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PREGNANCY WITH
OVARIAN TUMOUR

MCKERRON

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PREGNANCY, LABOUR AND CHILD-BED

WITH OVARIAN TUMOUR



PREGNANCY, LABOUR AND CHILD-BED

WITH OVARIAN TUMOUR

BY

R. G. McKERRON, M.A., M.D.

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TO

WILLIAM STEPHENSON, M.D., F.R.C.S.E.,

PROFESSOR OF MIDWIFERY AND DISEASES OF WOMEN AND CHILDREN IN THE
UNIVERSITY OF ABERDEEN,

This Book is respectfully Dedicated

BY

HIS FRIEND AND OLD PUPIL.



PREFACE.

IN preparing a paper on "The Obstruction of Labour by Ovarian Tumours in the Pelvis," I accumulated much collateral information in regard to the general subject of pregnancy with ovarian tumour. During my investigations I was impressed with the divergence of opinion, and consequent difference in practice, which obtained in regard to the treatment of this complication. I was further surprised to find that so important a subject had failed to receive the consideration it deserved, and that there existed in our own literature no full or satisfactory account of it, while recent Continental writers dealt only with partial aspects of the question.

As there was clearly need for a more extensive examination of the whole subject, I continued to pursue my inquiries, and was able to obtain what seemed sufficient material for a tolerably complete natural history of the complication. The results of these investigations were embodied in a thesis which I submitted to the Medical Faculty of Aberdeen University in 1898, and for which I was awarded the degree of M.D. The large number of cases since published, and the advances that have been made in the treatment of the complication, have compelled revision and enlargement of the original text.

The subject has been treated largely from a statistical point of view, and, though realising that figures, extending over a period in which the treatment has undergone vital changes, may be fruitful of erroneous deductions,

I feel that, with the limits of personal experience so restricted, the inductive method affords the best, if not the only, means of reaching scientific conclusions.

The work is divided into three sections. While much has recently been written on the complication of pregnancy and of labour with ovarian tumour, the management of ovarian tumour in the puerperium has been comparatively neglected. Few writers or text-books even refer to it. As a contribution to the literature of the subject, this section is, therefore, the most important.

I have to acknowledge my great obligation to many friends and others for kindly furnishing me with the details of unreported cases, or with facts supplementing the published records. To Professor Stephenson and to Dr. Scott Riddell for valuable suggestions and for assistance in revising the proofs, and to Dr. Howie for preparing the index, I am particularly indebted.

ABERDEEN, *April*, 1903.

INTRODUCTION.

Ovarian Disease as a Cause of Sterility—Frequency of the Complication of Ovarian Tumour with Pregnancy—Number and Source of Cases on which Description and Analysis based.

DISEASES of the ovary occur with so much greater frequency during the child-bearing period that it is not surprising to find them occasionally complicating pregnancy and labour. It might naturally be expected that ovarian disease would prove a barrier to conception, but experience shows that this is not the case. Where one ovary only is affected conception does not seem to be hindered to any great extent, while there are many instances on record in which pregnancy—even repeated pregnancy—has occurred with both ovaries the seat of advanced disease. Spiegelberg, for example, reports that on two occasions he examined soon after labour cancerous growths of both ovaries, in which not a trace of healthy tissue remained. Similar cases have been published by others. Sir John Williams¹ records an interesting case in which pregnancy occurred fifteen months after one ovary had been removed for cystic degeneration. Towards the end of pregnancy it was discovered that the other ovary was the seat of a large cystic tumour.

It is even more surprising to find that pregnancy has occurred after the removal of both ovaries—a fact established by well-authenticated cases,² which have been explained by the

¹ Williams, *Cavendish Lecture*, 1897.

² See paper by Alban Doran in *Journal of Obstetrics and Gynæcology of the British Empire*, vol. ii.

incomplete removal of the organs or by the existence of a detached portion of ovarian tissue. With these cases before us we can only agree with the view advanced by Lefholz¹ that, where even a small portion of healthy ovarian stroma remains, conception is possible.

While this is so, the evidence goes to show that ovarian disease is an undoubted cause of sterility. Heiberg,² who discusses its influence as an obstacle to conception, admits the difficulties in the way of arriving at a trustworthy conclusion. It has been computed by Simpson³ that of all married women 1 out of every 10 is sterile, while in married women the subject of ovarian disease 1 in 3 or 4 never becomes pregnant. West,⁴ combining 94 cases of his own with 97 observed by Scanzoni, reaches a result very similar to Simpson's. We may regard their conclusions as to the deterrent effect of ovarian disease on conception as probably approaching as near the truth as the data permit.

It is not easy to determine with any degree of certainty the frequency with which pregnancy is associated with ovarian tumour. The large number of cases recently published clearly shows that the complication is more common than was at one time supposed. The question can be settled only by an examination of the collective records of lying-in hospitals, but as these have not been available I have had to rely mainly on the investigations of Flaischlen⁵ and Löhlein.⁶ The former found only 5 labours complicated with ovarian tumour in a consecutive

¹ *Beitr. z. Complication der Geburt durch Geschwülste der Weichtheile im kleinen Becken*, Halle, 1881.

² Heiberg, *Om Ovariesvulsten som Complication ved Svangerskab*, Copenhagen, 1881.

³ Simpson, *Diseases of Women*, p. 411.

⁴ West, *Diseases of Women*, p. 533.

⁵ *Zeitschr. f. Geburtsh. u. Gynäk.*, Bd. 29.

⁶ *Gynäkologische Tagesfragen*, Heft iv.

series of 17,832 attended at the Berlin Frauenklinik. Löhlein met with 2 in 1,300 pregnancies at the Frauenklinik in Giessen, but this undoubtedly exaggerates the frequency of the condition. In 1,738 cases attended during the year 1901 at Tarnier's Clinique¹ only 1 instance of the complication with ovarian tumour was found.

These figures differ too widely to permit of any definite conclusion. If we take an average of the three statistics we get approximately 1 pregnancy in every 2,500 associated with ovarian tumour. This, though probably underestimating it, may meantime be accepted as representing the frequency of the complication.

The combination of pregnancy with ovarian tumour is a condition that involves great risk to both mother and child. The extent of this danger varies according to the character and site of the tumour, and according to the presence or absence of complications, as will be seen when these points come to be dealt with.

Owing to its importance this complication of pregnancy and labour has not failed to receive occasional consideration, and reference to it is to be found even among the earlier writers on midwifery. The methods of dealing with it, however, have within recent times been undergoing gradual change. Measures which, until a few years ago, were unquestioningly adopted have now been almost entirely discarded. Of those measures which have taken their place, some are still on their trial and require further practical experience before finally establishing their position. Indeed, the evidence of recent scientific papers, as well as that of recently published cases, goes to show that neither as regards pregnancy nor labour has the treatment fully emerged from this transitional stage; and it is this fact mainly that has led me to direct attention to the subject and to review our position in the light of increased experience.

¹ *L'Obstetrique*, 1902.

Owing to the comparative rarity of the combination of pregnancy with ovarian tumour, the experience even of those who have had the most ample opportunities of observation must form a too restricted basis for a complete account of this serious complication. Indeed, few observers have had experience of more than a trifling number of cases. That being so, a satisfactory description can be reached only by collating and analysing the records of published cases. To do this is the task I have set myself, and it has been greatly lightened by the labours of earlier workers—more especially of Jetter and of Heiberg, whose valuable treatises, published respectively in 1861 and in 1881, are marked by careful research and are as complete as the materials at the time permitted. Since these publications, however, evidence has accumulated and much progress has been made, more particularly in the methods of dealing with the condition.

The proportionately large number of cases which have been published during the last few years is proof of a growing necessity for further evidence in regard to this important subject. At the same time it seems to show that many of the earlier instances of the complication have not been recorded, and that the conclusions drawn from former collections underestimate the frequency of its occurrence.

The following description and analysis are based on a series of 1,290 cases. These have been obtained from various sources, among the more important being Jetter's well-known dissertation,¹ which includes 215, Heiberg's² series of 271 cases, and Dsirne's table of ovariectomies in pregnancy,³ which furnishes 100.⁴ The remaining 704 I have myself collected. For the

¹ Jetter, *Ueber den Einfluss der Eierstocksgeschwülste auf Conception, Schwangerschaft, Geburt und Wochenbett*, Tübingen, 1861.

² Heiberg, *loc. cit.* ³ Dsirne, *Archiv f. Gynäk.*, Bd. 43, Heft 3.

⁴ Dsirne's table includes 135 cases, but 35 of these are in Heiberg's collection.

most part these are to be found in the periodicals of the last twenty years. Four cases which will be given in detail have come under my own observation, while for several unpublished cases I am indebted to Sir John Williams, Professor Simpson, Dr. Herman, Dr. Dakin, Dr. Herbert Spencer, Mr. Bland-Sutton and others. Although the total series includes 1,290 cases, the actual number of patients is only 1,154, several of the women being pregnant more than once while affected with the tumour.

While the records of many of the cases are of too meagre a character to be of any practical value, the majority are recorded with sufficient fulness. All clinical histories have, where possible, been carefully examined, and on these the following observations are for the most part based. The recent cases have been more especially drawn upon, as they are on the whole both fuller in detail and more reliable. In several instances I have been able, through the kindness of the author, to supplement the published record.

With the view of illustrating unusual or important points, short abstracts of cases have been introduced, and these, it is hoped, will prove interesting as well as instructive.

CHARACTER AND SITE OF THE OVARIAN TUMOUR.

THE character and site of the ovarian tumour have so important an influence, not only on the progress of pregnancy and labour, but on the convalescence in childbed, that a few observations on the subject may be desirable.

Character of the Tumour.—All the usual kinds of ovarian disease have been found associated with pregnancy, but the relative frequency of the various forms differs in all published collections from that found in the non-pregnant condition. Of the cases in our series the character of the tumour may with reasonable certainty be determined in 862. Cystic tumours, as might be expected, are the most numerous, 594 being simple or multilocular cysts. A few of the latter are described as papillomatous. Of dermoid tumours there are 204, or nearly 1 in 4, a greater proportion than statistics in the non-pregnant would lead us to expect. This greater frequency in pregnancy is not difficult to explain. Dermoid tumours are for the most part small, giving rise to no or few symptoms until, from their situation in the pelvis during labour or from injuries which they may sustain in the abdomen during its progress, they make their presence felt. Save for their association with pregnancy they would probably escape observation. Another reason assigned by Herman¹ is that dermoids remain long in the pelvis, and that thus pregnancy is more likely to occur than in the case of a tumour early lifted up into the abdomen. Whatever the

¹ Herman, *Diseases of Women*, p. 763.

explanation, the greater danger which, as we shall see, attaches to dermoids in pregnancy renders the fact important.

Compared with the cystomata, solid tumours of the ovary are rare. Knowsley Thornton found but ten instances, or nearly 3 per cent., in 338 ovariectomies, while Olshausen computes that they occur in about 5 per cent. of all cases. They are even more rare in pregnancy. Swan,¹ in an interesting account of the complication of pregnancy with solid tumours of the ovary, states that, after a careful examination of the literature, he was "able to find but 14 cases of undoubted solid growths of the ovary in association with pregnancy". In our series fibromata or solid adenomata are recorded in only 19 cases, or just over 2 per cent., but besides these there were 45, or 5.2 per cent., in which the tumour was malignant, 25 being described as carcinomatous and 20 as sarcomatous.

In 65 cases the ovarian disease was bilateral, and in 55 of these the character of the tumours is noted. In 22 both tumours were cysts; in 17 both were dermoids; in 7 both were malignant, 4 cancerous, 3 sarcomatous; in 7 a cyst of one side was combined with a dermoid of the other; in 2 there was a dermoid of one, a sarcoma of the other ovary.

