards. This incision on the right side is the most difficult to execute, and it lies often not sufficiently to the right, but to the right and behind.

When the resistance of the os has been removed, it often happens that one has to remove the resistance caused by the lower third of the vagina (see p. 246). The combination of these two operations or each one by itself is specially indicated in eclampsia, in labour disordered by premature, perhaps artificial, rupture of the membranes, and in old primiparæ where through the long duration of labour danger has arisen threatening the life of mother or child.

In old primiparæ the mortality for mother and child is twice as much as the average. This higher mortality is explained by the rigidity of the soft parts which causes greater difficulties in both natural and artificial termination of labour. If, however, all resistance on the part of the soft parts be removed by a pair of smooth incisions, forceps extraction becomes easy, while up to now both protraction of labour and delivery in the three conditions mentioned were equally grave, commonly for both mother

and child, but still more frequently for the child. Forceps extraction in these cases may be much facilitated by using external pressure and applying the blades obliquely.

Fig. 23 shows the portio of a primipara, with an os through which a finger can be passed, as well as the

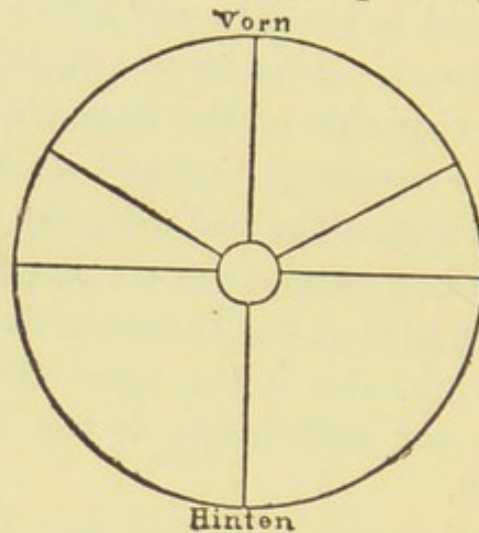


Fig. 23.

number and direction of the incisions which the author made before forceps extraction.

Severe eclampsia was the indication for incision. Forceps extraction was easy; the child was born living, and is still alive, and the mother passed through a normal confinement. The somewhat large number of incisions was necessitated because the two lateral ones did not quite reach the vaginal vault. If this point is thought of only four incisions will be necessary.

In 27 cases of deep cervical incisions by which perforation was always avoided, there was only a single death of mother and child. Forceps were used 24 times, version and extraction twice, and once a foot was brought down and followed by extraction. This mortality of 3.7 per cent. for the mothers is equal to, or less, than the mortality of perforation. The death was caused by sepsis and eclampsia pre-existing the operation. Of 21 of these

cases remaining under observation for over a year, 15 (71.4 per cent.) have since been easily and successfully delivered of two children each.

Mechanical Dilatation.

We generally turn to this method in multiparæ in whom the defective dilatation as a rule concerns the supravaginal portion of the cervix. Generally dilatation takes place on introducing some fingers, the half, or the whole hand. With this, combined or internal podalic version and extraction are used. As a result of the obstruction from the insufficiently dilated os uteri the child commonly dies from the too slow extraction. For this reason the practice of Mäurer, which the author has often successfully applied, is a decided improvement. Dührssen puts a thin-walled kolpeurynter into the uterus (this has been disinfected by a long stay in 1 in 1,000 perchloride of mercury solution, or by boiling)—the author's long forceps much facilitate this—he fills it with a pint of water and pulls continuously on the tube in a downward direction. When haste is necessary the cervix may be dilated

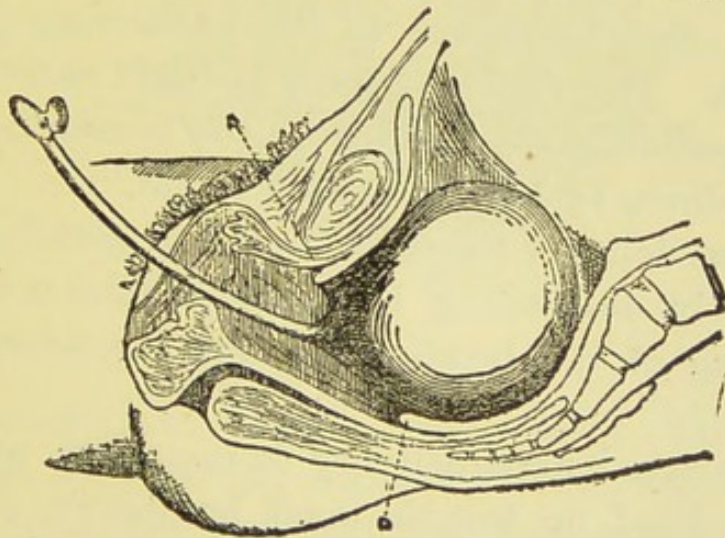


FIG. 24.

in this way in 10 to 15 minutes. If, however, there is cross birth or premature rupture of the membranes in a

contracted pelvis the treatment given for placenta previa is preferable (see p. 186). Even when the os uteri has not been fully dilated, the margin formed by the portio has at any rate been so fully dilated that it has offered no further opposition to extraction. Only in abnormal rigidity of the cervix, which the author has found to depend upon an absence of elastic fibres, are incisions of the cervical margin required.

Note.—If the mother's life is in danger, and the cervix cannot be dilated by the methods given, the vaginal Cæsarean section of Dührssen may, under favourable circumstances, be employed. This consists in opening the anterior and posterior fornices, pushing up the peritoneum, sagittal splitting of the anterior and posterior cervical wall, extraction of the child and the after-birth, and suture of the incision (see below).

Artificial Dilatation of the Lower Third of the Vagina.

For dilatation of the stenosed vagina, see p. 142.

The normal vagina, even the narrow vagina of a primipara, only offers resistance to the presenting part at its lower third. The vaginal lumen is itself narrower here, and is immediately surrounded by the levator ani muscle and lower down by the constrictor cunni.

In normal delivery the resistance is gradually overcome by the slowly descending head, which dilates the vagina and the ring of the levator ani, and stretches the perinæum.

But in a case where delivery is necessary, and the undescended head or breech must be drawn down comparatively quickly, gradual dilatation is impossible. As a result either the extraction fails, or only succeeds at the cost of multiple and extensive tears and bruises of the vagina and perinæum.

The child is usually dead at birth as a result of the slow extraction.

The resistance of the vagina and perinæum can be removed by one or two incisions, called by the author *vagino-perinæal incisions**—incisions by which the constrictor cunni is not only cut through, but even the levator ani is incised also. These incisions are indicated in primiparæ when the head rests on the perinæal floor and forceps extraction fails on account of the resistance offered by the soft parts.

This also applies to a foot-presentation, when the breech refuses to follow.

These incisions, 4 c.m. long, and about 3 c.m. deep, are

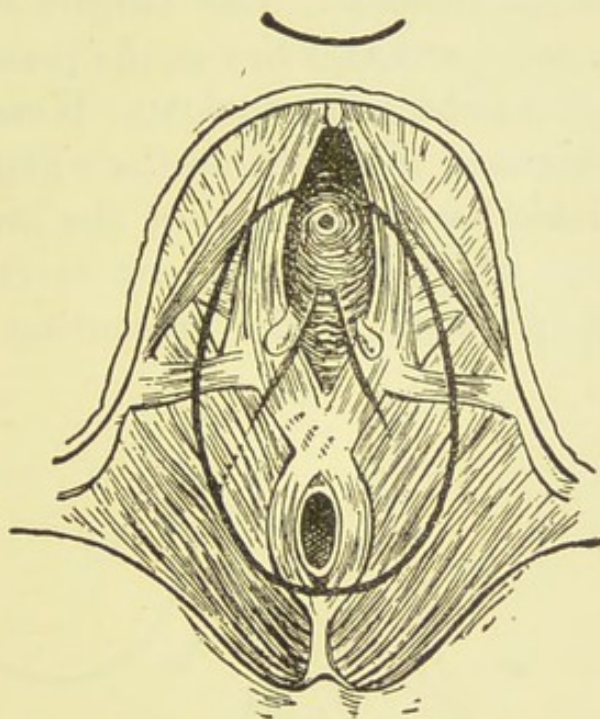


Fig. 25.

made through the vagina most easily with Siebold's scissors, as soon as the margin of the vaginal outlet is strongly distended and the presenting part does not yield to traction.

* The author gives the same postulates to the practitioner for these incisions as for those of the os uteri.

The depth of the wound is given by the length of the skin incision on the perinæum.

If the surgeon is satisfied with only one incision (and this is more advantageous for the re-establishment of normal anatomical relations), the incision must be deepened if there are further difficulties in extraction; in this way the sutured wound of the perinæum may reach a total length of 5-6 c.m. (2-2.4 inches). The direction of the incision is midway between the anus and the tuber ischii (see Fig. 25).

Fig. 25 shows on an anatomical preparation the length and direction of the double-sided vagino-perinæal incisions. The dotted line on the right shows the necessary lengthening of a one-sided incision. The elliptic line shows the margin of the soft parts as it lies on the presenting part of the child which has been drawn down. It can be seen from this that by means of the incisions the whole pelvic outlet becomes available for the passage of the presenting part.

The bleeding, which is often very severe, is at once stopped by the pressure of the presenting part as it is

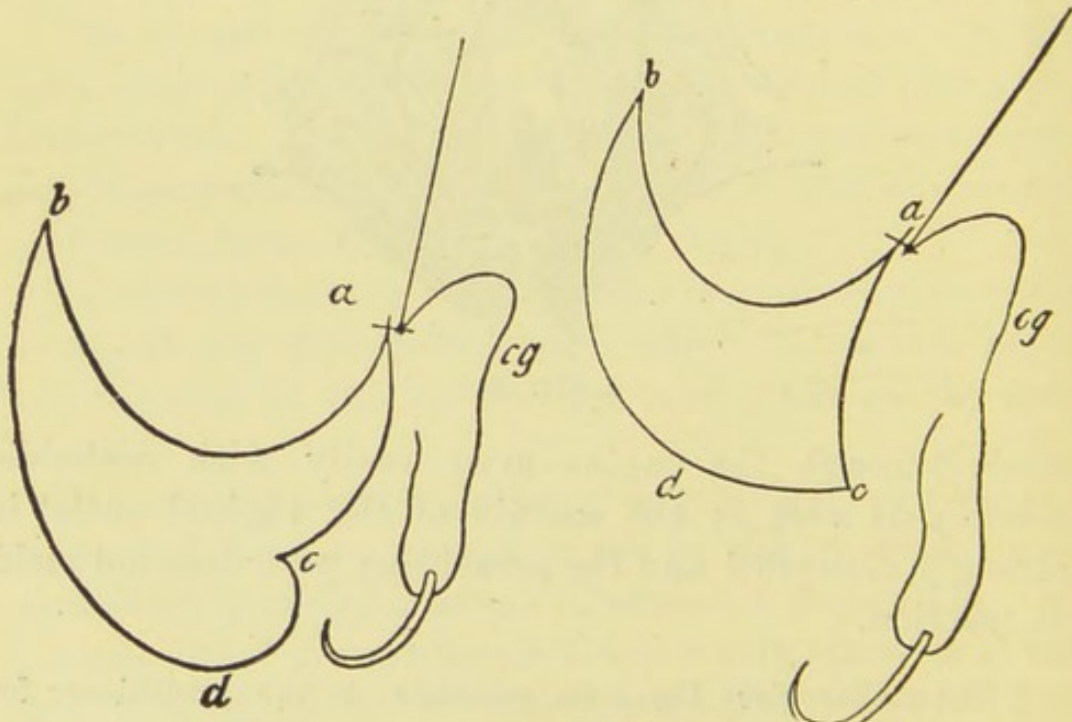


Fig. 26.