Size of the Tumour.—As the practice is now general to remove ovarian tumours as soon as detected, it might be surmised that only those of small or medium size would be found associated with pregnancy. As a rule this is the case, the average being from the size of a foetal to that of an adult head; but tumours of "enormous" size, which are of frequent occurrence in the earlier collections, have been met with even in recent cases. In not a few instances the termination of a full term pregnancy is stated to have left the abdomen inappreciably diminished. Spencer² records a case in which a multi-

¹ Swan, *Johns Hopkins Bulletin*, March, 1898.

² Spencer, *Obstet. Trans.*, 1901.

locular tumour, the main cyst of which contained 31 pints, ruptured on the third day after labour. The patient was removed to hospital, but died of syncope immediately on admission. The tumour had been known to exist for two or three years, but operation had been refused.

Tumours of medium size are the most common. Smaller tumours more often escape recognition. Though equally liable to complications they do not occasion the unusual size, shape or rapid growth of the abdomen which leads to the detection of larger tumours. Among the tabulated cases, however, will be found several in which a tumour of the size of a hen's egg or an orange was recognised either accidentally or from having given rise to acute symptoms.

Situation of the Tumour.—As in the non-pregnant, a tumour of the ovary may occupy either the abdomen or the pelvis, or, rarely, it may lie partly in the abdomen and partly in the pelvis. Its situation is determined mainly by its size and weight. In the abdomen an ovarian tumour may occupy almost any situation according to the length of its pedicle. It most usually lies at one or other side of the uterus, occupying the iliac and lumbar regions. It may, however, be found in front of or behind the uterus, or lie like a cap above it. Uncertainty in diagnosis has occurred from the tumour being fixed by adhesions in one or other hypochondriac region.

While in the later months of pregnancy the ovary normally rises into the abdomen, small and medium sized tumours are often retained in the pelvis either on account of their weight or from being incarcerated. This persistence of an ovarian tumour in the pelvis is more common in pregnancy. In 327 of our cases, or more than one quarter, the tumour was found in the pelvic cavity. Of these 102 were simple or multilocular cysts, and no fewer than 116 were dermoids. Thus nearly 3 out of every 5 dermoids occupy the pelvis. Of 22 cases in Heiberg's

collection, 14 were in the pelvis. The importance of this lies in the fact that in the pelvis they usually escape detection till the onset of labour. In the pelvis the usual situation of the tumour is the pouch of Douglas, where it fills up the hollow of the sacrum, pushing the cervix uteri forward and upward.

An abrupt change occasionally takes place in the position of the tumour. An abdominal tumour may be forced down into the pelvis by increased intra-abdominal pressure. This most commonly happens during labour,¹ when it may be spontaneous or the result of abdominal manipulation in the third stage; but it may take place towards the end of pregnancy. In Breit's case² it occurred before delivery of the placenta and interfered with its removal. On the other hand, a tumour in the pelvis may be spontaneously dislodged during pregnancy, and the case reported by Halliday Croom³ shows that this alteration of position, if suddenly produced, may be attended with acute symptoms.

The distinction between tumours in the abdomen and tumours in the pelvis is an important one, as in the latter situation the risks are greater, especially during labour when they form an obstruction to the passage of the child, and demand active treatment. This distinction will be kept in view throughout.

¹ See author's case, p. 171.

² Jetter, *loc. cit.*, p. 23.

³ See p. 31.

INFLUENCE OF PREGNANCY ON THE ORIGIN AND GROWTH OF OVARIAN TUMOURS.

Pregnancy a Preventive rather than a Cause of Ovarian Disease—Pregnancy neither accelerates the growth of Ovarian Tumours, nor favours Malignant Degeneration of them.

ONE of the first questions with which we are confronted in considering the complication of pregnancy with ovarian tumour is whether, as is sometimes asserted, pregnancy favours disease of the ovaries. The question has from time to time been discussed, and there exists a vague belief that pregnancy predisposes to ovarian mischief. For this belief there is, as we shall show, no proof. Indeed, the facts will be found to warrant just the opposite conclusion and to bear out the truth of Goodell's assertion, that "child-bearing women, and especially the prolific ones, are *less* liable to cystic degeneration of the ovaries".¹ Goodell supports his argument by an analysis of 840 cases of ovariectomy, in which he found that there were 371 single women or widows to 469 with husbands. Again, Sir John Williams,² taking the 1,000 cases of ovarian tumour operated on by Sir Spencer Wells and dividing them into groups corresponding to the age groups of the Registrar General for married and single, finds that:—

					Married.	Single.
Between the ages of 20	and	25 years	.	.	23	80
"	"	25	"	35	133	138
"	"	35	"	45	154	78
"	"	45	"	55	168	65
"	"	55	"	65	74	27
"	"	65	"	upwards	7	6

¹ Goodell, *Lessons in Gynecology*, p. 430.

² Williams, *loc. cit.*

He compares these figures with the proportion of the married to the single women in the population, as found in the Registrar General's Report for 1891, which shows that:—

					Married.	Single.
Between the ages of 20	and	25 years	.	.	30	70
"	"	25	"	35	67	33
"	"	35	"	45	83	16
"	"	45	"	55	87	12
"	"	55	"	65	89	11
"	"	65	"	upwards	89	11

A comparison of these tables shows that a disproportionately large number of ovarian tumours occurs in the unmarried.

The evidence is more conflicting, however, when we come to consider the effect of pregnancy on the growth and course of ovarian disease. It has been assumed—largely on *a priori* grounds—that from the increased determination of blood to the generative organs the growth of ovarian tumours receives an impetus during gestation. This view has been advocated by Hirsch, Jetter, Krause and Spiegelberg, and more recently has found a supporter in Dakin. In his *Handbook of Midwifery* the latter makes the statement that “the effect of pregnancy on ovarian tumours, whatever their nature, is, as a rule, to make them grow more rapidly”. Spiegelberg maintains that the solid tumours of the ovary are more liable than the other forms to this rapid development, while Hirsch and Jetter make an exception in the case of dermoids, in which, they agree, no increase is to be observed during pregnancy.

The fact on which this assumption rests is well established, but the inference is more than open to doubt. The argument is based mainly on the analogy of uterine fibroids, which undoubtedly grow *pari passu* with the growing uterus. As Sir John Williams¹ points out, however, the conditions are

¹ Williams, *loc. cit.*

different. Fibroids form part of an organ which normally grows during pregnancy, and are composed of the same tissues. There is, on the other hand, no enlargement of the ovary during pregnancy, as Thomson¹ has recently shown. The analogy further breaks down in that ovarian tumours do not, as fibromyomata, undergo involution after labour. In the few cases that have been recorded where the ovarian tumour diminished during, or after the termination of, pregnancy the explanation is probably to be found in the existence of inflammatory changes in the tumour, or is to be sought, as suggested by Löhlein,² in the disturbances of the circulation in the tumour to which childbed, mainly through torsion of the pedicle, exposes. It is possible also that some cases in which there was no post-mortem verification were fibroids.

That a rapid increase in the growth of an ovarian tumour is occasionally developed in association with pregnancy cannot be doubted. Many instances have been met with, but how far this increase was the result of pregnancy, the result of some complication, or was a mere coincidence, may be regarded as an open question. In not a few of them, doubtless, the rapid enlargement was indirectly the result of the pregnancy, being due to the formation of vascular adhesions, which are more liable to occur in connection with pregnancy. In others it may be ascribed to one or other of those complications to which gravidity is known to expose ovarian tumours, for example, inflammatory attacks or torsion of the pedicle with hæmorrhage into the tumour.

Although, then, an acceleration in the rate of growth of an ovarian tumour is often coincident with pregnancy, the cases in which this has been observed are far from as numerous as those in which no unusual development was originated. There are many cases in which the tumour is stated to have remained

¹ Thomson, *Deutsche medicinische Wochenschrift*, 1889, No. 44.

² Löhlein, *loc. cit.*

stationary through several pregnancies. I may refer to two cases related by Spencer Wells,¹ in one of which a woman six times bore living children during the progress of an ovarian cyst, which in the seventh pregnancy ruptured and was removed by abdominal section; in the other the woman passed through several pregnancies without marked distension till the last, which was a twin pregnancy, fifteen months after which the tumour was removed.

It must not be forgotten that a sudden increase in the rate of growth of an ovarian tumour is not uncommon apart from pregnancy. In most of the cases which are included in this series it is possible to determine, directly or by inference, the behaviour of the tumour. In comparatively few—less than 15 per cent.—is there any evidence to show that the rate of growth was greater than is often observed in ovarian tumours when unassociated with pregnancy. Löhlein's experience agrees with this, for in eighteen cases,² observed and recorded by himself, he found no increase in the rate of growth resulting from pregnancy.

Complete disappearance of an ovarian cyst has in a few instances been noted both during and immediately after pregnancy. The explanation of this is, no doubt, to be found in rupture of the tumour into the peritoneal cavity or into a hollow viscus with absorption or removal of its contents. That this termination is possible will be seen when we come to deal with rupture of ovarian cysts in pregnancy. On the other hand, a more rapid growth of the tumour is frequently reported to have followed delivery, and this has been attributed to the sudden diminution in the intra-abdominal pressure. Though this is a possible factor, the enlargement was more probably the result of injury to the tumour with consequent inflammation, or of some degree of pedicle torsion.

The clinical evidence furnished by a larger series of cases

¹ *Obstet. Trans.*, vol. xi., p. 252.

² Löhlein, *loc. cit.*

serves, therefore, to support the conclusion reached by Sir John Williams,¹ who has discussed this subject at considerable length. "There is no uniformity," he observes, "in the conduct of the tumour in different cases. The whole evidence, and the small number of the cases in which the growth of the tumour was rapid, appear to show that pregnancy exercises no influence in accelerating the growth of ovarian tumours."

The opinion may be here alluded to, which has been expressed by Wernich² and supported by Spiegelberg, that pregnancy occasions malignant degeneration in ovarian cysts. It is entirely unsupported by proof; and there is equally little evidence in the history of published cases in favour of the contention of Hirsch,³ that pregnancy in a woman with one ovarian tumour favours the occurrence of disease in the other ovary.

If, then, pregnancy favours neither the origin nor the development of ovarian tumours, what, if any, are the reciprocal effects of the two conditions when co-existing? These differ, both in character and frequency, according as they occur during pregnancy, labour or childbed, and will be considered under these three natural divisions.

¹ Williams, *loc. cit.*

² *Beiträge zur Geburtsh. u. Gynäk.*, Berlin, ii., p. 146.

³ *De Cystidum Ovarii in conceptionem, Graviditatem, partum efficacitate*, Berlin.

SECTION I.

PREGNANCY WITH OVARIAN TUMOUR.

SUMMARY.

- INFLUENCE OF OVARIAN TUMOUR ON PREGNANCY, 17.
- INFLUENCE OF PREGNANCY ON OVARIAN TUMOUR, 22.
- SYMPTOMS OF PREGNANCY WITH OVARIAN DISEASE, 29.
- DIAGNOSIS OF OVARIAN TUMOUR WITH PREGNANCY, 34.
- DIFFERENTIAL DIAGNOSIS, 45.
- DIAGNOSIS OF THE COMPLICATIONS OF OVARIAN TUMOUR, 64.
- PROGNOSIS IN PREGNANCY COMPLICATED WITH OVARIAN DISEASE, 70.
- TREATMENT OF PREGNANCY WITH OVARIAN TUMOUR, 80.
 - Historical, 80.
 - Non-Interference, 84.
 - Tapping, 89.
 - Induction of Premature Labour, 94.
 - Ovariectomy, 98.
 - Practical Observations on Ovariectomy during Pregnancy, 118.
 - General Summary, 124.
 - Tabulated Cases, 127.



INFLUENCE OF OVARIAN TUMOUR ON PREGNANCY.

THE more important influences exerted on pregnancy by an ovarian tumour are those that arise from pressure. The tendency of this pressure, as might be expected, is to cause interruption of the pregnancy. "It might be stated as a general truth that nature could not tolerate the double burden of a growing uterus and a growing ovarian tumour; the rapidly increasing pressure must at some time cause such distress that relief must in some way be obtained; in most of the cases he had seen this relief was found in the advent of spontaneous premature labour" (Barnes).¹ The frequency with which this termination occurs is not so great as might be expected, or as the above statement of Barnes would lead us to believe. Jetter found that in 215 pregnancies abortion or premature labour occurred 36 times, or 16·7 per cent. In 174 pregnancies in which there was no surgical interference Heiberg found 34 premature interruptions, or 19·4 per cent. These observations, which correspond to the period of expectant treatment, represent the effect of ovarian tumour in causing abortion and premature labour more nearly than do the later results when ovariectomy was the rule. They are of interest only in so far as they furnish the means of comparing the prospects of the child from the old and from the new methods of treatment. We shall have occasion to refer to them later when we come to deal with abortion after ovariectomy.

In reading the history of patients the subject of ovarian

¹ *Obstet. Trans.*, vol. xi., p. 201.

tumour, I was struck with the frequency with which abortion is stated to have occurred previous to the recognition of the tumour. The question as to the causal relationship was naturally suggested. Did the tumour exist and favour the occurrence of these abortions, or were they factors in the origin of the ovarian growth? It seems reasonable to assume, as pregnancy has been shown not to cause ovarian disease, that the frequency of abortion was due to the presence of a small ovarian growth which had escaped detection.

Large tumours are more liable to interfere with the normal duration of pregnancy, and the larger the tumour the more likely is gestation to be interrupted. Many cases show, however, that even very large tumours are not incompatible with the birth of a fully developed child. Among others Saxinger¹ and Bryant² report cases where the abdomen after labour was larger than that of a full term pregnancy. On the other hand, small tumours frequently cause abortion. A considerable number of cases are recorded where the tumour was too small to have interfered from its mere size with the growth and expansion of the uterus. In some of these the action of the uterus was probably due to interference with its development caused by the existence of adhesions between the tumour and neighbouring viscera, more especially the uterus itself.

From their situation in the pelvis, small tumours tend to cause incarceration of the uterus and abortion. A similar result may be produced by tumours occupying the pelvic brim and fixed by adhesions. Several observers record cases in which the incarceration was detected and rectified, the pregnancy going on to term. In illustration of this Lynch's case³ may be mentioned.

Apart from the mechanical influence of pressure and ad-

¹ Herdegen, *Dissert.*, Tübingen, 1876, p. 22.

² *Lancet*, 1879, ii., p. 45.

³ Heiberg, *loc. cit.*

hesions, miscarriage frequently results from the supervention of complications, such as torsion of the pedicle, inflammation or rupture of the cyst, or peritonitis.

Another effect of ovarian tumour which will tend to influence the course of gestation is that to which Schultze¹ has recently drawn attention, namely, torsion of the uterus. This is probably a more common result of ovarian tumour than the few cases which have been recorded would lead us to suppose. I find 6 cases in which uterine torsion is noted during pregnancy or in the puerperal period. Schultze describes several cases in which the rotation amounted to 180°. Torsion to this extent will tend to affect the uterine circulation and favour abortion. In a case reported by Halliday Croom² sacculation of the uterus seems to have been due to the presence of an ovarian cyst.

The opinion has recently been gaining ground that ovarian disease is a cause of cystic degeneration of the ovum. Baumgart³ has lately recorded a case in which a vesicular mole was removed from a woman, twenty-two years of age, in the third month of her first pregnancy. A tumour was at the time recognised in the abdomen. Laparotomy was performed four and a half months after and two cystic ovaries removed. The following similar case came recently under my own observation :—

Case I.—Mrs. L., married three years, no children; last period ended on the 2nd of June, 1901, followed by morning sickness and other evidences of early pregnancy. From the 3rd of July she suffered from pain in the back, intermittent, but for the last month so severe that she was confined to the house and had frequently to lie down. On the 2nd of August sudden discharge of blood from the vagina: treated for threatened

¹ *Zeitschr. f. Geburtsh. u. Gynäk.*, 1898.

² Halliday Croom, *Edin. Medical Journal*, vol. xl.

³ Baumgart, *Centralbl. f. Gynäk.*, 1902, No. 4.

abortion. Occasional slight discharges till the 7th of October ; on the afternoon of that day profuse hæmorrhage set in and she applied to the Maternity Hospital. She was seen by a nurse, and then by Dr. Howie, who, recognising the characteristic cysts of chorionic degeneration, sent for me. I found the woman much reduced from loss of blood, blanched and with quick, feeble pulse. The abdomen was enlarged to the size of a six and a half months' pregnancy. The uterus was hard and tender, especially at the fundus and over the pubis : considerable hæmorrhage : uterine contractions good. The vagina was full of blood clot and cystic masses. On removing these the cervix was found high and difficult to reach from being pushed to the right posterior quadrant of the pelvis, almost against the brim. A cystic tumour, about the size of a large orange, occupied the left side of the brim, dipping into the cavity of the pelvis. Under chloroform the uterus was emptied, and a hot uterine douche given. The tumour, which before could not be well defined, could now be differentiated from the uterus. The woman made a good recovery, though there was considerable pyrexia for over a week. The tumour, evidently a cyst of the ovary, remained unchanged during the puerperal period. Operation was meantime refused.

In addition to the above I find 8 cases of vesicular mole associated with bilateral ovarian tumours. No explanation can yet be given as to the influence of the ovarian disease, but the frequency with which the two conditions are associated suggests more than a mere coincidence.

When the pregnant uterus escapes incarceration and rises into the abdomen it may be prevented by the situation of the tumour from assuming its normal position. It may be pushed to one side or the other or thrown forward against the abdominal wall. Deviations in the axis of the uterus are thus produced, which may prevent the head from engaging the brim in the end of pregnancy, as in Winckel's case, where, however, the tumour

was spontaneously pushed to the side during labour. The effect of this uterine obliquity on the course of labour will be seen later.

When an ovarian tumour is associated with pregnancy the usual symptoms of the latter condition tend to be exaggerated, sometimes to a pathological degree. This may be the result of pressure on the uterus. In many cases the mechanical irritation is so great as to lead to chronic inflammatory attacks. Indeed, the clinical histories of our cases seem to show that comparatively few women with ovarian tumour escape some degree of peritoneal inflammation during pregnancy.

Besides tending to produce adhesions, these inflammatory attacks combine with the embarrassed respiration to favour the production of ascites, which adds to the abdominal distension and discomfort, as well as to the difficulties of diagnosis.

Whether albuminuria occurs with greater frequency, though probable, cannot be determined with certainty from the data. Puerperal eclampsia, however, is relatively more common than in uncomplicated pregnancy. It is noted in 6 cases, or about 1 in 130 (Jetter and Heiberg's cases not included).

Disturbances of nutrition result more readily than in uncomplicated ovarian disease, and lead sometimes to great emaciation and exhaustion.

Notwithstanding the great pressure to which the growing uterus is exposed in the case of large tumours, the development of the foetus seems, as a rule, to be little interfered with, though Langley¹ records a case in which malformation of the cranium was attributed to this cause. It is probable that, as in the case of twins, the children have less resisting power.

¹ Jetter, *loc. cit.*, p. 13.

INFLUENCE OF PREGNANCY ON OVARIAN TUMOUR.

IN a condition so liable to serious complications as ovarian tumour it is difficult to separate the effects which are to be attributed to pregnancy. While in many of our cases pregnancy exercised no influence either on the growth or on the natural course of the tumour, the records of complications of a more or less serious character are so frequent that one cannot resist the conclusion that pregnancy does favour the occurrence of untoward changes in an ovarian tumour. The same changes are, no doubt, met with apart from pregnancy, though, as will be shown, with less frequency.

We limit ourselves here to the accidents and injuries arising in or attributable to gestation ; but it must not be concluded that these give the full measure of the danger attaching to pregnancy with ovarian tumour. Labour and the puerperal period are even more liable to produce dangerous complications.

Some of the effects to which pregnancy exposes ovarian tumours have already been incidentally referred to. It has been mentioned that the pressure exerted by the growing uterus tends to produce friction and irritation of the peritoneum. This results in peritonitis which affects chiefly the covering of the tumour and the contiguous peritoneal surfaces. It is more likely to occur in those cases in which the tumour as well as the uterus grows rapidly. Peritonitis due to this cause is usually chronic and attended with only a moderate degree of pain and tenderness in the region of the tumour. Attacks of this kind are of common occurrence in ovarian tumour associ-

ated with pregnancy. As a rule they do not materially affect the woman's health or interfere with gestation, but they lead to the formation of adhesions between the tumour and the adjacent viscera or parietes. During pregnancy adhesions seem often to form without any subjective symptom of peritonitis. On the other hand, existing adhesions may sometimes be broken down by the rapid growth of the uterus. As an instance of this the following case, which in many respects is most instructive, may be cited.

Case II.—A woman in the second month of pregnancy was found to have the right ovary adherent to the uterus, but an operation was not thought necessary. Soon after there occurred sudden collapse with signs of fluid in the abdominal cavity. Laparotomy was performed, when both ovaries were found healthy, but an adhesion of the right ovary to the uterus had been torn owing to the growth of the organ, causing hæmorrhage. The torn adhesion was ligatured. The woman made a good recovery, pregnancy being undisturbed.¹

Besides these chronic attacks, inflammation of the peritoneal covering of the tumour of an acute or subacute character is not infrequently met with, apart from other complications of the tumour. This is usually localised, but may be general. It is rare, however, to find acute general peritonitis independent of some pre-existing complication, such as rupture or torsion.

An accident to which pregnancy undoubtedly exposes an ovarian tumour is twisting of its pedicle. Several reasons have been advanced to explain the frequency of twisted pedicle during pregnancy, but into these it is unnecessary here to enter. Of the fact, though it is sometimes disputed, there can be little doubt. It may be of interest to mention that the first recorded instance of torsion occurred in pregnancy.

Aronson,² in a dissertation on the complications of ovarian

¹ Murphy, *Lancet*, 1895, vol. i.

² *Zur Ruptur, Vereiterung, und Axendrehung von Ovarialcysten*, Inaug. Dissert., Zurich, 1883.

tumours, points out that the conditions existing in pregnancy favour the occurrence of this accident. Of 72 instances of torsion which he collected, 9 were associated with pregnancy. Taking into account the infrequency of ovariectomy in pregnancy and the often imperfect records, he concludes that pregnancy is an important factor in the production of rotation of the pedicle.

Petritschek,¹ on the other hand, though admitting that most authors regard pregnancy as a cause of torsion, is inclined to agree with Löhlein² that it has no special influence in this direction. He collected from literature all the cases of torsion in pregnancy he could find, 32 in number. He accepted, however, only those cases which were met with during ovariectomy. This would represent the frequency of torsion in pregnancy as about 12 per cent., while its general frequency is variously estimated at from 6 to 10 per cent. In 375 cases of ovarian tumour with pregnancy Sir John Williams³ found torsion in 21, or about 6 per cent., which he contrasts with the 2 per cent. found in Spencer Wells' 1,000 ovariectomies.