Fig. 27.

drawn down; after delivery of the child it is stopped by tamponade or by the temporary use of pressure forceps, and after delivery of the placenta, by suture.

It should be noticed that in one-sided, as well as in double-sided vagino-perineal incisions a completely irregular wound figure arises owing to the stronger upward retraction of the constrictor cunni muscle.

This must be recognised when the sutures are passed. A rational reunion is only rendered possible by passing a large needle, threaded with silk or silkworm gut, under the whole wound, from *c* to *b*. When the ends *s s* of the ligature are drawn upon, Fig. 28 is produced, the upper

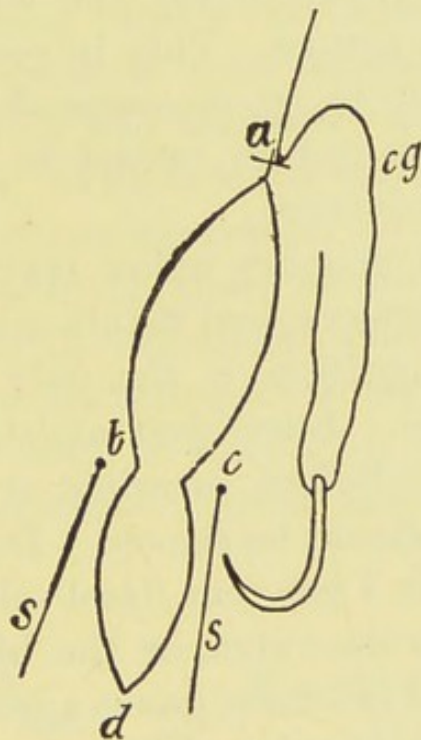


Fig. 28.

end of which lies in the vagina, and is sutured continuously with catgut (*cg*), while the lower half is closed with interrupted sutures of silk or silkworm gut because of the greater tension.

The continuous suture need only catch the margins of the vaginal mucous membrane, since the perinæal sutures passing under the whole wound draw its sides sufficiently into apposition to prevent any pocketing. If the suture is

carried deeper in the vagina it is very easy for a loop to lie in the rectum. In order to avoid exactly this accident the perinæal sutures must be passed just under the base of the wound. After finishing the suture a rectal examination is made to see whether there may not be a loop in the bowel. If there is, it is caught with pressure forceps and then the knot on the perinæum is cut on both sides so that the loop can be drawn out from the rectum. In this way it is possible to avoid infection of the wound from the rectum. If the perinæal wound now gapes, the left forefinger is passed into the rectum, and another perinæal suture is passed.

In a few cases I have closed the whole wound with a continuous catgut suture. This is generally more convenient, but is not to be recommended, since any loop penetrating into the rectum cannot be removed without spoiling the whole suture.

In this way also primary union may be prevented, or, as in one case, a recto-vaginal fistula may be the result.

The lithotomy position is the only suitable one for passing the sutures. Intelligent assistance is acceptable but not necessary. Before suturing, or before using the forceps, the parts should be shaved. During the lying-in fomentations of $\frac{1}{2}$ to 1 per cent. lysol solution are applied for several hours to the vulva, or the bladder is emptied, a douche given, and iodoform gauze applied. By antiseptic procedure septic infection of these incisions is excluded. If the incisions do not heal directly, after the 8th day secondary suture of the granulating perinæal wounds should be done with silk or silkworm gut—interrupted sutures (see p. 74); the author has done this many times with success. If this also fails to cause union Lawson Tait's flapsplitting perinæal operation should be performed later on.

Artificial Dilatation of the Vaginal Outlet.

This only needs consideration as an independent operation in natural labour, or in delivery of the head or breech already lying at the pelvic outlet, when the perinæum offers resistance to extraction or threatens to rupture. Then the perinæum should be incised. With a scalpel or Cowper's scissors the surgeon cuts laterally from the posterior commissure through the stretched skin margin in a direction which turns toward the middle line from the tuber ischii so as to facilitate the suturing. The edges of the wound retract greatly and posteriorly; the fascia shows itself as a tense band which is divided by a second cut. If the extraction is still difficult the incision is deepened until in this way the entire constrictor cunni is at last cut through. This is much better than a perinæal tear as a result of too superficial an incision. A deep perinæal incision is much more advantageous than two superficial ones. The suture of two incisions takes longer and the constricted tip between the incisions heals badly. If the constrictor cunni is completely divided, Fig. 26 is formed again, with the difference that the incision does

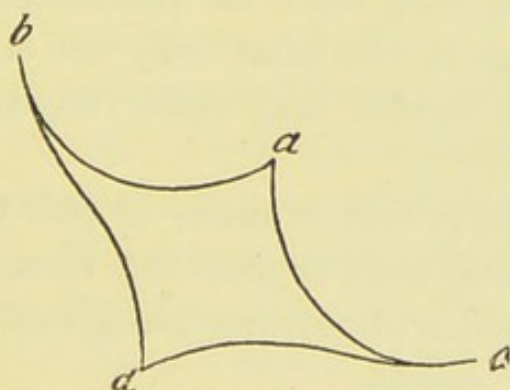


Fig. 29.

not extend so far into the vagina. If only the skin or the fascia together with the superficial fibres of the constrictor cunni are divided, Fig. 29 is formed, in which also the points *b* and *c* should be united first with a single suture.

The after treatment is the same as for vagino-perineal incisions.

Version.

Version has three indications for its use.

(1) As an operation preparatory to extraction.

Those cases are here included in which the mother or child is in danger, or the child, as in prolapse of the umbilical cord, is liable to come into danger every moment, but where extraction of the head (with forceps) is not possible owing to its high position. In order, in these cases, to gain the foot as a handle for extraction we must perform podalic version by bringing about a foot instead of a head presentation, *i.e.*, by turning the foetus.

(2) To improve the presentation.

Cross birth is the prototype of these cases because as a rule a child in this position cannot be born spontaneously. We must also remember that many normal head presentations in contracted pelves, and many abnormal head presentations, and engagements of the head, such as the posterior parietal presentation, the brow and face presentations with prolapse of an arm, or these presentations in contracted pelves, may have as unfavourable a course as a cross birth, that is, the head may not engage, the child may die, and the mother may suffer from rupture of the uterus.

(3) In placenta previa in order to pull the breech into the pelvic inlet and thus to stop the hæmorrhage.

Different varieties of turning are given.

(1) External version.

(a) By simple posture.

(b) By external manipulation.

(2) Combined version.

(3) Internal version.

External version is applicable only in cross births so

long as the membranes are still unruptured. We try to engage the part which is nearest the pelvic inlet—usually the head—in the pelvic inlet by placing the patient on the side on which this part is. If simple posture does not suffice the part nearest the inlet is pressed toward it with one hand in the intervals between pains, and the other pole of the foetus is pressed towards the fundus. For this operation to succeed the abdominal and the uterine walls must not be too tense (anæsthesia may be finally necessary) and the foetus must be movable. When the head or breech has been brought to the pelvic inlet, it must be fixed for a time with the hands, otherwise it slips back. This retrogression takes place very readily when no pains come on. A simple method of safely fixing the presenting part is by artificial rupture of the membranes. But this is contraindicated so long as the os uteri is not quite dilated. From what has been said, external version is uncertain in its results, and when one has been induced to prematurely rupture the membranes it may become a very dangerous operation. One may therefore always attempt external version, but the membranes must not be ruptured while the os is incompletely dilated. If the operation does not succeed the surgeon places the patient in a lateral position and maintains an expectant attitude.

Cross birth only becomes dangerous after rupture of the membranes. While the pains before rupture of the membranes act only by dilating the os, afterwards they produce great thinning of the lower uterine segment,* since they cannot drive the shoulder through the pelvis, and in proportion to their strength are so much the more likely to produce rupture of the uterus.

* This takes place first, according to Winter, when the os is almost fully dilated, unless any unsuccessful attempts at delivery have been made or ergot has been given. For this reason we can postpone version until this time without any danger to the mother.

As soon as the membranes are ruptured, therefore, podalic version must be performed (not cephalic version because the head so easily slips away); if the os only allows one or two fingers to pass, combined version is best; if the os allows the whole hand to pass, internal version alone is best.*

Version with the half hand when the thumb remains in the vagina occupies a middle position between the combined and internal versions.

By "version" alone we mean internal podalic version.

Combined Version.

Technique of combined version: The patient is placed in the lithotomy position, anæsthetised, and disinfected as in all operations; the bladder is emptied.

That hand is introduced into the vagina which is directed towards the feet when we stand in the middle position—the left hand in 1st cross-birth position.

The index and middle fingers of this hand are introduced into the uterine cavity, and push the shoulder away in the direction of the head, while—and this is the chief thing—the external hand presses the breech strongly downward.

As a rule a foot is thus brought into reach of the fingers which grasp it, and at the same time rupture the mem-

* For the cases of cross birth with premature rupture of the membranes previous dilatation of the os seems to the author specially worthy of trial; when the upper part of the cervix is already smoothed out, dilatation by incision; in other cases dilatation by kolpeuryxis. If this practice is further confirmed it will have an advantage over that recommended by Winter, who after the membranes have ruptured waits until the os uteri becomes spontaneously nearly quite dilated, in order to follow up turning with extraction. Version put off so late is decidedly more difficult, and the child is hereby exposed to greater danger. Early turning with previous dilatation of the os uteri enables one to proceed at once to extraction.

branes and draw it down through the cervix into the vagina.

If there is difficulty in grasping a foot it may be of help to push the breech away from the pelvic inlet toward the side on which previously the head lay (Kaltenbach). In this way the feet sink down. If a foot is felt now and then, but cannot be grasped, the membranes should be ruptured.

In order to pull the foot with the fingers through the os, the foot together with the lower segment of the uterus should be pressed against the symphysis.

In this way we get the opposing support which one finger gives another.

If we only understand how to use the external hand skilfully we may succeed in effecting combined version long after the membranes have ruptured.

As previously mentioned combined version can be much shortened by mechanical or surgical dilatation (see also page 188).

After combined version the foetal heart sounds should be carefully watched. If they are not audible or become slow the size of the os is examined. Commonly the os dilates fully immediately after turning, so that we can proceed at once to extraction.

Internal Version.

Necessary conditions for this are :—

(1) The presenting part must still retain a certain mobility, and the contraction ring must not be higher than a hand's breadth above the symphysis.

(2) The os uteri must admit the whole hand.

Internal version is easiest when the membranes are unruptured and the os is fully dilated. When therefore we get a case of cross-birth with unruptured membranes we

should wait for the dilatation of the os before proceeding to internal version.

If the membranes rupture prematurely, as commonly happens in cross-births, then on the other hand version should be performed at once as previously stated.

The preparation of the accoucheur and of the patient is the same as in every operation. Deep narcosis is here of special value.

Since extraction must often follow on version, and the child is brought into the world more or less asphyxiated, one should see that there is tepid and cold water, as well as warm flannels placed ready, that a piece of tape for tying the cord is boiled and the tracheal catheter is at hand. The tape may be used as a loop in turning if necessary.

The author prefers the lithotomy position for turning, but the lateral position on the side of the feet is recommended to the beginner, especially when the belly of the child is directed forward. That hand is chosen for introduction which looks towards the side on which the feet are when one stands in the middle line. One uses the left hand for the right side of the patient and *vice versâ*. The operator sits between the thighs of the patient when she is in the lithotomy position, and behind the patient when she is on her side.

Turning is divided into three stages.

(1) Introduction of the hand through the vagina and the os uteri at the end of a pain.

(2) Grasping a foot.

(3) Pulling the child round or rotation.