The present series⁴ furnishes no fewer than 60 instances of torsion during pregnancy attended with well-marked symptoms. There were besides several cases in which torsion, often of considerable degree, was met with at operation, but had given no clinical indication of its presence. If these are included it may be computed that twisting of the pedicle occurs in 1 out of every 8 cases.⁵ In the puerperium it will be found to occur in 22·7 per cent. If the general average be taken at 8 per cent.,

¹ *Zur Casuistik der Stieltorsion von Ovarientumoren während der Schwangerschaft, Inaug. Dissert., München, 1898.*

² Löhlein, *loc. cit.*

³ Williams, *loc. cit.*

⁴ Jetter and Heiberg's cases excluded: torsion is not mentioned by the former; in the latter's collection only 4 instances are noted.

⁵ In this analysis the cases of ovariectomy in which torsion was not present are excluded.

while in pregnancy and the puerperium it is from 12 to 22, it is obvious that the frequency of torsion apart from pregnancy will be less than 8 per cent. It would seem, then, that pregnancy, and the puerperium more especially, have an undoubted influence in causing this accident, and that the statement of Sir John Williams (who probably has the puerperal cases in view as well) may be accepted as not far from the truth, that "twisted pedicle is found nearly three times as often in cases of ovarian tumour with pregnancy as in ovarian tumour apart from pregnancy".

The situation of the tumour, and to some extent its character, affect the frequency of torsion. Experience shows that it is more apt to occur in abdominal than in pelvic tumours. Our cases, however, do not support the conclusion which Aronson¹ reached, that dermoid and solid tumours are more liable than the cystic to torsion during pregnancy. In 8 only of the above 60 cases was the tumour a dermoid. In 5 the tumour was in the abdomen; in 1 it was partly in the abdomen, partly in the pelvis. In 2 it occupied Douglas's pouch; no symptoms were present in one, but on removal at the sixth month of pregnancy the tumour was found deeply congested. Their comparative immunity from torsion during pregnancy is due to the fact that they so frequently occupy the pelvis, where they are little subject to change of position. Even in the abdomen dermoid tumours do not seem more liable to torsion. Of 40 removed during pregnancy the pedicle was found twisted in only 5.

The effects of torsion are the same as in the non-pregnant. In most of the above cases the rotation was acute or subacute, and attended with symptoms more or less severe, but in others it was chronic, in some giving rise to intermittent attacks of pain and discomfort throughout the whole course of pregnancy.

¹ Aronson, *loc. cit.*

Another complication of ovarian tumour favoured by the coexistence of pregnancy is rupture of its wall; an accident which is more liable to occur where the cyst wall is thin, and is more frequently met with in tumours of small or medium size. The causes of rupture concern us here only in so far as they are affected by the pregnant condition. One of the most common is torsion of the pedicle, and the liability to torsion during pregnancy helps to explain the frequency with which rupture occurs. Torsion leads to rupture either from rapid distension due to hæmorrhage into the cyst or from necrotic changes in its wall. Another cause of rupture will be found in the rapid growth of the uterus and the consequent tendency to tearing of the adhesions which so often bind the tumour to neighbouring structures or even to the uterus itself. That adhesions may give way from this cause is seen in Murphy's case,¹ where hæmorrhage with collapse occurred from the tearing of an adhesion between the uterus and the right ovary which was otherwise normal. Rupture may, again, be the result of great mechanical pressure, and this will obviously be increased during pregnancy by the enlargement of the gravid uterus.

Though more common during pregnancy, rupture of an ovarian cyst is not so frequent as the above considerations would lead us to anticipate. Aronson² in a series of 257 cases of rupture found only 16 associated with gestation; but even this shows, if we accept the estimate previously given of the frequency with which pregnancy is associated with ovarian disease, that rupture is relatively more common during pregnancy. Sir John Williams³ arrives at the same conclusion. In his 375 cases he found rupture in 13, or in 3·5 per cent., while from Spencer Wells' cases he estimates the general frequency of rupture at 2·4 per cent.

¹ Murphy, *Lancet*, 1895, vol. i.

² Aronson, *loc. cit.*

³ Williams, *loc. cit.*

Our collected cases show that rupture occurred during pregnancy on 22 occasions (in 2 the result of external violence, in another during vaginal examination), or in about 2·3 per cent.¹ The discrepancy as compared with Sir John Williams' figures is no doubt due to the more general adoption of ovariectomy in pregnancy. The cases of Jetter and Heiberg give us more nearly the frequency with which rupture may be expected to occur under an expectant treatment. In their combined series of 486 cases rupture took place during pregnancy 18 times, or over 4 per cent.¹

Suppuration is a more rare complication of ovarian tumour during gestation. How far the pregnant condition, apart from increasing the liability to torsion of the pedicle, contributes to produce it, is not easy to determine. Aronson,² who discusses at length the causation of suppuration in ovarian tumours, while emphasising the effect of labour and the puerperium, does not seem to attach much etiological importance to pregnancy. In a series of 122 cases of suppuration he found only 7 in which it occurred during pregnancy, 3 of the 7 being dermoids. Indeed, in his total series there appears a surprisingly large number of dermoid tumours. In 65 of the cases in which the nature of the tumour was stated no fewer than 31 were dermoids. The proneness of these tumours to suppurate has long been recognised, and this tendency, combined with the preponderance of dermoids in pregnancy, would of itself account for a somewhat greater frequency of suppuration.

Our series furnishes 16 instances of suppuration during pregnancy, excluding those cases in which suppuration followed aspiration. In most of the cases the condition was recognised during pregnancy, but in a few the tumour was not detected till the onset of labour or early in the puerperium.

On the whole, pregnancy would seem to favour suppuration

¹ Cases of ovariectomy in pregnancy excluded.

² Aronson, *loc. cit.*

in ovarian tumours. Though met with in less than 2 per cent. of pregnant women it is found more frequently in the puerperium, and it is probable that in many of these cases the process began in pregnancy without, as often happens in suppurating ovarian cysts, giving rise to any symptoms.

In the collections of Jetter and Heiberg 5 cases are noted in which hæmorrhage took place into an ovarian cyst during pregnancy, seemingly independent of torsion. In 1 of these the hæmorrhage was due to a blow in the fifth month of gestation. On the eighteenth day after the injury the cyst ruptured and death ensued without the pregnancy having terminated. In the other 4 cases it is probable that the hæmorrhage was the result of an undetected torsion of the pedicle.

Acute or subacute complications only are considered in the above analysis. They number approximately 140 in a series of about 870¹ cases, or 1 in 6. If the cases of chronic peritonitis and torsion are added, it may be computed that in every fourth case some complication is to be anticipated during gestation.

¹ Cases in which ovariectomy was performed during pregnancy before the occurrence of a complication are excluded.

SYMPTOMS.

THE symptoms occasioned by the complication of pregnancy with an ovarian tumour are extremely variable, and are determined to a large extent by the size and mobility of the tumour as well as by its situation and character. There are many instances in our collection in which no symptoms beyond those of pregnancy were present, and this immunity may exist even in the case of large tumours, which have not infrequently remained undiscovered till delivery was completed. Indeed, in several cases so large was the tumour that the abdomen underwent little sensible diminution and a second child was believed to be present. In a case kindly communicated to me by Dr. Haultain, a midwife finding the uterus, as she thought, undiminished in size after the expulsion of the child sent for assistance in the belief that a second had still to be delivered.

It is when the tumour is small, however, that we are most likely to find a complete absence of symptoms, and more particularly when it occupies the pelvis and is in consequence less mobile and less liable to injury during pregnancy. Of 263 cases which I have tabulated, where the tumour during labour occupied this situation, there were over 80 per cent. in which no suspicion of its existence was entertained till its presence was revealed by vaginal examination in the course of delivery, while in several others in which the tumour had been recognised previous to the pregnancy, or been accidentally discovered during it, no symptoms were observed.

Though in a large number of our cases there was thus

nothing to indicate the existence of any complication, yet a closer investigation shows that a complete freedom from symptoms is exceptional. Often, however, they will be found to have been so slight that they were regarded as the natural outcome of the pregnancy, and unworthy of mention, their existence being elicited on inquiry subsequent to the discovery of the tumour during or after labour. Neither were they of a very constant character. In some they consisted of an exaggeration of one or other of the ordinary symptoms of pregnancy. Sometimes there was merely a sense of weight in the region of the affected ovary; more often there was pain, described by some as a continuous ache, by others as severe but of short duration, returning perhaps at intervals during the course of pregnancy. At times again the pain was of a dragging character or resembled the pains of labour and was attended with down-bearing. The latter was especially associated with pelvic tumours.

Pains of the kind described, which are not infrequent in pregnancy apart from ovarian or other recognisable disease, are in this connection commonly dependent on peritoneal irritation, on the stretching of adhesions, or on threatened torsion of the pedicle of the tumour. Sudden, acute and persistent pain has a more serious significance, and points to some dangerous complication.

Another symptom, frequently noted in the records of pregnancy with ovarian tumour, is irritation of the bladder. This is due to pressure or dragging on the organ, and is most troublesome and persistent where rotation of the uterus has been produced. When the tumour lies in the pelvis constipation is generally complained of, but occasionally diarrhœa with tenesmus has been present. In a few cases of abdominal tumour symptoms of obstruction occurred—the result, sometimes of adhesions, sometimes of direct pressure of the tumour on the bowel.

Any one or all of the foregoing symptoms may be met with in the course of an otherwise normal pregnancy, and for that reason are apt to be regarded as of little significance. From the fact that they may form the chief or sole indication of serious pelvic or abdominal conditions, which it is important to recognise early, their presence, more particularly when persistent, should suggest the advisability of a careful examination.

In many cases it will be found that the first thing to arouse the woman's suspicions and to lead her to seek advice was the unusual shape or large size and rapid growth of the abdomen. Pregnancy not infrequently brings into notice small tumours which were previously unrecognised. This may be due to the growing uterus pushing the tumour in front of it from the pelvis into the abdomen, when it may be felt or seen by the woman. The rapid enlargement of the abdomen which may thus be produced is often out of proportion to the size of the tumour.

Small ovarian tumours usually rise into the abdomen with the uterus, or are pushed up before it. When they remain in the pelvis they are liable from the narrowing of the brim which they occasion to prevent the ascent of the uterus, and thus give rise to symptoms of incarceration. Several cases where this occurred are recorded. After the uterus has left the pelvis there is little tendency for the tumour to be elevated. In some cases, however, a displacement into the abdomen has taken place, the result usually of some sudden movement or jolt. This is attended with severe pain from the tearing of slight adhesions or from the strain put on the pedicle. A case, reported by Halliday Croom,¹ illustrates a sudden dislodgment of this kind which was followed by severe symptoms.

Case III.—A woman, four months pregnant, was suddenly seized with acute pain in the right side. On examination an ovarian tumour was found lying to the right of the uterus and

¹ *Trans. Obstet. Soc., Edin., 1899.*

partly in the pelvis. A fortnight later the patient had a fall, and a few days afterwards the tumour was found lying under the liver. On laparotomy the tumour showed signs of recent hæmorrhage in the sac, and already there were numerous adhesions. "The pedicle was markedly twisted, which torsion no doubt occurred when the tumour was suddenly passed entirely free of the pelvis. This accords with my previous experience of a very definite cause of twisted pedicle."

Provided the tumour escapes complications, it is unusual for the woman's health to be seriously impaired save in the case of very large or malignant growths. In the former there is at first only moderate discomfort, but later, owing to the encroachment of the growing uterus, this becomes intensified and is associated with well-marked digestive and respiratory troubles, which may be so great as to render the woman incapable of exertion or unable even to lie down. In these circumstances, the woman becomes rapidly emaciated—more rapidly than in the distension of simple ovarian disease—and suffers so much from respiratory embarrassment that relief of some sort becomes necessary. This may occur in the case of even small tumours, if associated with ascites, the presence of which in pregnancy is always suggestive of ovarian tumour. When the tumour is malignant, emaciation is usually rapid, and the woman quickly becomes cachectic. A good illustration of this is seen in the case observed by Voigt.¹ On the other hand, it is important to note that malignant disease has been unexpectedly found when there was nothing in the symptoms to excite suspicion, as in the following case recorded by Murphy.²

Case IV.—A woman, aged thirty-two, was found in the sixth month of pregnancy to have an ovarian tumour. Ovariectomy was performed; the tumour proved to be a round celled

¹ Voigt, *Archiv f. Gynäk.*, Bd. 49.

² Murphy, *Lancet*, 1895, vol. i.; see also Münchmeyer, *Centralbl. f. Gynäk.*, 1890; Landau, table ii., case 24; and Pernice, table v., case 1.

sarcoma, weighing two pounds, with numerous adhesions. Labour pains commenced twenty-four hours after the operation and soon resulted in the birth of a boy who lived twelve hours. Convalescence was uneventful. "During pregnancy there were no marked symptoms and nothing at any rate to indicate the malignant character of the growth."

From what has just been stated it will be gathered that there is no uniformity in the general symptoms, but some or other of those described will be found in a large number of the cases of ovarian tumour with pregnancy in which no more serious complication arises. Though seemingly trivial they are of importance in directing attention to the condition and permitting of its early recognition, and for that reason should never be disregarded.

DIAGNOSIS.

THE dangers to which ovarian tumour exposes the pregnant woman render the diagnosis of this condition a matter of great importance—an importance which is increased by the growing, and now almost general, opinion in favour of ovariectomy in preference to expectant or palliative treatment.

Though easy, as a rule, and more especially when the tumour is small and movable, the diagnosis may present extreme difficulty or even baffle the most careful investigation. The present collection furnishes many instances where experienced observers failed to satisfy themselves of the true condition after prolonged examination. In several cases the sound has been unsuspectingly passed into the pregnant uterus, while in others ovariectomy has been undertaken in ignorance of the coexistence of pregnancy. In 18 of Heiberg's 52 cases of ovariectomy in pregnancy, the latter condition was not suspected till the abdomen had been opened. But even opening the abdomen has not always been proof against error. Spencer Wells¹ records a case where, after removing a cystic ovary, he tapped the pregnant uterus under the belief that it was a cyst of the other ovary, while in a somewhat similar case McKee² punctured what appeared to be a second cyst from which, however, a loop of the umbilical cord protruded on removal of the trocar.

In reference to diagnosis in this complication Heiberg³

¹ *Obstet. Trans.*, vol. xi.

² *N.Y. Med. Journal*, 1893.

³ Heiberg, *loc. cit.*

advises that patients with tumours of the ovary should always be examined with the possibility of pregnancy in view, and all the more because for the exact diagnosis of ovarian tumour the use of the sound is necessary.

Many of the mistakes which have occurred may be traced to the belief that ovarian disease arrests menstruation or prevents conception. The clinical facts prove both beliefs to be erroneous. The arrest of menstruation should suggest pregnancy, and the more sudden the arrest the more likely is pregnancy to exist. "In all cases of ovarian tumour during the menstrual age, it is safe to suspect the coexistence of pregnancy when, after menstruation has been previously regular, the menses become suspended for a season" (Atlee).¹

When ovarian tumour is combined with pregnancy the diagnosis involves the separate recognition of the two conditions. This must be based on their characteristic signs. Clinically, we know the physical signs of pregnancy may so resemble those of ovarian tumour, and *vice versa*, that the two conditions are only to be distinguished by careful examination. When they coexist the physical signs of the one condition may modify or conceal those of the other. This being so, it is easy to understand that the difficulties which may be encountered may render an accurate diagnosis impossible short of abdominal section.

The recognition of pregnancy is, as a rule, the more difficult, and especially is this the case in the early months, when it has frequently been found impossible to pronounce with any certainty on its presence.

So many mistakes have been made from not attaching sufficient weight to the signs and symptoms of pregnancy which were present that it may be well very briefly to allude to some of the more important, and at the same time point out how their value may be affected by the coexistence of an ovarian tumour.

¹ Atlee, *Diagnosis of Ovarian Tumours*.

It has already been noted that the frequency with which the signs of pregnancy are obscured gives a greater significance to the various symptoms. When the arrest of menstruation suggests the possibility of pregnancy, other symptoms of the condition should be carefully inquired for. Morning sickness, increased or capricious appetite, the existence of other digestive disturbances, will each and all serve to strengthen the probability. As previously mentioned, these symptoms are sometimes aggravated by the presence of ovarian disease, but, on the other hand, their diagnostic significance is lessened from the fact that they may be found with ovarian tumour independently of pregnancy.

Where the situation or size of the tumour makes bimanual palpation of the enlarged uterus difficult or impossible the most reliable signs are the changes in the cervix, which in many doubtful cases have proved of service, and in the shape and consistence of the lower uterine segment; save exceptionally, these can be readily made out. The mammary changes may also help us, more especially in primigravidæ.

As the pregnancy advances the physical signs increase in number and in diagnostic importance, though from the increasing distension they may be more difficult to determine. If the case has been under observation the rate of growth of the uterus, corresponding with pregnancy, will be important. The condition of the cervix becomes more characteristic. Ballotement, external and vaginal, can often be made out, while the movements of the fœtus may be subjectively or objectively detected. In most cases the heart sounds can be heard. These signs are conclusive, and have the same value and the same limitations as in simple pregnancy.

For the recognition of the ovarian tumour symptoms are of little use. The history will sometimes aid us, though too much reliance must not be placed on the statements of a patient, more especially when they are in conflict with the physical conditions.

The known existence of an abdominal enlargement antecedent to pregnancy may indicate the nature of the complication where the physical signs of the tumour have become obscured by abdominal distension. Of more importance is the history of peritonitic symptoms before or in the course of pregnancy, and in several instances this has contributed towards a correct diagnosis.¹ Slight as well as severe attacks of peritonitis, occurring during pregnancy, point to the coexistence of ovarian disease and should always be carefully investigated. Indeed, when we consider the frequency with which definite indications pointing to an abnormality are absent it cannot be too strongly urged that any unusual symptoms, however slight in character or short in duration, or even any persistent exaggeration of an ordinary symptom of pregnancy, should receive attention. An observation of this rule would have led in many cases to an earlier diagnosis, and thus have facilitated treatment and sometimes have prevented serious consequences.

Routine examination towards the end of pregnancy, which is rightly becoming more and more the habit of obstetric physicians, has occasionally led to the detection of a pelvic tumour, which gave no indication of its presence, and has placed the medical attendant in a more favourable position in regard to treatment.²

Apart from the occurrence of complications, the symptoms to which pregnancy with ovarian tumour gives rise are so variable and uncertain that, beyond directing attention to the condition, they are of little value in diagnosis. It is on physical signs that we must rely. As a rule, these are unequivocal, but they may be so closely simulated by those of other conditions that careful examination is necessary in order to arrive at a correct conclusion. In all cases the examination should be systematic.

¹ See Lewer's case, *Lancet*, 1893, vol. ii.

² See two cases reported by Duncan, *Lancet*, 1899, i., p. 301.

Inspection will usually show an abdominal enlargement out of proportion to the duration of pregnancy, though if the tumour is small or lies in the pelvis nothing abnormal may be observed. In many cases inspection will reveal a characteristic shape of the abdominal swelling which at once suggests the nature of the complication. The symmetrical appearance which the abdomen presents in pregnancy is seen to be altered. Provided there is not excessive distension, two tumours may often be clearly distinguished, separated perhaps by a distinct groove. According as the tumour lies at the side of or above the uterus, the groove is vertical or horizontal; occasionally it has an oblique direction. The existence of this groove may be deceptive. Atlee¹ and Howitz² record cases where two separate tumours were simulated by a large semi-solid multilocular cyst. Where the tumour is large, and especially when associated with ascites, the abdomen will be seen to be enormously and uniformly distended—to a size out of proportion with the duration of pregnancy. This obliteration of the line of demarcation is liable to occur towards the end of gestation even with tumours of moderate size.

Palpation affords more valuable evidence. In the simpler cases we can often readily ascertain the existence of two distinct swellings. Where the abdominal wall is lax, as in early pregnancy, the two tumours may be independently movable, while the fingers can be pushed into the furrow between them. In most cases the two tumours lie side by side, the gravid uterus occupying the more central position. Sometimes the uterus lies behind the ovarian tumour, which has become fixed by adhesions to the front of the abdominal wall. Palpation will then reveal only the ovarian swelling. Where the tumour has a long pedicle, it may be found in almost any region of the abdomen, where it may be fixed by adhesions, or, as is more usual, remain

¹ *Diagnosis of Ovarian Tumours.*

² Heiberg, *loc. cit.*

movable. In one of my own cases it lay in the right hypochondrium,¹ but could be easily pushed down, while a case is recorded² in the *Medical Record* of 1897 in which, in the fourth month of pregnancy, the left hypochondrium was occupied by a "rather flat, globular swelling, tender on pressure and dull on percussion". From the unusual situation of the tumour no positive diagnosis was ventured on. Lewers³ describes an interesting case where the tumour lay like a cap over the uterus but permitted the hand to be pushed down between it and the uterus to the promontory of the sacrum.

Even when no line of demarcation can be made out the nature of the complication may be suggested by some irregularity in the shape of the tumour or by its extension into one or other loin.

A difference in consistence in the two tumours, or in the different parts of the abdominal swelling, may be made out by palpation. In the more central tumour it may be possible to recognise the characteristic consistence of the pregnant uterus, while, if gestation be advanced, the limbs and movements of the foetus may be felt. In the intermediate months abdominal ballottement may be made out. The intermittent contractions, characteristic of the gravid uterus, have often contributed to a correct diagnosis.

The ovarian tumour will usually be harder and more elastic, and if cystic, fluctuation may be perceptible. The existence of fluctuation is especially valuable in those cases of enormous distension in which the usual physical signs are obscured.

While, for the most part, merely corroborating the information which palpation yields, percussion may furnish independent evidence. It is most valuable in those difficult cases where abdominal distension renders the results of palpation uncertain.

¹ See p. 171.

² Jones, *Med. Record*, 1897.

³ Lewers, *Lancet*, 1893.

Dulness will be found over both uterus and tumour with occasionally an intermediate zone of resonance indicating the line of demarcation. In some cases this line of resonance has been found to be due to an adherent coil of intestine. Dulness extending into one flank and practically unaltered by change of position will tend to corroborate the suspicion of some complication. Percussion also will enable us to determine the presence of free fluid in the peritoneal cavity, which is not uncommonly met with in cases of ovarian tumour with pregnancy.

In doubtful cases the use of the stethoscope must not be omitted. The other signs of pregnancy so often fail us in the presence of ovarian disease that the detection of the foetal heart sounds acquires more than usual importance. Though often difficult it is generally possible to make them out. Where great ascites existed, however, or where the uterus lay behind the tumour, it has usually been found impossible to detect them, so that in this complication of pregnancy their limitations as an aid to diagnosis are increased, and too much reliance must not be placed on negative stethoscopic evidence. From the fact that it has been heard over ovarian tumours, the uterine souffle is not of much value.

It is seldom that abdominal examination alone suffices for diagnosis. The information obtained has to be supplemented by internal exploration, which alone, or combined with abdominal palpation, furnishes important diagnostic evidence.

In the early months, and especially when the ovarian tumour is so large as to interfere with bimanual palpation of the uterus, vaginal examination gives us the most reliable signs of the existence of pregnancy. The situation and character of the cervix uteri are ascertained. The cervix varies in position according to the duration of pregnancy and to the site and size of the tumour. It is comparatively seldom normal in position, a fact of much diagnostic significance. In the case of pelvic tumours which occupy their usual position in Douglas's pouch,

it is pushed forward, lying usually in the middle line, less often to one or other side. In the latter half of pregnancy it may be so high as to be inaccessible to an ordinary examination, being situated well forward above the pelvic brim or behind the upper part of the symphysis pubis.