1. The hand, folded up into a cone shape and disinfected with lysol (which renders a lubricant unnecessary), is passed through the vulva with pressure directed to the side. In a primipara, the vulva may be so narrow that the hand will not pass at all, and the vagina may be so rigid that the arm will cause it to burst. In such a case

a vagino-perineal incision is at once indicated. When the hand has passed the os uteri the presenting part of the fœtus is pushed upward and away from the side in which the feet lie. If the membranes be still unruptured, it does not matter whether we rupture them in the os and perform the version inside the membranes, or whether we reach the feet by going between the membranes and the uterine wall. The latter procedure renders the version easier.

2. The feet may be seized in one of two ways.

(a) By going over the abdominal surface of the child directly to the feet (German method). For instance, when the feet lie behind on the right, as in cross-birth, with the head left, back to the front, the accoucheur carries his hand straight to the right sacroiliac synchondrosis above. The inexperienced accoucheur may in this way very easily seize a hand instead of the foot. Hence the second method is recommended to him.

(b) In this the hand is passed along the lower anterior side of the child until the hips are reached, and from these the hand is slipped down to the foot (French method). The use of the external hand is as important as that of the internal. The former fixes the uterus and forces the breech towards the inner hand. If the internal hand does not succeed in grasping a foot by this means the external hand should by pushing the breech out of the way, and by direct pressure upon the leg cause this to float freely and drive it against the internal hand. The internal hand, when there is not room for it to slip down to the foot, should draw the thigh against the belly, and it is then able to get hold of the fore leg with the index and middle fingers, and finally to seize the foot at the ankle between the two fingers.

In cross-births with the back to the front (dorso-

anterior transverse) we turn with the lower foot, and in dorso-posterior with the upper foot, and in turning from head presentations always with the anterior foot. It is only by this method that the foot which is drawn down comes to the front and that the labour takes place without rotation of the trunk. But with prolapse of an arm in the dorso-posterior transverse presentation it is better to turn with the lower foot, as Zweifel correctly points out, to avoid rotation of the child. As a rule only one foot is used in turning, because the other foot is carried up and with the hips dilates the soft parts more strongly, thus facilitating the passage of the head.

3. In order to assist rotation the foot is drawn downward and towards the abdominal surface, while the external hand drives the head up. The rotation is completed as soon as the knee is in the vulva.

Rotation may be difficult—

(1) During a pain. Treatment: Waiting.

(2) When the breech sticks on the venter of the ilium. Treatment: Pulling the foot strongly to the side of the head.

(3) When the greater part of the foetus is surrounded by the stretched lower uterine segment. Treatment: The foot already grasped is tied with a loop of tape. If the foot cannot be drawn down to the vulva, the loop of tape is carried into the uterus with long dressing forceps, and attempts are then made to pass it over the foot with the fingers. After tying up the first foot the second is drawn down. In this way room is made in the uterus, and rotation then takes place easily. If this does not succeed we must then first decide whether the child is still alive. This is soon settled by the umbilical cord, which is often near the fingers.

If the cord does not pulsate all attempts at version are

given up, and we proceed to embryotomy. If the child still lives we put a loop on the second foot also and pull them both down, while the other hand introduced into the vagina presses the shoulder cautiously up and towards the middle line (double-hand manipulation of Justine Siegemundin). If this method appears to fail it should not be applied forcibly, since the patient's uterus may easily be ruptured. Embryotomy should be done in this case.

When the lower uterine segment is much stretched, we should only proceed to turn when the child is still alive, and this should be done with both feet at once. *If the child is dead no attempt to turn should be made, but embryotomy should be performed.*

Theoretically Cæsarean section comes into consideration in cross-births when the uterus is greatly stretched and the child is alive. The practical carrying out of this depends upon several considerations, which are more closely discussed under the heading of Cæsarean Section (see below).

The treatment in tetanus uteri is more simple; this is a tonic contraction of the uterus which arises after the use of ergot, after manipulation of the os uteri, and after unsuccessful attempts at version, but may also arise spontaneously in cross-births. If the tetanus does not cease under deep anæsthesia the shoulder is fixed so firmly against the pelvis that one cannot get at the child with the hand at all, and the accoucheur is left with no resource but embryotomy. The clinical picture of so-called *protracted or neglected* cross-births is formed by a combination of great stretching of the lower segment of the uterus, of tetanus uteri, and of decomposition of the already dead child. The woman has usually been in labour several days, she is feverish, has a soft and quick

pulse, the discharge is foul, the arm has prolapsed a good distance, and shows signs of decomposition. The shoulder is apparently or really wedged in the pelvis. Prolapse of the arm in cross-births is unfavourable to the accoucheur, in so far as it presumes a deeper position of the shoulder, which renders version more difficult; it is favourable in so far as the accoucheur need not free the arm in any extraction afterwards. The prolapsed arm does not hinder the turning. A loop is put on it, and the loop is kept moderately tense during the turning. This pulling directed toward the abdominal side of the foetus is especially important during extraction, because the arm otherwise easily slips behind the neck, and afterwards is broken by pulling on the loop.

Prolapse of the funis occurs in 9 per cent. of all cross-births according to Winckel. The treatment of cross-birth is not in any way affected by this accident. Reposition of the funis is not practised in cross-births.

Extraction by the Foot.

Extraction by the foot is only performed when danger to the mother or child demands the termination of the labour. An exception to this rule is a foot presentation brought about by turning. Here many obstetricians, among whom is Gusserow, recommend that extraction be at once proceeded with, provided that no contra-indication exists, that is that the os uteri is fully dilated.

This advice is good for a practised accoucheur, but the beginner does better by controlling the foetal heart sounds after turning, and extracting only when these are not to be heard, or are getting slower and slower. The mortality of children after turning alone is not higher than that of turning and extraction (50-60 per cent.),

while the mother may suffer many kinds of injuries through extraction.

Conditions necessary for extraction :—

(1) The membranes must have been ruptured.

(2) The os uteri must be fully dilated.

The above conditions, with a not too greatly contracted pelvis and a not abnormally large child, are not to be regarded as absolutely fixed.

In a flat pelvis the after-coming head passes more easily than the fore-coming one, and for this reason we perform podalic version in cases of flat pelvis.

Abnormal size of the child is recognised first during extraction by its not advancing in spite of a normal pelvis and a fully dilated os.

The first condition can be easily satisfied by rupturing the membranes, and the second in primiparæ by deep cervical incisions (see p. 243).

In multiparæ the experienced accoucheur may attempt extraction even when the os is not fully dilated, but the beginner had better wait. The trunk can often be extracted through an imperfectly dilated cervix, but the os uteri may contract tetanically round the child's neck; the head can then only be delivered after deep laceration of the os, whereby dangerous bleeding may be caused.

In such cases if incisions be made it should be remembered that the constricting ring in multiparæ is formed by the somewhat inverted internal os uteri. On this account the incisions should not be more than $\frac{1}{4}$ c.m. deep, and must be multiple so as not to cut through the uterine wall.

Mechanical dilatation is perhaps to be preferred in these cases (p. 245). If the head cannot be delivered on account of this constriction of the cervix, we should wait calmly, anæsthetise deeply, and continue it.

Sooner or later the spasm passes away, and the head is either spontaneously born or is easily delivered by Veit's manipulation. As preparatory to the foot or breech extraction, the various restorative agents for the child should be at hand, and the patient should be laid across the bed.

Anæsthesia is very advisable and must be very deep. The freeing of the arms becomes especially difficult if the woman when half anæsthetised draws her pelvis back into the bed on account of pain.

Technique of the Operation.—If the foot still lies in the vagina it is pulled out by the index and middle fingers of that hand which looks towards the child's abdomen. When both feet are down, three fingers are used, the middle finger resting between the feet. When only one foot is down, both hands grasp the foot, which is wrapped up in a towel in such a way that the thumbs lie on the dorsal surface. The hand of the same side goes in front, and as more of the leg appears the hands take a higher grasp. The pull must be directed exactly downwards. The back of the leg must be always carried to the left in the first foot position, in the second to the right. If the anterior hip appears, the thumb of the anterior hand is laid on the dorsum, the index finger on the iliac crest, and the remaining fingers grasp the thigh.

The index finger of the posterior hand (not the middle finger as well) is introduced from behind into the groin of the posterior limb, the thumb lies on the dorsum, and the accoucheur now pulls with both hands equally on the whole pelvis until the angle of the scapula appears at the vulva. The hands should not grasp the trunk higher than this, a mistake which the beginner is very likely to make. A fatal rupture of the liver may take place in this way.

At intervals after the birth of the navel the severely stretched cord must be freed with the anterior hand. If the foot which is still up does not come down naturally, it should be pulled down over the abdomen when the angle of the scapula is felt at the vulva. When both feet come down each is seized with the corresponding hand and drawn upwards as far as the hips. The commonest injury in that part of the extraction so far described is fracture of the thigh. This arises from placing two fingers on the posterior groin (a dearly beloved trick of beginners), or by pulling with the one finger not directly on the groin but on the thigh, or by dragging the anterior foot too strongly forwards.

The treatment of this fracture consists after (Credé's extraordinarily practical proposition) in placing the limb upwards on the trunk and bandaging it on the trunk as a splint for fourteen days. This attitude is not at all uncomfortable to the child, because it has already been in this attitude within the uterus. The freeing of the arms and head has been already described on p. 78. This does not always go smoothly if one has broken up the natural mechanism of the labour by the extraction.

If the arms are carried very high it will be necessary, in order to reach the elbow, to introduce four fingers or even the whole hand. In this way the widest vagina may be torn because the hand must be forced past the trunk. A tear of the perinæum of the second or third degree may then arise. It is therefore wise to consider whether it is not better with a big child and a narrow vagina to introduce only two fingers, and to pull down the arm by the shoulder over the abdominal surface. In this way at the worst only a clavicular or humeral fracture occurs, which is cured in eight days, while a perinæal laceration of the

third degree requires a longer time for its by no means certain cure.

A quickly made vagino-perinæal incision may be advisable in these cases, especially in primiparæ with narrow and rigid vagina. This gives so much room that one can get past the trunk with four fingers. While a laceration almost always gives trouble to the accoucheur, an incision never does. Something similar applies to fracture. If it is necessary to pull down the arm by the shoulder, the friends should be told at once that the delivery can only be completed by artificial fracture of the arm. If the arm is broken it does not matter, and if, as is common, it is intact, the fame of the accoucheur is enhanced. If the posterior arm has slipped over the neck we bring it forwards by rotating the trunk and freeing the other arm first. The author in a great number of extractions has not required any other means. It seems to him specially important to teach this already exceptionally complicated operation with the fewest modifications possible. The author has not yet used incisions in multiparæ, and consequently on the introduction of his hand or fingers has caused several perinæal lacerations of the second and third degree. There were also in his cases several fractures of the clavicle and humerus, but never a separation of a diaphysis. By simple bandaging of the arm to the thorax, and in clavicular fracture by using Sayre's plaster strapping method, these fractures united without trouble in eight to fourteen days. The strapping was changed each day at the time of bathing.

As regards the delivery of the head, we have only to speak of the behaviour of the accoucheur when the chin is directed forwards. Usually this accident is caused by meddlesome rotation of the trunk, but it may be avoided by careful extraction if the back is held to the side. If

the accoucheur, with outside pressure to help him, can get his finger into the mouth the chin can be pulled to the side and backwards. If this is impossible, and the child is already dead, perforation of the aftercoming head must be performed. If the child is still alive forceps are applied according to Fritsch, while the head is still above the pelvis. For this purpose the trunk must be carried strongly forwards.

If, on the other hand, the small fontanelle is already to be felt behind, the reversed "Prague manipulation" should be made. This consists in hooking the fingers over the shoulders and raising and drawing the legs as strongly as possible against the mother's belly.