With abdominal tumours the position of the cervix is even more variable. According to the situation and size of the tumour it may be pushed back into the hollow of the sacrum or forward behind the pubis, but the most usual displacement is lateral. It may be pushed to the side of the pelvis or even into an iliac fossa. These abnormal positions of the cervix uteri in pregnancy are always suspicious of some complication.

The changes in the cervix uteri characteristic of pregnancy can usually be readily made out, and in not a few of our cases, where early gestation was accompanied by great abdominal distension, they have furnished the chief evidence of its existence. They are of most importance in early pregnancy when the abdominal and other vaginal signs are more likely to fail us. In the later months, again, the diagnosis of pregnancy has often been assured by the perception of the presenting part of the foetus.

Pelvic tumours are seldom suspected till a vaginal examination is made. Ovarian tumours in the pelvis vary much in size, sometimes being as small as a Tangerine orange, sometimes as large as a foetal head. The latter fill up almost the entire pelvis, leaving only enough room to push up one or two fingers between them and the pubis, and thus rendering palpation of the uterus and cervix difficult or impossible. They are usually tense and elastic, though ovarian fibromata have been met with and been mistaken for a foetal head¹ or pelvic exostosis.² On the other hand, purely cystic tumours may be

¹ Griffith, *Obstet. Trans.*, vol. xxxiii.

² Kleinwachter, *Archiv f. Gynäk.*, Bd. iv.

so tense, especially towards the end of pregnancy or during labour, as to give the impression of being solid.

As in all abdomino-pelvic conditions bimanual examination forms our most important means of diagnosis. It seldom fails to contribute valuable information even where it does not enable us to reach a positive conclusion.

It may seem unnecessary to point out that the bladder and rectum should first be emptied, but mistakes have occurred from neglecting this ordinary precaution. Fæcal accumulations at the upper part of the rectum and a distended bladder have each been mistaken for an ovarian tumour, an error which can only be attributed to want of care.

The shape, character and consistence of the uterine and ovarian tumour can best be made out by the bimanual method. The independence and relation of the two tumours may also in most cases be readily established. Movements imparted to the uterus from the abdomen will be communicated to the cervix which will remain unaffected by corresponding movements of the ovarian tumour, provided no adhesions exist, and these are seldom so close that impulse to the tumour is in the same degree imparted to the cervix. The greatest difficulty will be experienced in the case of large tumours with great abdominal distension. The bimanual evidences of an early gestation may then be obscured, and we must rely for the diagnosis on the less certain vaginal signs and on the symptoms. On the other hand, when in the later months the existence of pregnancy is assured, there may be difficulty in determining the nature of the accompanying abdominal condition. In these circumstances an anæsthetic will permit of a more satisfactory examination, but cases will always be met with in which an absolute diagnosis is possible only after an exploratory laparotomy.

It has been found possible under chloroform to make out bimanually the attachment of the tumour, and the detection of

the pedicle has contributed to the diagnosis in cases in which the tumour was at first thought to be a myoma.

A useful extension of the bimanual method has been suggested independently by both Schroeder¹ and Professor Howitz² of Copenhagen. They recommend that the cervix be pulled down by a hook or volsellum. By this means movements may be more readily communicated to the uterus in the abdomen, which in this way will be differentiated from the adjoining tumour. The volsellum should be held by an assistant while the tumours are manipulated from the abdomen, and this is best done by attempting to lift or push them up. The fear which might be entertained that this interference with the cervix would bring on labour seems to be unfounded. In Howitz's clinic, where this method was habitually employed, no such result followed.

Information, which may help towards a diagnosis in obscure cases, will sometimes be derived from a rectal examination. A higher exploration of the pelvis is obtained, and the uterus or the tumour may thus be palpated when it proved inaccessible to vaginal examination. It may be combined with abdominal examination, and in one or two cases it has been possible by this means to ascertain the attachment of the tumour. In this bimanual examination Herman advises that two fingers should be introduced into the rectum under anæsthesia.

Rectal examination is especially valuable in the case of pelvic tumours. In these it should be employed as a matter of routine. From neglect of rectal exploration an ovarian tumour was in several instances regarded as a bony outgrowth from the pelvic wall. This happened in a case recorded by Kleinwachter,³ where Cæsarean section was performed with fatal result, and it was found that what had been regarded as a pelvic

¹ *Zeitschr. f. Geburtsh. u. Gynäk.*, Bd. v., Heft 2.

² Heiberg, *loc. cit.*

³ Kleinwachter, *loc. cit.*

exostosis was an ovarian fibroma which was non-adherent and could have been pushed above the brim. A more excusable mistake which has been made is to regard the tumour as an extra-uterine pregnancy.

Jetter¹ recommends simultaneous rectal and vaginal examination with a view to ascertain the character and consistence of the tumour, a not unimportant point when it has to be decided during labour whether tapping may be resorted to with advantage or not.

The importance of arriving at a correct diagnosis is so great that in obscure cases an anæsthetic should be employed when the greater relaxation of the abdominal wall and freedom from pain will permit of a more satisfactory examination.

Where the abdominal distension is great, tapping may prove useful by diminishing the tension and thus allowing the two tumours to be recognised as distinct. The chemical character of the fluid withdrawn may enable us to distinguish an ascitic collection from an ovarian cyst. In tapping the greatest care must be taken not to injure the uterus, several cases being recorded where the trocar was pushed into the uterine tumour.

¹ Jetter, *loc. cit.*

DIFFERENTIAL DIAGNOSIS.

IN dealing with the differential diagnosis, I propose to rely more on illustrative cases than on a lengthy analysis of the differential signs, which will be found enumerated in text-books of gynæcology.

The diagnostic problem presents itself clinically in one or other of the following forms :—

1. The presence of pregnancy may be readily determined, but the nature of the complication is obscure.

2. The evidence of ovarian disease may be clear, while the coexistence of pregnancy is uncertain.

3. The existence of pregnancy and the nature of the abdominal enlargement may both be doubtful.

The first only of these need be considered. The second group, though furnishing the largest number of cases, is relatively unimportant. The existence of pregnancy makes operation only more imperative ; but this must not be held to relieve the practitioner from making every effort to solve the problem. It is important for the operator to be aware of the existence of pregnancy, and it is only fair to the patient to inform her of its possibility before submitting to operation. The diagnosis of pregnancy in association with ovarian tumour has already been considered.

Cases coming under the third category are now seldom met with, though they were of common occurrence when ovarian tumours were allowed to run their course without operation. The earlier literature furnishes many instances where the

abdominal distension had become so great that the condition could not be definitely ascertained. In these circumstances the presence or absence of pregnancy will seldom alter the treatment. The important point is to determine the nature of the complication. The clinical problem is thus practically the same as in the first group.

Pregnancy Certain or Probable, Complication Obscure.—Cases coming under this head are distinguished less by their frequency than by the variety of the conditions which may simulate ovarian tumour in association with pregnancy.

Fibromyoma Uteri.—Uterine myomata are not infrequently associated with pregnancy. Although the diagnosis is as a rule easy, the clinical characters of the condition may so resemble those of pregnancy and ovarian tumour that diagnosis is impossible. This is most likely to be the case where the myoma is pedunculated, soft and œdematous, or partially cystic, or, on the other hand, where a multilocular nodulated ovarian cyst is adherent to the uterus.

The differential diagnosis is important, unless, indeed, the startling recommendation which has recently been made¹ to operate at once on all cases of uterine myomata were to be extended to myomata in pregnancy. We are still, however, far from even a limited acceptance of this attitude.

The difficulties that may be experienced in distinguishing an ovarian tumour from a myoma of the uterus are largely increased by the coexistence of pregnancy. Not only does the most distinctive symptom fail us in the suppression of the menstrual flow, but we are debarred from a valuable diagnostic method, the use of the uterine sound. If, in addition, the physical characters of the tumour are of uncertain import

¹ Bland-Sutton, *Obstet. Trans.*, 1899.

the diagnosis will at best be conjectural. The tumour may be inferred to be ovarian, however, when it possesses great mobility, is tense, elastic, or fluctuating. A myoma, on the other hand, is less movable, seems to form part of the uterus, to which its movements, even when pedunculated, can generally be communicated, and gives an impression of greater weight and solidity. Ovarian fibromata may be equally hard, but are comparatively rare and are often combined with ascites.

In distinguishing the two conditions, Schroeder's method of pulling down the uterus by a hook fixed in the cervix is of use. By this means the more intimate connection of a myoma with the uterus will be demonstrated, while the point of origin of the tumour may be ascertained and the diagnosis decided. It has sometimes been possible to palpate the ovaries and thus determine the tumour to be uterine, but this can only be done exceptionally and at an early period of pregnancy.

Where the physical signs are insufficient the previous menstrual history may help us to a decision.

When the tumour occupies the pelvis the differential diagnosis may not be easy, as several published cases prove. If it shows fluctuation it is almost certainly ovarian, but the absence of fluctuation does not preclude the possibility of the tumour being cystic, for in not a few cases a cyst of the ovary in the pelvis has been found so hard that it was regarded as a uterine fibroid. In this situation the differential diagnosis is of less importance, as in either case operation is indicated.

When the ovarian tumour is fibromatous the greatest difficulty may be experienced in distinguishing it from a uterine tumour. Free fluid in the peritoneal cavity so often associated with fibromata would favour an ovarian origin.

Two cases ¹ are recorded in which pregnancy was complicated

¹ Worrall, *Med. Press and Circular*, May, 1900 ; Downes, *Amer. Gynecol. and Obstet. Journal*, 1898.

by uterine myomata as well as by an ovarian cyst. In neither case was the latter diagnosed till the abdomen was opened.

In doubtful pelvic cases it is a good plan to push the tumour above the brim. If this can be effected, the diagnosis will often be rendered easier.

I add abstracts of two cases ; in one a fibroid outgrowth of the uterus was regarded by both Spencer Wells and Knowsley Thornton as an ovarian cyst, in the other the converse mistake was made.

Case V.—Uterine outgrowth operated on during pregnancy in the belief that it was an ovarian tumour ; premature labour ; death. (Knowsley Thornton, *Obstet. Trans.*, vol. xxi.)

H. A., aet. thirty-nine, married two years, enjoyed good health previously ; menstruation regular and painless till a few weeks after marriage, when she had a severe illness, seemingly peritonitis, but the account of it indefinite. After this attack menstruation irregular, profuse, and attended with much pain. During illness patient's attention was first directed to two lumps in the lower abdomen, one in the situation of each ovary.

Early in August, 1878, catamenia ceased and vomiting after meals began, but no morning sickness. She became rapidly worse and was confined to bed. On 2nd May she was admitted to the Samaritan Hospital much exhausted with troublesome sickness and high temperature. When she could be examined the os and cervix were found in the condition of advanced pregnancy ; the position of the uterus could not be accurately defined owing to a hard round adherent mass in the pelvis. On 18th May foetal heart sounds heard and movements detected in the mass occupying the left side of the abdomen. There was a distinct groove between this mass and one on the right. The tumour was believed to be ovarian, and operation was decided on. In this Spencer Wells concurred. Operation on 22nd May. It was not till the tumour was almost separated

that any doubt of its ovarian character was entertained. It proved to be a uterine fibroid weighing nearly six pounds.

Case VI.—Ovarian cyst complicating pregnancy mistaken for a uterine fibroid; Porro's operation; recovery. (Debaissieux, *Report of Congress of Gynæcology and Obstetrics*, 1892.)