Of the countless injuries of the child which can arise owing to extraction by the feet the most important are injuries of the extremities. Concerning these a few words require to be said on separation of the diaphysis, so often falsely designated as luxation. The most constant sign of this is the inward rotation of the humerus (Küstner). If the injury is not diagnosed it renders the arm completely useless. Küstner treats it by bandaging the supinated forearm to the injured humerus, so that the hand lies on the injured shoulder, and then the forearm and the arm are fixed to the thorax upon a cushion pushed into the axilla.

The paralyses of the upper extremity which the author has seen have spontaneously disappeared in a few weeks. If this does not take place, a weak Faradic current should be applied every other day after the fourth week (Seeligmüller).

Extraction by the Breech.

Danger to the mother or child forms the indication for this operation. The necessary conditions are those for

extraction by the foot. Since, however, extraction by the breech is much more difficult than by the foot one should always try whether it may not be possible to pull down a foot and extract by this.*

This succeeds with deep anæsthesia in all cases, according to the author's observations, where the breech is still so high that one cannot hook the index finger into both groins. In the latter case one can deliver the breech comparatively easily with perhaps the help of perinæal incisions.

To bring down a foot we place the patient in the lithotomy position; if the belly is directed more forwards on the side of the feet, that hand is introduced which looks to the child's belly, the breech is pushed somewhat towards its own dorsum, and the foot is seized if it is to be felt, if not, the tips of the fingers are carried on the anterior thigh to the popliteal space above; they press this against the child, and the leg thus brought near is now seized, and finally the foot is reached. If we are operating in a uterus empty of waters, and the posterior foot can be seized and brought down more conveniently we naturally choose this foot.

If the methods described should ever be insufficient a blunt hook, guided by the first two fingers of the left hand, is passed into the groin which is easiest to get at (the anterior). By not pulling too roughly injuries of any gravity may be avoided. Nevertheless, the child is often brought into the world dead on account of the long duration of the operation.

* In two conditions one brings down a foot without always extracting by it, namely, in placenta previa, in which it is sufficient when the breech is engaged firmly in the pelvic inlet, and in prolapse of the funis, provided that the umbilical cord still pulsates after bringing down the foot.

Forceps Extraction.

In Germany Naegele's forceps are used almost universally. Their shape may be taken as well known.

The *indications* for forceps extraction are danger to the mother or child.

The *forceps* can, however, only be applied when the following conditions are fulfilled:—

(1) The head must lie with its greatest circumference at least in the pelvic inlet.

(2) The os uteri must be fully dilated. (In primiparæ this full dilatation may be obtained by cervical incisions.)

(3) The membranes must have been ruptured.

(4) The head must not be too big, too little, or too macerated.

(5) The pelvis must not be too narrow.

The third condition can be satisfied in every case. If the head is too big, and the pelvis too small, the head will not engage in the pelvis; if the head is too little or is macerated, it usually comes so quickly through the pelvis that the forceps are not required at all. Strictly speaking, therefore, only the two first conditions need be considered in extracting with the forceps. Yet the fifth condition should be remembered and retained, because forceps should only be applied in contracted pelvis under special circumstances.

Forceps replace the pressure from above, caused by the pains and abdominal forces, by traction from below.

Ideal forceps would be those which did not compress the head at all. But the forceps can only get their hold by compressing the head about 1 c.m. in the transverse diameter. The pressure also upon the maternal parturient canal should be as slight as possible. On this account leverage action should be abolished.

The forceps should never be applied on account of simple

weakness of pains. If the circumstances of practice ever compel the accoucheur to make an exception, this should only be done when he is certain that the case will be easy, when the head lies right for the forceps, *i.e.* in the pelvic inlet with its small fontanelle directed forward, and when no resistance of any importance is expected from either the soft parts or the pelvis (contracted pelvic outlet in kyphotic and funnel-shaped pelves). These conditions are as a rule only fulfilled in multiparæ. In primiparæ we cannot tell beforehand whether the forceps will not cause many bruises and tears, and thus necessitate lateral incisions in order to prevent perinæal laceration.

The possibility of preserving the soft parts from lesions depends not so much on the width of the genital canal, as upon its extensibility. The degree of the latter is not to be estimated with certainty, but is at any rate much less in primiparæ than in multiparæ.

Forceps extraction undertaken for simple weakness of the pains may have very sad results if the accoucheur is mistaken in the position of the head.

The operation begun, perhaps, as a slight affair must be ended at any cost. The child comes into the world dead as a result of difficult forceps extraction, the mother dies later of sepsis because in such an unconsidered and unexpectedly difficult operation defects in the antisepsis generally occur—and all this happens in a case which would have terminated spontaneously and happily under patient waiting.

Preparations for and Technique of Forceps Extraction.

Since a thorough disinfection can only be made in the lithotomy position, this is always chosen. Anæsthesia is only dispensed with when great haste is necessary, as for

instance when the cord has prolapsed, but still pulsates when the head is already engaged in the pelvis. Not only the forceps but the catheter, uterus catheter, and a pair of Cowper's scissors are placed in the 1 per cent. lysol solution. The small case with iodoform gauze is placed ready in order to be able to plug any tears or incisions in the vagina. Immediately before the operation a thorough examination is again made. One often finds through this that the head stands higher than was thought, and that there is still a rather broad rim of the os uteri undilated at the back, etc.

In considering the build of the forceps it is clear that the concavity of the pelvic curve of the forceps must look forward so as to coincide with that of the pelvis. In this position of the forceps the left blade of the forceps which carries the lock is in the left side of the pelvis, the right blade in the right side. The transverse diameter of the forceps coincides with that of the pelvis. The forceps, moreover, must seize the head in a quite definite manner, that is in its bitemporal diameter, and this diameter should likewise coincide with the transverse diameter of the forceps.

In the above described position of the forceps they can only seize the head correctly when the small fontanelle is directed forwards (occipito-posterior positions are at present excluded). This is only the case at the pelvic outlet.

From this view the conclusion follows that *forceps can only lie in correct position with the pelvis and the head when the head is at the pelvic outlet and the smaller fontanelle is directed forward.*

We will consider now the operation when the head lies conveniently for the forceps in the described position. The fore and middle fingers of the right hand are pushed

up as high as possible on the left side of the pelvis to the head, so that the blade of the forceps may be passed under guidance of the fingers nearly all the way. In this way one avoids the inclusion of the cervix (if not fully dilated) or of a prolapsed arm.

The left hand then seizes the left blade like a quill, between the thumb and forefinger, and places it in the right groin of the mother. In this position the point of the blade is introduced between the right fingers and the head. The hand is now depressed and carried to the middle line, and the blade lubricated with lysol slips upwards of itself into a good position on the head in the pelvis. Any obstruction to its progress should not be overcome by force, but the blade must be introduced in some other direction, and the right thumb is finally pushed in with the blade. If the blade tends to slip out after being passed, it should be held by the midwife beneath the patient's left thigh.

The right blade is passed in the same way from the left groin with the right hand. When both blades have been properly passed it is only necessary to bring both handles together and press the catch on the right blade on to the lock. The lock, which should be a hand's breadth from the vulva, looks now to the symphysis.

The right hand grasps the handles so that the fore and middle fingers are over the flanges. The other hand holds the handles together. The operator then pulls in the direction of the handles, which gradually become elevated in agreement with the descent of the head. The traction should not be increased by throwing body weight into it, but the upper arms should be kept to the side so that the pulling may be stopped at a moment's notice.

If danger to the mother or child was the indication for forceps, as is usually the case, the head is extracted as

quickly as the resistance of the soft parts will allow. If traction is incessant the accoucheur tires quickly, and has to lessen the traction force, but this should only be done sufficiently to prevent the slipping back of the head.

The operation accordingly consists of "tractions" and "intervals."

In multiparæ it is often possible to extract the head when low down, by a single traction, but in primiparæ this can only be done when the resistance of the soft parts has been removed by incisions. If the head advances on pulling, and the perinæum begins to stretch more forcibly, a *perinæal laceration must above all be avoided*, and this arises more easily in forceps extraction than in natural labour.

Three means assist the accoucheur in this:—

1. *Judicious extraction.*

The beginner almost always fails in this because in his joy at the descent of the head he pulls as hard or even harder than before, whereas just at this time the head should be forcibly held back during a pain or during the action of the abdominal pressure which is reflexly excited.

2. *Removal of the forceps* as soon as one can reach the brow with the left fore and middle fingers per rectum (Ritgen's manipulation).

The right hand undoes the lock, draws both blades out carefully, and holds back the head during a pain, and during the interval the head is expressed from the rectum.

The shoulder must of course be got out with the right hand, for the left hand would have to be most carefully disinfected first, and time does not allow of this. The brow cannot be reached so early from the region behind the perinæum, but this modified Ritgen manipulation is to be preferred for the sake of preserving asepsis.

3. *Lateral incisions of the vaginal entrance.*

These are made when the head does not advance on traction because of the resistance of a greatly overstrained perinæum. While making the incisions the head must be held back by the left hand, or the midwife must hold the forceps so that the head may not pass through too quickly and at this juncture still tear the perinæum. If, after incising, the extraction remains difficult the incisions must be deepened. The shoulders should be delivered by expression, and only secondarily by manual extraction. If the child is asphyxiated its cord is tied at once. While the accoucheur revives the child the midwife should watch the uterus. If there is bleeding from tears of the vagina or from the incisions, the accoucheur puts down the child and tamponades the lower third of the vagina. Artery forceps are but rarely required. After delivery of the placenta the wounds are sutured.

If the lesser fontanelle is still to the side (deep transverse position) the forceps are put on obliquely.

For this, one holds the closed forceps at the vulva of the patient in the position that they will occupy in the pelvis and with the tips and concavities of the forceps towards the smaller fontanelle, that is either to the left (in the first head position) or to the right (in second head position). If the lock of the forceps be now opened while their oblique position is kept we see at once which blade goes in front and which behind. The anterior blade is then passed laterally, and caused to deviate by depressing the handle strongly and pressing the point forward with the fingers in the vagina. The posterior blade is then introduced more towards the back.

Note.—If one thinks of putting the forceps on obliquely in other head presentations the tips of the blades must be

directed to that part which should come forward, for instance to the chin in face presentations. The forceps only rarely lie as obliquely after locking as they were introduced, but in many cases extraction is rendered much easier or only possible by applying the forceps obliquely. By oblique application of the forceps the child's head is much less strongly compressed.

Theoretically one could imagine great injury to the maternal soft parts through the greater rotation of the forceps, but practically this does not occur.

If the head lies at the pelvic inlet, one tries to cause its descent by external pressure while the patient is in Walcher's position with extended thighs. This succeeds not only in normal but also many times in flat pelves. The descent is diagnosed by our not being able to reach the sacral promontory any longer, also in flat pelves by the sagittal suture being pressed away from the promontory, the lesser fontanelle descending and often already coming forwards.

If extraction (in primiparæ) is still difficult, this difficulty may be removed by perinæal or perineovaginal incisions. If the head sticks at the pelvic inlet in spite of external pressure, and perhaps in an unfavourable position for extraction (anterior parietal presentation, descent of the large fontanelle), one attempt with the forceps is allowable after the blades have been introduced under guidance of the half hand. If the head does not descend after one traction carried out "lege artis," the forceps should be taken off again and the head perforated if the mother be in danger.

In such cases, if the accoucheur explains beforehand that the forceps are only being applied tentatively, the friends will not think any the worse of him should extraction fail. But if it does succeed the credit is all the

greater. When high forceps are used in a normal pelvis the forceps should be passed obliquely and toward the lesser fontanelle. With a flat pelvis and descent of the large fontanelle the forceps should be applied transversely (see also p. 153).

If *the head is still movable above* the pelvis version alone requires consideration. If this is too hazardous, owing to too great stretching of the lower uterine segment, the various axis traction forceps may be useful. Their advantage, according to Freund, consists in their drawing the freely movable head more easily into the pelvis. Whenever the axis traction forceps succeed in this the author thinks it would have been possible to force the head into the pelvic inlet by external pressure. Attempts should therefore be made to press the head into the pelvic inlet, and to use the ordinary forceps before perforation is done in a case of this sort.