Patient, aet. forty, for two years the subject of a tumour which was regarded as a fibroid of the uterus. She became pregnant and passed through pregnancy without trouble. Labour began at term. Debaissieux concluded that delivery in the ordinary way was impossible, and performed Porro's operation. The tumour proved to be a cyst of the ovary. Notwithstanding an attack of secondary hæmorrhage the woman recovered.

Retroverted Gravid Uterus.—In the early months of pregnancy an ovarian tumour in the pouch of Douglas may be mistaken for a retroverted gravid uterus. Several illustrations of this are to be found among our cases. Such mistakes can be avoided by a systematic examination.

Although the constitutional and local symptoms of incarceration of the gravid uterus are usually more severe than where a pelvic ovarian cyst complicates early pregnancy, this cannot be relied on. The physical conditions resemble each other, but it is seldom that an ovarian tumour presents the soft consistence of the pregnant uterus. In the case of a cystoma the tumour is more tense, elastic, and fluctuating, while with solid tumours their unyielding hardness will distinguish them from the uterine fundus. With care also the intermittent contractions characteristic of the pregnant uterus can be made out in the retroverted organ.

The position of the cervix, which in both conditions is high and pressed against the symphysis pubis, does not help us so much as its direction. In the case of an ovarian cyst in Douglas's pouch this is practically unchanged, whereas in retro-

version the cervix is directed forward and upward. This difference is of great diagnostic significance.

The diagnosis will be further assisted by ascertaining the relationship of cervix to tumour. While in retroversion the cervix will be felt to be continuous with the pelvic mass, of which it clearly forms a part, in an ovarian cystoma the vaginal roof can usually be invaginated between cervix and

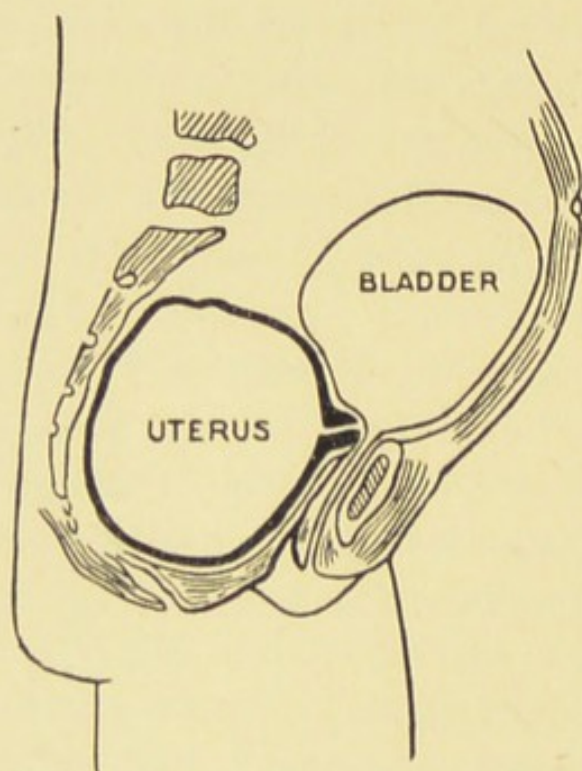


FIG. 1.—Retroverted gravid uterus, showing position and direction of cervix. (After Dakin, by permission.)

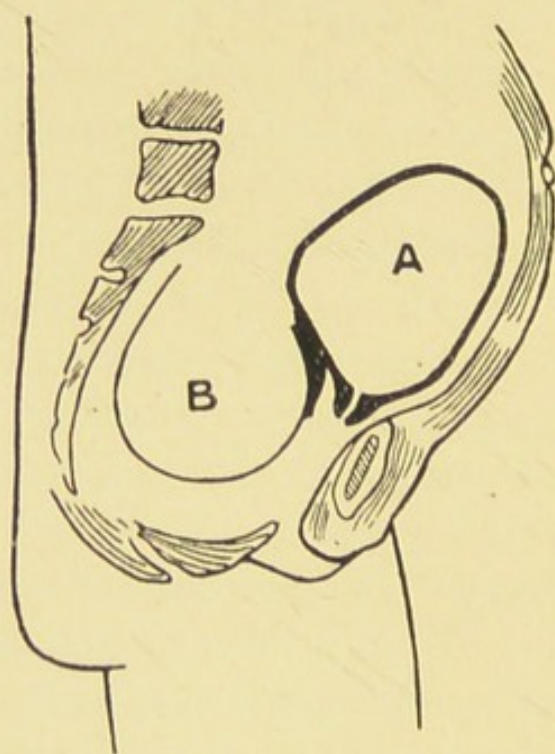


FIG. 2.—Showing cervix in author's case of extra-uterine gestation. A = uterus, B = gestation sac. The physical condition is similar to that of intra-uterine pregnancy with ovarian tumour in the pelvis.

tumour, the two being thus partially isolated. If the vaginal examination be now combined with abdominal palpation, the enlarged fundus will be found, in the latter condition, lying above the pelvic brim and reaching a somewhat higher level than would correspond with the duration of pregnancy, while if the abdominal wall be lax the uterus can be grasped and isolated and ascertained to have a mobility distinct from that of the

pelvic tumour. In retroverted gravid uterus, on the other hand, the whole mass occupies the pelvis and is of a size corresponding to the pregnancy. The accompanying diagrams illustrate the different physical conditions.

In doubtful cases an attempt may be made to push the tumour above the brim, either from the vagina or rectum. If this can be done all uncertainty will disappear.

Floating Kidney.—It is only rarely that a floating kidney can simulate ovarian disease during pregnancy. However, several cases have been recorded where this has occurred. Winckel¹ collected six such, and a few others have since been published.

A displaced normal kidney may resemble a small ovarian tumour, or the latter may simulate a kidney, as in a pregnant patient of Howitz's,² where a small tumour was found which presented many of the characters of a movable kidney, but was determined to be ovarian from its long pedicle being traced to the left cornu of the uterus.

When the displaced kidney is cystic the difficulties of diagnosis will be greater. Cases have been recorded where during pregnancy a cystic kidney has occupied the brim or cavity of the pelvis and presented more than a superficial resemblance to an ovarian tumour. Cragil (Academy of Medicine, N.Y., 1899) mentions that he removed a cyst *per vaginam* in a pregnant woman under the belief that it was ovarian. To his surprise it proved to be a cystic kidney.

The diagnosis must rest on the history and on the character, shape and attachments of the tumour, which in the pelvis can best be made out by combined vaginal and rectal examination.

In the two following cases a cystic kidney was associated with pregnancy. In one it was mistaken for an ovarian tumour,

¹ *Lehrbuch der Geburtshülfe.*

² Heiberg, *loc. cit.*

in the other the diagnosis was doubtful till the abdomen was opened.

Case VII.—Pregnancy in fourth month; hydronephrosis of the right kidney mistaken for an ovarian cyst. (Fehling, Waehmer's *Inaug. Dissert.*, Halle, 1900.)

E. B., aet. twenty-eight. Since her first confinement in January, 1899, patient under treatment for prolapse and a tumour in abdomen; last period 28th June, 1899; examined on 28th October, when the abdomen was found to be uniformly distended by a cystic thin-walled tumour reaching a hand-breadth above the umbilicus. There was dulness over the hypogastrium extending to the right; elsewhere tympanitic; no change produced by change of position: vulva relaxed, both vaginal walls prolapsed; portio soft; uterus corresponding to fourth month of pregnancy, soft and pushed forward and to right. In right broad ligament a firm band; cyst nowhere distinctly to be felt; ovaries and tubes not to be made out; urine normal. A diagnosis of pregnancy with an ovarian cyst made, but at operation the tumour proved to be a cystic right kidney. It was removed; recovery good; pregnancy uninterrupted.

Case VIII.—Pregnancy in fifth month; dermoid cyst of right ovary; kidney displaced and partly in the pelvis; ovariectomy; pregnancy uninterrupted. (Runge, *Archiv f. Gynäk.*, Bd. 41.)

A woman, badly nourished and supposed to be in the fifth month of pregnancy, was found to have three distinct tumours in the abdomen. To the left lay what was regarded as the pregnant uterus, the fundus two finger-breadths under the umbilicus; to the right a tumour about the size of a child's head, very movable and elastic, which was diagnosed a right ovarian cyst; the third tumour was detected only on vaginal examination; it lay in front of the promontory and upper half of the sacrum and showed a distinct notch. In a day or two from first examination pregnancy was placed beyond doubt by

the detection of the heart sounds and movements of the foetus. Laparotomy was performed and a dermoid of the right ovary removed. The pelvic tumour proved to be a displaced kidney ; good recovery. At the seventh month premature labour induced on account of the encroachment of the kidney on the pelvic brim. A living child was delivered and the convalescence of the mother was satisfactory.

Combined Extra- and Intra-Uterine Gestation.—The physical characters of an ectopic gestation are similar to those of an ovarian tumour. In the early months, from the simultaneous enlargement of the uterus, the condition may closely simulate intra-uterine pregnancy with a small ovarian cyst. I had recently an opportunity of examining a case of this kind. A diagnosis of extra-uterine gestation was based on the rapid growth of the cyst and on the size of the uterus which was too small to correspond with the duration of amenorrhœa. It was thought also that the foetal heart sounds could be heard over the cystic tumour. In either case operation should be advised, but the possibility of this being refused increases the importance of a differential diagnosis.

It is easy to illustrate by actual cases the difficulties that may arise. Our series furnishes several instances in which an ovarian tumour associated with pregnancy was regarded as an extra-uterine gestation, notably that of Griffith,¹ and the two which are quoted below. The converse mistake has been made, but is not so common.

It is, however, when an extra-uterine is combined with an intra-uterine pregnancy, which conceals the more important symptoms of the former condition, that the resemblance to pregnancy with an ovarian tumour is greatest. Of this there are several instances on record. In most of them the extra-

¹ Griffith, *Obstet. Trans.*, vol. xxxiii.

uterine pregnancy had become arrested before the occurrence of the intra-uterine, but the two may originate about the same time and proceed concurrently. Bland-Sutton¹ has tabulated six cases of this kind. All went to term and with one exception ended disastrously for the mother. In Ludwig's case² not only the mother but both children were saved. Owing to its dangerous character the diagnosis of this condition is of great importance. Where the extra-uterine conception is of an earlier date than the intra-uterine and has been blighted and arrested in its growth the history of the case will often be of service. From the physical signs alone it may be impossible to distinguish it from an ovarian tumour.

When an extra- and intra-uterine pregnancy proceed concurrently the symptoms which usually direct attention to the former, and aid in its diagnosis, are absent. We must then rely, in the early months, on the shape and character of the tumour and on its growth, which is more rapid than in an ovarian cyst. In the later months the parts of the extra-uterine child may be felt or double foetal heart sounds heard. Where, as may happen, the extra-uterine foetus dies before term, the shrinking of the sac which takes place will favour the diagnosis of extra-uterine pregnancy.

If the extra-uterine sac ruptures, the case will be difficult to distinguish from strangulation or rupture of an ovarian cyst. Symptoms of hæmorrhage will be more prominent in the former; but in view of the necessity for operation the distinction is not of practical moment, and so need not be further dwelt on.

The following cases, in which the clinical features were equivocal, may be of interest:—

Case IX.—Extra-uterine gestation mistaken first for retro-

¹ Bland-Sutton, *Lancet*, 1901, vol. i.

² Ludwig, *Monats. f. Geburts. u. Gynäk.*, 1899,

verted gravid uterus and then for pregnancy with ovarian tumour. (Unpublished.)

Mrs. C., admitted to the Aberdeen Maternity Hospital on 9th January, 1903. She was recommended by her medical attendant in the country, who thought she had incarceration of the gravid uterus.