With high forceps traction must at first be made in a downward direction. A test pull is often made at first to see if the forceps will easily slip off, the left hand is placed upon the right one, and two of the fingers of the left hand are at the same time placed on the head. If the forceps now slip, the left hand glides away from the right one if the two fingers are kept on the head.

If the large fontanelle has rotated forwards the forceps are put on transversely, or obliquely when the sagittal suture runs obliquely, in such a way that the large fontanelle shall come forward. Artificial rotation for the purpose of bringing the smaller fontanelle forwards is obsolete. If the sagittal suture runs transversely and we have not to deal with a frontal presentation, but with simple descent of the large fontanelle, and if the head has already passed the pelvic inlet, external pressure should be used.

If then the smaller fontanelle comes down, the forceps are applied obliquely in the direction of the small fontanelle, but if the large fontanelle remains lower the forceps are applied so as to bring this forward. When in a case of frontal presentation we have to do with a small round head, or, as happens in multiparæ, the resistance of the soft parts is entirely absent or has been removed by artificial means, then forceps extraction is easy, but it is more difficult under other conditions, as in brow and face cases, because the wider occiput must go down the longer posterior pelvic wall, and must also pass over the perinæum.

The author thoroughly concurs with Zweifel that in frontal presentations traction should not be made continuously downwards until the brow appears. The handles of the forceps generally point forwards before this time, and if we pull in this direction the head will be delivered with ease.

Brow and face presentations demand no special description of the method of forceps extraction. Since the perinæum is usually more endangered in these cases, the forceps should be removed as soon as one can grasp the occiput from behind the anus after birth of the brow or chin.

As a rule forceps extraction is only possible in face and brow cases when the chin or brow has rotated somewhat forward. This rotation has almost always occurred by the time any indication for terminating labour has appeared. Only in very rare cases does the chin remain directed backward when in the lower sections of the pelvis.

In these rare cases the application of forceps is bad practice. If the chin is to the side an attempt with forceps may be made. In two cases of this kind which the author

saw he was not successful in extraction with forceps. In both cases the heads were large and dolichocephalic. If danger to the child comes on in face cases where the chin is back, and when turning is no longer possible, the delivery should be left to nature. If on the other hand the mother is in danger perforation should be used. When the chin is directed to the side an attempt with the forceps should be made before perforating.

Prognosis of Forceps Extraction.

If the operator uses forceps only after sufficient examination and on strict indications, with strong antiseptic precautions, and takes them off rather soon instead of forcing extraction, *then the mother is not placed in any greater danger from the operation itself than by normal labour*. In Leopold's clinic, of 206 forceps extractions not one mother died; of the children 12 per cent. died, which is only 1 per cent. more than Hecker reckoned for the normal mortality of children within eight days of birth, although of the 206 children 87 per cent. were extracted by means of forceps on account of asphyxia being already present.

The author in 92 forceps extractions lost no mother and only five children (5.4 per cent.). His later results have been equally good. If on the other hand the forceps are applied without sufficient examination or direct indication, and extraction effected come what may, then extensive injuries of the maternal soft parts, or even of the pelvic bones and symphysis, and manifold lesions of the child's skull (with cerebral hæmorrhage) are the necessary consequences. If, in addition, antiseptic precautions are not thought of, as is often the case in a critical operation like this, not only the child but also the mother may frequently succumb. Even after easy extractions one sees paralysis of the arms and face. These disappear spon-

taneously. The death of the child through compression of the cord (when it lies round the child's neck) by the tips of the forceps (Hecker) may be prevented by the method of quick extraction given above.

Perforation and Craniotraction—Cranioclasia.

This operation is indicated when the mother's life is in danger and neither forceps nor version with extraction are possible. When the child is alive Cæsarean section requires consideration before perforation (see p. 284). Perforation is most commonly required for disproportion between the head and the pelvis, or for unfavourable engagement of the head.

Conditions necessary for perforation :—

1. The membranes must have been broken.
3. The os uteri must allow the perforator to pass.

The author prefers Naegele's scissor-shaped perforator as the most useful of all so far invented. Its chief advantage consists in the fact that one can use it in every case. It also demands the least amount of force. If one cannot perforate through a suture or a fontanelle it is easy to go through the skull itself with a few boring movements. As a result of these advantages the head is not driven upwards so strongly, the already stretched lower uterine segment suffers less, and the fixation of the head from outside is easier. It does not slip out so easily, and it bores into the soft parts and bones more quickly. All these advantages are offered by Auvard's cranioclast when it has the author's double-edged sharp point (see Fig. 31), so that this instrument renders Naegele's perforator superfluous. The operation is performed in the lithotomy position. Two or four fingers of the left hand are passed to the most accessible part of the head,

and the back of the hand looks backward. While an assistant carefully fixes the head over the pelvic inlet with both hands, the operator sticks the perforator, which is strongly depressed, into the skull up to the barb, he opens it, closes it again, turns it round 90 degrees, and opens it again as far as it will go. Then he tries with his finger if the opening is wide enough, and passes a double-channelled catheter (a glass tube easily breaks) into the skull cavity and breaks up thoroughly, and washes out with this the brain, and especially the medulla oblongata. This is necessary so that the child shall not be born alive.

A *presenting face* is most easily perforated through the brow ; the *after-coming head* is perforated in the following manner :—

The index and middle finger of the left hand are carried as high as possible between the symphysis pubis and the neck of the child, and the perforator—which in this case should scarcely be of the trephine form—is passed between the fingers and the neck of the child, and is inserted at the highest point which the finger tips can reach.

Perforation of the after-coming head is easier than that of the fore-coming head, because the head is easily fixed by holding the trunk. Generally the path which the perforator must take when the head is very high is somewhat longer, since the instrument has to work through the first cervical vertebra before passing through the foramen magnum into the cranial cavity.

Extraction should at once follow on perforation, since the danger to the mother demands quick ending of labour.

In order to enable extraction with a defectively dilated os to take place, especially in primiparæ, 1-2 deep cervical incisions are indicated. If they are not made, one finds almost always a cervical tear reaching far over the

insertion of the vagina, from which severe bleeding may take place.

Perinæal and perinæo-vaginal incisions may be necessary in old primiparæ.

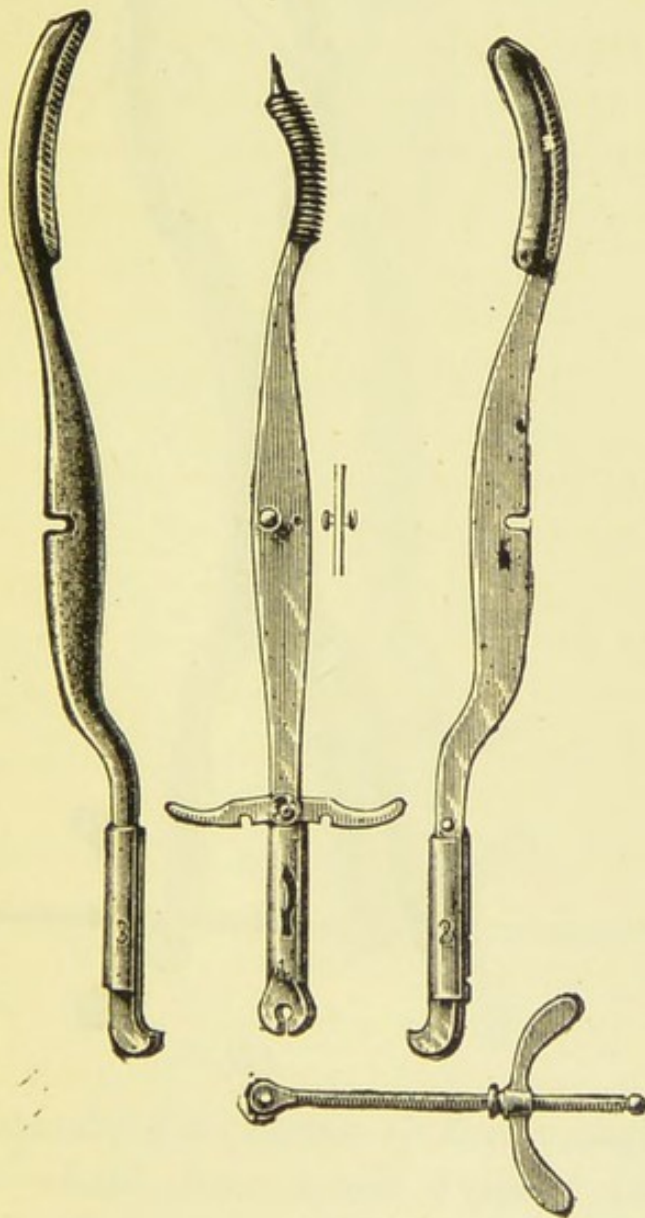


Fig. 30.



Fig. 31.

Extraction is performed—

(1) With the ordinary cranioclast (see Fig. 32).
Auvard's instrument (see Figs. 30, 31, and 32) is such a

cranioclast when the third blade is simply removed; that is, it is a strong bone forceps provided with a compression apparatus.

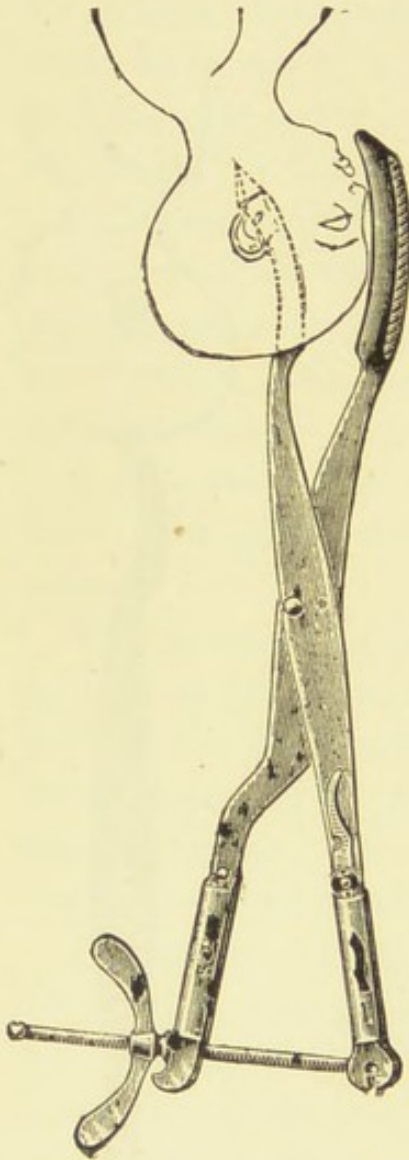


Fig. 32.

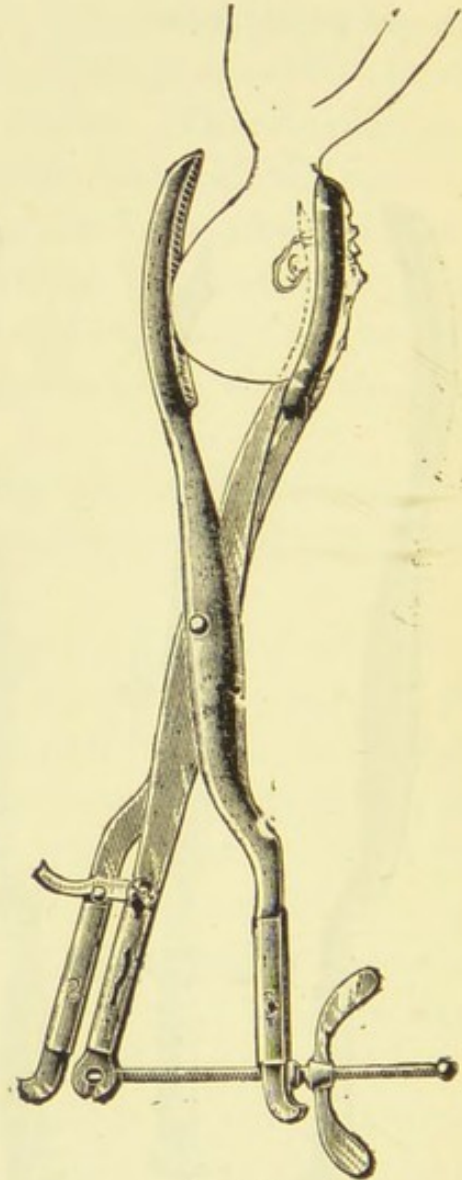


Fig. 33

The inner grooved blade which is used as a perforator is put into the cranial cavity; the second blade is passed like a forceps blade under guidance of two fingers over the frontal region because the instrument does not then tear out so easily (see Figs. 31 and 32). The compression apparatus is then closed and the extraction begun; the latter is not hurried, so that the head may

gradually adapt itself to the pelvic canal by extending itself into a sausage shape. By the favourable configuration which the cranioclast gives the head, this instru-

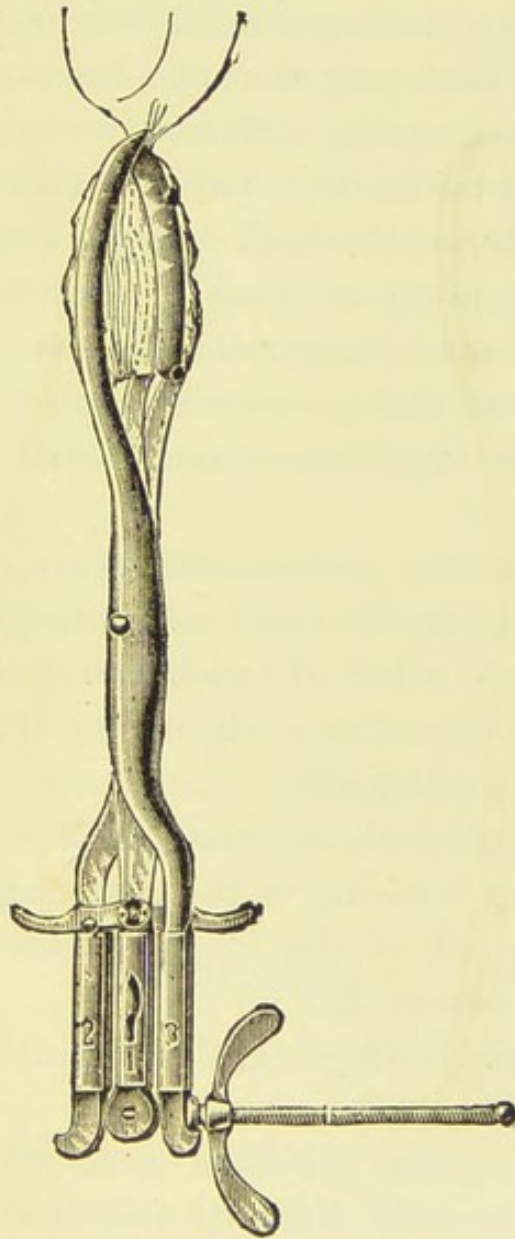


Fig. 34.

ment, which is properly only an extraction instrument, becomes in a certain sense a diminishing instrument.

When the head comes to the pelvic floor the face is pulled back by means of the instrument in imitation of the natural process of labour.

(2) With a sharp hook.

This instrument is advantageous in those cases where

the cranioclast keeps tearing out on account of the friability of the bones. The hook is here passed into the cranial cavity and fixed at a spot which one can reach from outside with the finger in the vagina. If slow traction be now used in such way that one can stop pulling at any moment, one can quite sufficiently control the depth to which the point bores, and feel whether one may apply more power without the hook tearing through.

This accident must be avoided in every way possible, since it may cause dangerous lesions of the posterior vaginal wall or of the operator's hand.

(3) With the three-armed cranioclast of Auvard* (see Figs. 30, 33, 34).

In cases of greater pelvic contraction, or with very big and hard skulls, the diminution produced by perforation is not sufficient to allow of extraction with the cranioclast without great difficulties. Here very often kephalotripsy is needed after perforation.

The instrument hitherto used for this is so thick that it causes serious bruising of the maternal soft parts. The head also slips out of the blades when the compression apparatus is screwed up.

All these disadvantages are avoided by the carefully designed instrument of Auvard.

First the two parts are used as a simple cranioclast. If extraction is still difficult, the third blade is introduced on the free side of the head (Fig. 33). By turning the screw the third blade is brought nearer the cranioclast, and the head is crushed (Fig. 34). Bruising of the soft parts need not be feared from this delicate instrument. The head also cannot slip out of the blades because it is held fast by the cranioclast.

* Auvard's excellent instrument serves as perforator, cranioclast, and cephalotribe.

The author believes that this instrument will considerably facilitate the extraction of the after-coming perforated head.

This is more difficult because the brain cannot be so fully washed out, and the head does not mould so well.

The author in five cases of perforation of the after-coming head only used the cranioclast twice for extraction, but succeeded by pulling on the perforation opening and the mouth with his fingers; the extraction was difficult in every case, the maternal soft parts were greatly bruised, and the author came to the conclusion that in certain cases of this kind one could not succeed in extraction without a cephalotribe.

The **prognosis** of perforation and craniotraction or cranioclasia is good when the described procedure is adopted. The deaths after the operation are not due to the operation, but to the life endangering conditions which necessitated it. At the same time the mother may sustain serious injuries by the unskilful use of the instrument.

Embryotomy.

This consists in Decapitation and Exenteration. It is indicated—

- (1) In neglected cross-birth (p, 259).
- (2) In abnormal size of the child's trunk, whether this be caused by disproportionate growth or malformation.

For both operations the lithotomy position is absolutely necessary.

(1) Decapitation is performed in those cases where the neck can be reached comfortably with the hand. This is facilitated by strong traction on the prolapsed arm. The left hand grasps the neck, and, when the back lies forward, Braun's hook is passed forward, guided by the

thumb; otherwise, guided by the half hand, it is passed backward, with its curve over the spine. If one now draws it downward the point pierces the soft parts, which must always be guarded by the internal hand, and the hook surrounds the spine completely. If the hook is now pulled more towards the head of the child (Fehling), the spine is divided. The bridge of soft parts still left can be divided in the same way, or can be drawn down so far that one can divide it easily with scissors. It is now important to fix the head from outside to prevent it from receding into the uterine cavity.

Decapitation can be also done with Siebold's scissors, but is more troublesome. For this the arm is pulled down strongly, or the neck is drawn down with a blunt hook, and then the soft parts and an intervertebral space are cut through gradually under cover of the left fore and middle fingers.

The trunk is removed by pulling on the arm. Perforation of the trunk and craniotraction are rarely necessary. When the head is left behind it may be extracted by putting two fingers in the mouth, and by external pressure. A contracted pelvis or an abnormally large head may necessitate perforation and craniotraction or cranioclasia.

(2) When the trunk is more reachable exenteration is performed by pushing Naegele's or Auvard's perforator, guided by several fingers of the left hand, into the most attainable part, and dragging out the thoracic and abdominal organs—the latter after dividing the diaphragm—through as large a hole as possible.

The author believes, from watching two cases of this kind, that the simplest method to follow is that of Pawlik, who pulls down the neck by means of an arm, and visibly incises the parts with scissors.

Others advise the introduction of a pointed or blunt hook through the perforation opening, the fixation of it in the child's pelvis, and then the pulling of the breech past the shoulder, as in the mechanism of spontaneous evolution. It is only in very rare cases that it is allowable to cut off the prolapsed arm of a dead child; namely, when it prevents the performance of embryotomy. In most cases the presence of the arm is an advantage, since by pulling on the arm the neck and trunk may be brought lower down.

The operation if performed on the lines here described is not in itself dangerous.

With a dead child and great stretching of the lower uterine segment one should therefore, on principle, give up every attempt at turning, since this exposes the mother to danger of rupture of the uterus.

Cæsarean Section.

This consists in the extraction of the foetus through an artificially established opening in the abdominal wall and uterus. The mortality of this operation in the preantiseptic stage was very great—85 per cent. Therefore Porro proposed to amputate the uterus after removal of the foetus and the placenta, and to fix the stump in the abdominal incision, so as to prevent the entrance of decomposing lochia into the abdominal cavity. The favourable results of Porro's operation were partly due to the operation having arisen during the early days of antiseptis. To Säger belongs the credit of applying antiseptic rules to the old conservative Cæsarean section, and more especially on having evolved an exact method of suture, thereby making this again the ruling operation. Even if the methods of suture have undergone

many modifications, the principle has remained the same, namely: *The most complete possible closure of the uterine cavity from the peritoneal cavity.*

Cæsarean section is indicated—

(1) When extraction of the destroyed child is impossible *per vias naturales* = *absolute indication* (contracted pelves, with a conjugate under $5\frac{1}{2}$ c.m., and with irreplaceable and undiminishable tumours which fill the pelvis).

(2) When the extraction of a destroyed child is possible *per vias naturales*, but the mother desires a living child = *relative indication*.

(3) When death of the mother is close at hand, or has already taken place, and delivery *per vias naturales* cannot be accomplished as quickly.

(4) For carcinoma of the lower segment of the uterus as soon as this has passed the insertion of the vagina, Cæsarean section and perforation compete in the relative indication. The first operation will in future obtain the preference. The more the mortality diminishes the greater will be the preference for Cæsarean section.

In the clinics of Zweifel and Leopold, up to 1894, 47 Cæsarean sections, all told, had been done with three deaths = 6.4 per cent. But of 22 perforations in contracted pelves (with a conjugate under 7.5 c.m.) done in Leopold's clinic not a single case died. Hence we see that individual skilled operators have very good results with Cæsarean section, but still better results with perforation.

The mortality per hundred in Cæsarean sections performed by other skilled operators comes to 32 per cent., so that we can place its mortality at 50 per cent. even to-day when carried out in general practice and not go too high.

From these considerations it follows that one should not keep back from the patient and her friends the greater danger of Cæsarean section over perforation; and, further, if the former is to be done, the patient should be placed in a hospital and a surgeon versed in the technique of abdominal sections should be called in.

If the patient is already infected one should never think of performing Cæsarean section in general practice.

Three great points require thought in the *technique of Cæsarean section*.

(1) The prevention of external infection (by strict asepsis and antisepsis).

(2) The prevention of infection from the uterine cavity (by careful suture and uterine tamponade).

(3) The control of bleeding (at first by the elastic rope and afterwards by plugging the uterus).

(1) This is attained by studious disinfection of the field of operation, of the hands, the instruments, and of everything which comes into contact with the abdominal cavity, and especially the silk and the sponges or gauze compresses. Sterilisation of instruments, silk, and gauze compresses, which are used instead of sponges in practice, is best done by simple boiling in a closed pan, after wrapping them all in a towel. The towel then serves as a rest for the instruments, compresses, and silk. The patient's abdomen and the operator's hands are disinfected with 1 per cent. lysol solution, the pubic hair is shaved off, and the field of operation surrounded by towels which have been boiled. The improvised operation table is washed and a clean sheet, under which is a big piece of waterproofing, is laid upon it. Two assistants are required at least, one for anæsthesia, and one to help the operator. If the antisepsis of the midwife is not very strict, the operator should

thread his own needles and place them and the compresses so that he can reach them with his own hand.

Time for operation.—It is best to operate before the membranes are ruptured, as soon as strong pains come on. Before beginning the operation an injection of ergotin is given, so that the uterus may contract well after being emptied.

The *incision* is in the linea alba for a length of two handbreadths, so that its middle falls in the region of the navel. The linea alba and the peritoneum are opened between two forceps and the opening is enlarged with a blunt knife to the extent of the skin incision.

Following the advice of P. Müller, the uterus is turned out of the abdomen and one proceeds to the application and fixing of the rubber tubing (1 c.m. thick) below the ovaries and round the cervix. So that no bowel may escape at the back of the uterus, one or two compresses are inserted. The *uterus* is now opened, beginning at the fundus, with a scalpel and then with a blunt-pointed bistoury for about 16 c.m. (6 inches); if the placenta is met with it is quickly separated to one side, the membranes ruptured, and the child at once dragged out by any presenting part. After tying the cord the placenta is removed with the membranes. *Stitching* then is carried out with eight deep sutures passed through the whole thickness of the uterine wall, and about 10 superficial sutures fixing the peritoneum only. With the superficial sutures the peritoneal edges curl in of themselves, so that any special folding in of these peritoneal surfaces, by transfixing the peritoneum twice on each side, is unnecessary. Fritsch advises instead of this simply to close the uterine wound by 15 interrupted silk sutures, enclosing the whole thickness of the walls. It is of no importance what suturing material one chooses so long as it is aseptic

and not too quickly absorbed. After suturing the tube is slackened. A fatal atony now often sets in which most operators put down to the constriction by the tube, but which the author would put down to the rapid evacuation of the uterus.

If the uterus be distended with a tamponade, this forms a stimulus to contraction, or if contraction fails, the bleeding may be mechanically stopped by compressing the uterus against the tamponade.

Dohrn, Van der Meij, Peter Müller and others have carried out my proposal and were very pleased with the result.

In addition to stopping the bleeding the gauze also secures continuous disinfection and drainage. The author is, however, now of the opinion (opposed to his former proposal) that the tamponade of the uterus should only be carried out in cases of atony and decomposition, and then in the usual manner from the vagina after the uterine suturing has been completed. Any bleeding from the wound itself may be stopped by putting in more sutures.

After cleaning out the peritoneal cavity the incision is closed with deep sutures taking up the whole thickness of the abdominal wall and by superficial sutures; it is dressed with iodoform gauze and wool, and the dressing is fastened on with a binder or a towel.*

The after treatment is that of laparotomy.

Generally a small percentage of the children succumb in Cæsarean section.

In repeated Cæsarean section adhesions of the uterus with the abdominal incision or the omentum may produce difficulties. In a case of this kind operated upon successfully by the author the uterus was enveloped in the

* A sterilised antiseptic bandage is provided for this purpose by Dr Mylius for one mark in the case No. 40 (bodyband).

hypertrophied omentum as in a veil, and the omentum was also adherent to the abdominal wall.

The use of catgut sutures in the first operation had not prevented adhesions.

Porro's operation corresponds entirely in its technique with supravaginal amputation of the body of the uterus with extra or intraperitoneal treatment of the pedicle.

By the extraperitoneal treatment of the pedicle, the uterus with the ovaries and broad ligaments above the tube is cut away, and the peritoneum of the pedicle is stitched below the ligature to the parietal peritoneum of the lower angle of the wound.

Indication for *Porro's* operation is given by the following affections:—

(1) By osteomalacia.

The osteomalacia is aggravated by each fresh pregnancy; while it is cured, according to Fehling, by castration combined with *Porro's* operation.

(2) By myoma of the uterus, the removal of which is indicated.

(3) By cicatricial stenosis of the vagina, which renders the escape of the lochia impossible.

(4) By septic endometritis.

(5) By uncontrollable atonic bleeding from the already sutured uterus (in cases where otherwise one would do the conservative Cæsarean section).

Vaginal Cæsarean Section.

As is demonstrated in the previous chapter the mortality of Cæsarean section is still high.

It also has the same disadvantage as laparotomy, in that a ventral scar ensues which compels the patient to wear a belt, and exposes her to the danger of a hernia later on.

To avoid this disadvantage the author has introduced Vaginal Cæsarean Section.

This operation gives access to the uterus through the

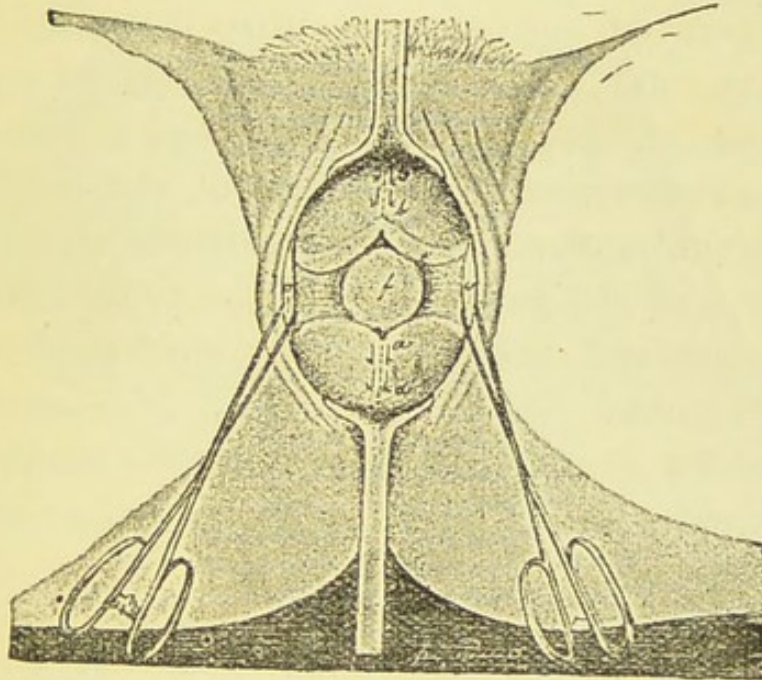


Fig. 35.

vagina without necessitating the opening of the peritoneum. Of course it is not indicated in strongly contracted pelvis (conjugata vera under 8 c.m.), although

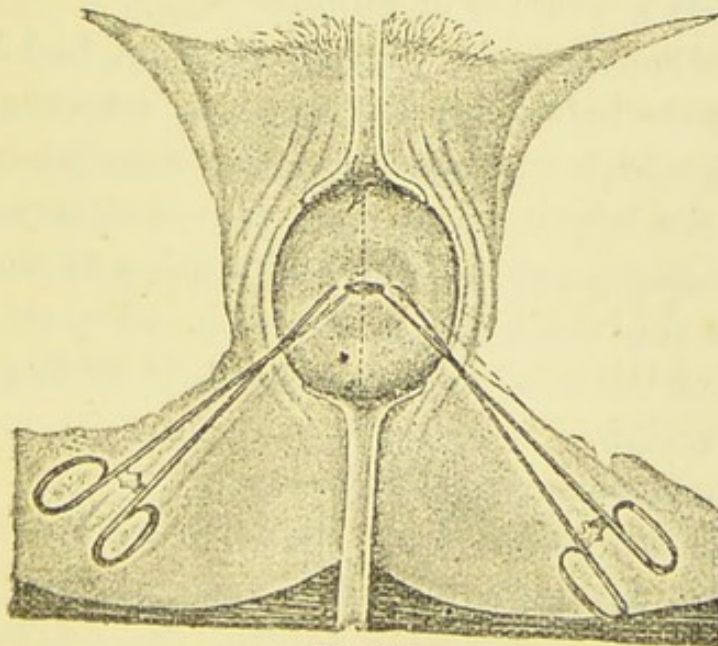


Fig. 36.

it is technically quite safe to perform it when the cervix is closed and intact.

The author has performed this operation once towards the end of pregnancy, and although the cervix was quite

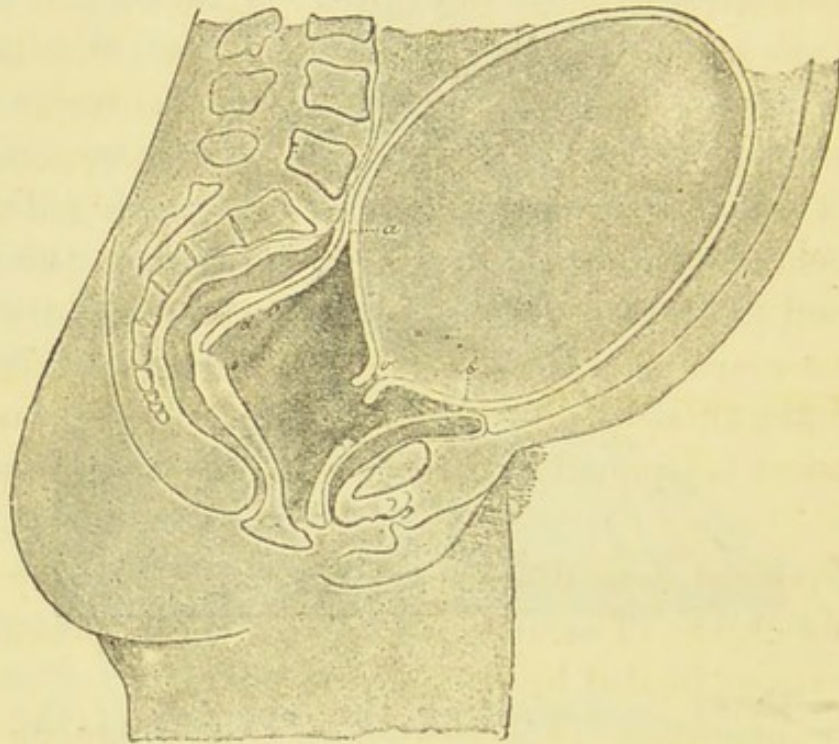


Fig. 37.

closed, he delivered a living child of $4\frac{1}{2}$ kilogrammes weight within a quarter of an hour.

This was a case where vaginal fixation had been performed the year before for prolapse and retroversion.

The child, which was very big, lay crosswise. It was feared that the labour pains had caused deformity of the uterus and consequent defective dilatation of the os.

Therefore the author considered it advisable, both in the interest of the mother and of the child, to dispense with the uterine action.

The operation was as follows :—

The portio was seized laterally with two volsellæ, large specula were inserted into the anterior and posterior fornices; then the posterior fornix, the portio, and the

anterior fornix were divided sagittally (Fig. 35 *e o f*), and the pouch of Douglas separated bluntly from the posterior uterine wall. The peritoneum was torn in doing this at one spot (Fig. 37 *c d*). The posterior cervical and body wall thus exposed was split sagittally (Fig. 36 *o o* and *a a*), and the severe bleeding controlled by ligatures. Similarly, the bladder was separated in front and the anterior uterine wall divided (Fig. 36 and Fig. 37). The plica vesico-uterina did not come into view. The membranes bulged through the opening thus made to about the size of the palm of the hand (Fig. 36 *f*). The hand could be easily passed into the uterus and the child was turned and extracted.

The placenta was born spontaneously, whereupon the uterus was tamponaded and the incisions were closed with catgut.

The patient was discharged on the 16th day with a thriving child. The uterus was in normal position, and the incisions healed by primary union.

This operation is indicated in grave danger to the mother and (in rare cases) to the child, coming on in the last months of pregnancy or in labour, when the methods of dilatation described above are not sufficiently rapid, and whenever the obstruction is in the soft parts of the lower uterine segment.

As special indications the following are given:—

1. Severe eclampsia or nephritis with uræmia.
2. Severe intrauterine bleeding as a result of premature separation of a normally situated placenta.
3. Severe lung and heart affections in which the indication is to eliminate uterine action.
4. In lieu of the classical Cæsarean section on the dying or dead.
5. Cicatricial stenosis of the cervix (to this subdivision the obstruction to labour after vaginal fixation

belongs. These obstructions may be as a rule avoided by a suitable alteration in the technique).

6. Prolapse with rigid long cervix.

7. Cancer and myoma of the cervix.

In new growths of the cervix it is easy to combine vaginal Cæsarean section with enucleation of the new growth. With cancer of the cervix, after scraping it away, the cervix can be separated from the vagina and the bases of the parametria and amputated above the growth; then the uterus is split back and front and the child extracted with ease.

If the peritoneum is opened in doing this it is of small concern, since after emptying the uterus the splitting is continued upward until the uterus can be drawn out, when the ligaments are either ligatured or clamped from above down. Even when the clamps are used it is possible, as Dührssen has shown, to close the peritoneal cavity by sutures behind the clamp. The author has experienced the facility of vaginal extirpation of the uterus immediately after labour in a case successfully operated upon in this way for rupture of the uterus.

When myomata obstruct the parturient canal a similar procedure is used. The cervix is incised round about, the exposed anterior and posterior uterine walls are divided as high as possible back and front, the myomata are cut up and enucleated, the uterine incision is enlarged sufficiently to admit of the delivery of the child. The uterus is emptied. The uterine incisions are sutured, and so are those of the peritoneum, if opened, and the vagina.

If there are several myomata these may be enucleated, or the myomatous uterus may be extirpated after removal of the child. This operation of vaginal Cæsarean section can only be carried out by a specialist who possesses

knowledge of the technique of vaginal cæliotomy as opposed to that of abdominal section.

Operations of the After-Birth Period.

1. *Manual removal of the placenta* has been already described (p. 195). This is indicated (after Credé's manipulation has failed) when there is decomposition within the uterine cavity as well as in cases of hæmorrhage. In the former cases antiseptic douches must be used before and after.

2. *Removal of remnants of placenta.*—In abortion retention of single chorionic villi occurs, and this requires curetting to prevent bleeding.

The diagnosis here can only be made out secondarily after microscopic examination. Generally we understand remnants of placenta to mean large masses, in fact, whole cotyledons of placenta. The causes of their retention are as follows:—Abnormally firm cohesion between the placenta and the uterine wall from endometritis, abnormal form of the placenta (*placenta succenturiata*), and attempts to express the placenta when contraction is feeble.

The symptoms of retention of large pieces of placenta consist in hæmorrhages and septic or sapræmic inflammations. A natural cure takes place by the spontaneous expulsion of the retained pieces only when these have changed into placental polypus by deposition of blood clot on them. The diagnosis of retention is possible by examining the already expelled after-birth (see p. 69), by feeling it with one or two fingers or the half or whole hand after dilatation of the cervix (see p. 196). The treatment, after a sure diagnosis, must consist in manual removal of the placental remnants.

All instruments are dangerous, but especially ovum

forceps. These have often perforated the uterus, and instead of the placenta bowels have been drawn into the vulva. When there is putrefaction the uterus should be douched out both before and after entering it. The operation should be performed under the strictest anti-septic precautions. The technique corresponds to that of separation of the whole placenta. The external hand should firmly press the placental site against the internal fingers. The volar side of the finger must be kept always toward the placenta, and the placental remnant separated as a whole from the uterus, by pushing the finger in between the uterus and the placental remnant with saw-like movements. If no more large projections are felt on the interior of the uterus the evacuation is ended, since the normal placental site is always somewhat rough to the touch and elevated above its surroundings.

3. *Removal of retained membranes.*—Retention of the membranes is more frequent than that of the placenta since the membranes are not detached by the contractions but really by the weight of the descending ovum sac (in abortion, see p. 115), or the placenta. In premature severe spontaneous or artificial attempts at expulsion the membranes easily tear away from the placenta, especially when, as in endometritis decidua, they are abnormally adherent to the uterine wall. Retention of the decidua alone is only of real importance in the first month, and is already described on p. 115.

After normal labour there is always some of the decidua left behind; if it is all retained, and nothing can be scratched off the chorion with the finger, then copious foul lochia are seen at times.

Retention of the decidua and chorion occurs when, for instance during the labour, only the chorion is lacerated.

It may then retract with the uterine wall upward, and become thus entirely separated from the amnion.

Practically the retention has the same signification as that of the decidua, chorion, and amnion together. These retentions of the membranes occur, as opposed to retention of ovum remnants (see p. 118), after labour at term, and are total or partial, and may be diagnosed from inspection of the after-birth or examination of the mother. The retained membranes only require removal when they lie in the vagina, unless decomposition or hæmorrhage occur. If they lie in the uterus they are spontaneously expelled covered with blood clot in a few days, especially if ergot has been given. If the causes mentioned point to immediate removal of the membranes from the uterus their insertion in the uterus is sought under guidance of the external hand, and the finger is pushed with sawing movements between the membranes and the uterine wall. If their insertion is not felt the internal finger must be carried over the whole inner surface of the uterus, by which means the membranes will be freed.

Membranes lying in the vagina must always be removed, because they give rise to an increasing foul discharge—for this purpose they are seized as high as possible with a pair of long forceps, the catch fastened, and then by twisting the forceps they are wound into a rope, which is drawn carefully down until firmer resistance is felt. The membranes are now seized higher up, and the same processes repeated. The uterus should be made to contract by rubbing it previously, and it should be pressed by the midwife into the pelvis during extraction (see p. 68).

4. *Uterine irrigation* is used by the author in every case where the patient has been examined before without complete aseptic precautions. Germs may gain entrance

to the uterine cavity by such an examination. The uterine douche is used to render these germs innocuous. It is superfluous in every case where, through strict anti-sepsis, no germ has been carried into the vagina or uterus. It is clearly indicated in every case of *decomposition in the uterine cavity*. Here, after removal of the placenta, the uterus should be douched. In such cases, when manual separation of the placenta is necessary, the uterus should be washed out beforehand.

A 3 per cent. carbolic or 1 per cent. lysol solution, and not a sublimate solution, is used for the uterine douche. These solutions may be used in cases of great anæmia and disease of the kidneys. A previous thorough vaginal douching should precede the uterine one, so that infectious material may not be carried by the catheter from the vagina into the uterus. To ensure a continuous out-flow a thick double-channelled catheter is used, and not a single tube. Since using these the author has never seen a case of "carbolic poisoning"—that startling accident in which the breathing suddenly stops, the pulse becomes feeble, and in which death may come on. The *treatment* of carbolic poisoning consists in artificial respiration and the injection of ether.

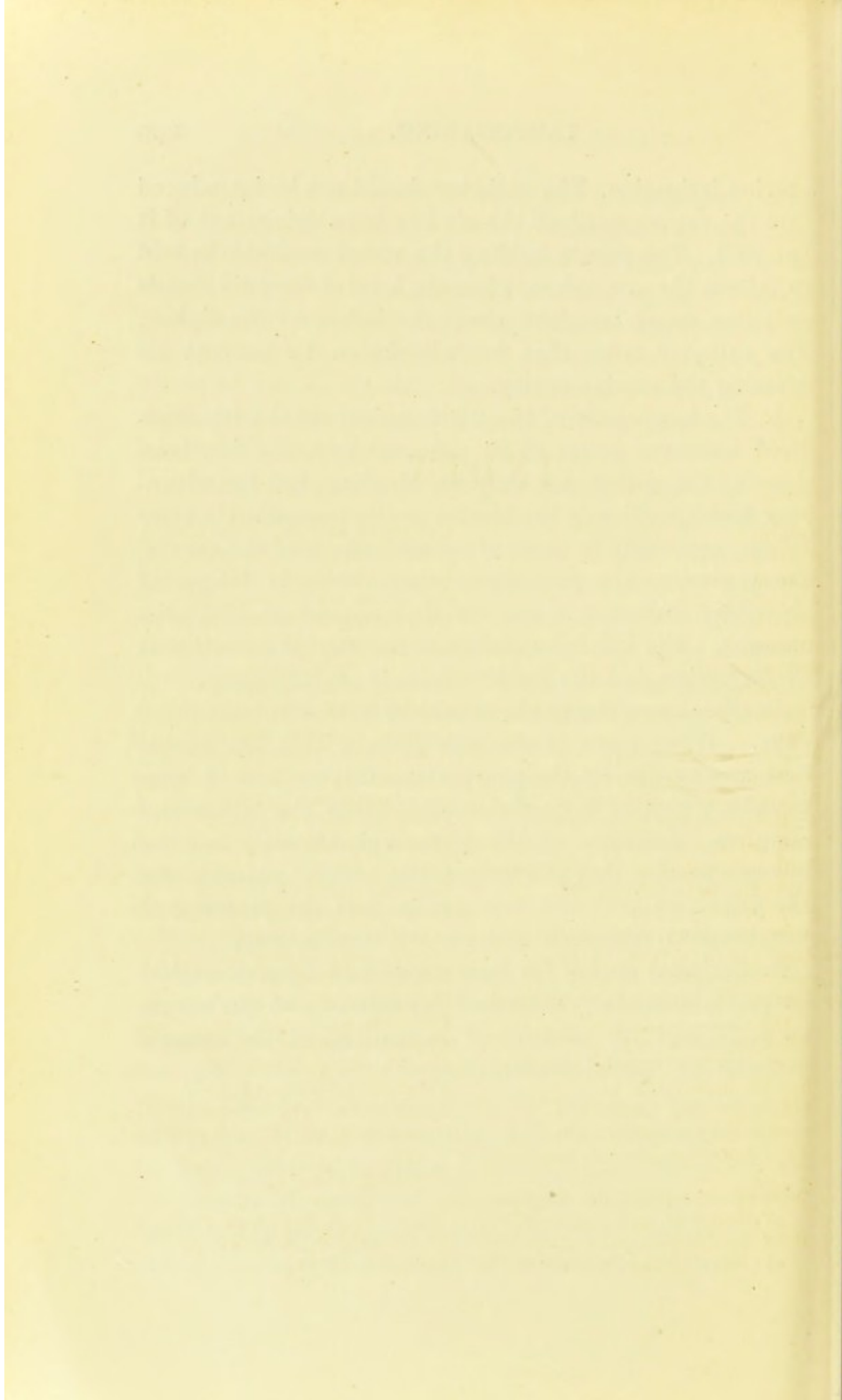
The beginner has often some difficulty in passing a catheter into the uterus because the finger loses itself in the lax lower segment of the uterus. The first and middle fingers of the left hand, or sometimes the four fingers, are passed up to the raised and thickened contraction ring. This has often so contracted that only the catheter will pass. If it is difficult to find the contraction ring the uterus should be pressed into the pelvis from above. As soon as the catheter has passed the ring one feels whether the point of the catheter lies in the fundus of the uterus. One or two litres of water are required for

uterine irrigation. The catheter should not be introduced into the vagina until all the air has been driven out of it (p. 222). The person holding the vessel must also be told to inform the accoucheur when the level of the fluid stands only two finger breadths above the inflow of the siphon. The catheter must then be withdrawn to prevent air entering the uterine cavity.

5. The tamponade of the uterovaginal canal with sterilised iodoform gauze (5-20 per cent.) (p. 35) has been done by the author, not only for bleeding, but for advancing decomposition in the uterine cavity immediately after labour, especially in cases of severe wounds of the cervix, the vagina, or the perinæum, where there is danger of secondary infection from the decomposed lochial discharges. The iodoform disinfects the uterine secretion at its formation, and the gauze carries it rapidly away.

In these cases the gauze should be left for at least three days. When signs of decomposition within the uterus first appear during the puerperium this method of tamponade, which in my opinion establishes the fullest and simplest "drainage of the puerperal uterus," has the advantage also that it renders the cervix passable for the finger, so that one can easily feel the presence of membranous remnants and remove them at once.

6. Perinæal suture for lacerations has been described on p. 71, secondary suture of wounds of the perinæum on p. 72 and 73. Suture of lacerations of the clitoris presents no special features.



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