She was thirty-eight years of age, the mother of one child eleven years before; no miscarriages; last period ended in the middle of September, 1902; two weeks after she was seized with cramp-like pains in the abdomen, which continued off and

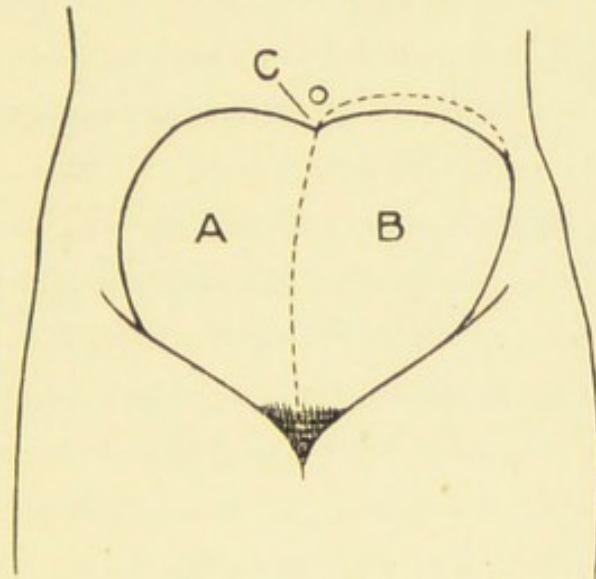


FIG. 3 shows condition on abdominal examination. A, gestation sac; B, uterus, differentiated by contractions; C, indentation at upper margin; dotted line shows increase in height of uterine fundus.

on and were accompanied by sickness. She was much troubled with constipation and with difficulty in micturition, and towards the end of November had retention of urine.

On admission the woman looked ill, being thin, anæmic and sallow. There was persistent sickness with subfebrile temperature for the first few days. On examination the hypogastrium was found to be occupied by a rounded swelling reaching almost to the umbilicus, and of tolerably uniform consistence save that the right portion felt more cystic; no sulcus could be made out, but at the middle of the upper

margin there was a perceptible indentation or notch. During examination the left half was felt to become harder; it became distinctly prominent. Over the *right* portion of the tumour a souffle was heard. Internal examination showed a cystic swelling in Douglas's pouch, filling up the upper half of the pelvis and reaching to within $1\frac{1}{2}$ inches of the vulva. Between this and the right portion of the abdominal tumour fluctuation could be made out. The cervix uteri could be reached with difficulty; it was pressed forward, lying in the middle line behind and on a level with the upper margin of the symphysis; it was directed downwards (see fig. 2, p. 50); it was neither so large nor so soft as would have been expected for the period of pregnancy. During the examination crepitation, indicating recent peritonitis, was felt.

Though keeping in view the possibility of extra-uterine gestation, which was suggested by several facts in the case, I concluded that the condition was intra-uterine pregnancy with ovarian tumour, for the following reasons: (1) the occurrence of suppression of urine at the end of the second month; (2) the absence of vaginal discharge; (3) the unusually large size and globular shape of the uterus, and the vigour of the uterine contractions; (4) the elevated temperature and the evidence of peritonitis. In this diagnosis Dr. Scott Riddell, who afterwards saw the case with me, agreed. As influenza was prevalent in the hospital operation was deferred. An examination on 29th January showed the uterus to have enlarged, the fundus being now distinctly higher than the upper margin of the cyst. This was looked on as corroborating the diagnosis; but on 2nd February ballottement was made out *per vaginam*.

3rd February: laparotomy by Dr. Riddell. The cyst proved to be an extra-uterine gestation sac. A fortnight afterwards a five months' foetus was removed *per vaginam*. At the time of writing the woman was progressing favourably.

Case X.—Pregnancy in fourth month complicated with a

dermoid tumour of the right ovary ; diagnosed extra-uterine gestation. (Denny, *Boston Med. and Surg. Journal*, 1896.)

The patient was twenty-five years of age, and the mother of six children ; she had had two miscarriages, the last in August, 1895. Her period ceased on 2nd November, 1895, and she had all the symptoms of early pregnancy. On 1st February she had a sharp attack of pain in the abdomen, and tenderness which was so general as to preclude a satisfactory examination. Opiates, ice-bag and rest relieved her so rapidly that in forty-eight hours she could be examined. A soft mass was found in the right side of the pelvis. Bimanually the uterus was found deflected to the left and somewhat enlarged, though not to an extent corresponding with the probable length of foetation. No effort was made to depress the mass towards the finger. A diagnosis of extra-uterine gestation was made, and this was corroborated a few days later by Dr. Ohage. Operation was performed on 19th February, when the supposed extra-uterine sac proved to be a dermoid of the right ovary, which was removed without interrupting pregnancy.

Case XI.—Pregnancy in second month associated with a large cystic tumour ; diagnosis doubtful till abdomen opened. (Hirst, *Amer. Journal of Obstetrics*, vol. xxxii.)

Mrs. K., married five years ; one child four years ago ; miscarriage in second month ten months ago ; good recovery, but for eight months after had slight pain in left groin from time to time. Last period in February ; during March pain in left groin, gradually increasing, but with intervals free from pain. She was first seen on 22nd April ; a week before she had such a violent attack of pain during a walk that she was temporarily disabled ; similar attacks followed ; once there was a discharge from the vagina of a small quantity of dark blood with a small clot. Examination showed a cystic tumour reaching half-way to umbilicus on left side of abdomen, filling Douglas's pouch and pushing the womb close against the

symphysis. "Not so sensitive nor so adherent as one would expect from an extra-uterine pregnancy, but perfectly possible to be so; perhaps an adherent inflamed ovarian cyst; possibly a retroverted womb, twisted on the cervix, adherent and pregnant." Operation revealed intra-uterine pregnancy and a dermoid cyst with one twist of the pedicle.

Ascites.—In his well-known work Atlee¹ describes several cases where it was found difficult or impossible to distinguish between ovarian dropsy and fluid in the peritoneal cavity. There are two conditions in which ascites associated with pregnancy may so closely simulate the latter condition with an ovarian tumour that the diagnosis can be determined only after the most careful examination. The first of these is where the ascitic fluid is so confined by peritoneal adhesions that its position is unaltered by any change in the position of the patient. The area of fixed dulness would suggest an immobile ovarian cyst. The diagnosis will be difficult only in the case of great distension. The absence of any well-defined tumour will otherwise be readily made out. The second class of cases is where the quantity of fluid is so great as to fill up the peritoneal cavity and produce enormous distension with practically universal dulness. It may then, as in several recorded cases, be difficult to decide whether the pregnancy is complicated by ascites or by a large ovarian cyst. It must not be forgotten that ovarian tumours, more especially the small papillomatous growths, often occasion ascites, and that thus the two conditions may be found combined with pregnancy. Several cases have been met with where the existence of an ovarian tumour was in this way completely concealed, and only discovered on withdrawal of the ascitic fluid. In all cases of great distension from ascites this possibility should be kept

¹ *Diagnosis of Ovarian Tumours.*

in view, and where doubt exists as to the exact condition, tapping should be resorted to. By the greater relaxation of the abdominal wall the true condition of matters may then be revealed.

As a rule the abdominal signs of fluid in the peritoneal cavity are sufficiently characteristic, but where this is not so, vaginal and rectal examination will often assist us to a correct diagnosis. The position of the uterus and cervix is important. In ascites this is usually little altered from the normal, while in the case of a large ovarian tumour, which alone can be confounded with ascites, there is, as we have seen, almost always some obliquity of the uterus and displacement of the cervix. Atlee¹ attaches importance in the diagnosis to the greater constitutional disturbance in ascites, which usually has its origin in some grave pathological condition, such as tubercular peritonitis or renal disease.

Hydramnios.—The rapid enlargement of the uterus in dropsy of the amnion has occasionally been mistaken for pregnancy, complicated with an ovarian cyst. The clinical features of the two conditions present an undoubted similarity, and the difficulty of diagnosis is increased by the fact that advice is usually not sought till the distension is so extreme that the demarcation of the abdominal tumour is far from easy. An inquiry into the history, along with repeated physical examination, will usually serve to prevent error. The history is important. In hydramnios the early months of pregnancy show nothing abnormal, the rapid growth beginning after mid-term, while in an ovarian cystoma, of a size to interfere with the physical examination, there is almost always observed by the patient an unusual enlargement from the beginning.

The other important diagnostic points are the uniform

¹ Atlee, *loc. cit.*

globular shape of the abdominal tumour, the tension of the membranes felt through the opened cervix, the thinning and tension of the lower uterine segment, and the facility with which abdominal and vaginal ballottement can be elicited. Abdominal ballottement is especially valuable, as it will be perceptible over the whole area of the tumour, proving it to be entirely uterine. The position and character of the cervix are important. In hydramnios the cervix is normal in position, or directed slightly backward; the portio vaginalis is obliterated, the os somewhat dilated, its edges thinned, ring-like and more or less tense—conditions not found in the complication with ovarian tumour. Further, if the abdominal tumour is formed entirely of the enlarged uterus any movement communicated to it will be imparted to the cervix, and conversely the tumour will be affected in its whole extent by impulses to the cervix. In hydramnios the uterine contractions characteristic of pregnancy will be felt over the whole area of the tumour.

If, even after careful examination, doubt should exist, the case should be regarded as one of hydramnios, when time will quickly clear up the diagnosis.

Of several instances in which difficulty was experienced, I may refer to the case of Florentine,¹ where the simultaneous combination of hydramnios, ascites and ovarian tumour presented a clinical problem of obvious complexity. Lewers² records a case in which the symptoms and abdominal signs simulated those of hydramnios, but he was led to the diagnosis of pregnancy with ovarian cyst by the history of two well-marked peritonitic attacks.

The importance of a proper interpretation of the early history is seen in the following case in which an observer of acknowledged experience was led into serious error.

¹ Florentine, *Amer. Gynecol. Journal*, 1892, vol. ii.

² Lewers, *Lancet*, 1893, vol. ii.

Case XII.—Pregnancy with ovarian cyst; diagnosed hydramnios; labour induced; a week later ovariectomy. (Fehling, *Waehmer's Inaug. Dissert.*, Halle, 1900.)

M. S., aet. twenty-seven; i. gravida; last period in beginning of September, 1896; six weeks later abdomen large, and thereafter rapid increase with pain in the side, and dyspnoea on lying down. 7th February, 1897.—Œdema of ankles, and urine found to contain a trace of albumin; circumference of abdomen 130 cm.; fundus uteri reached ensiform cartilage; foetal parts not to be felt. In both flanks tympanitic note, unchanged on change of position; dulness elsewhere with distinct fluctuation in area of dulness; colostrum to be expressed from the breasts; external genitals very œdematous; cervix conical and hard; external os dimpled; presenting part of child not to be felt. Diagnosis, hydramnios. 9th February, 1897.—The cervix was dilated and the membranes ruptured, but not much liquor amnii. Two days later puncture in the right hypogastric region with removal of twelve litres of yellowish clear fluid; labour began on the 12th; child born on the 13th, followed by fever and pain in the abdomen; successful ovariectomy on the 19th.

In a case of hydramnios which came recently under my own observation several of the features were so unusual as to suggest the possibility of ovarian tumour and pregnancy.

Case XIII.—On 9th February, 1903, I was asked by her medical attendant to see Mrs. K., who was suffering from extreme abdominal distension in the sixth month of pregnancy. She was twenty-three years of age and had had one child two years before, which died soon after birth. Menstruation afterwards was regular till the middle of August, when it ceased. From the outset she felt ill; and before the end of November there was so obvious enlargement of the abdomen that it was remarked by her friends. She complained of abdominal discomfort and dragging pains. The abdomen grew so rapidly

that in the beginning of January she was larger than at full term. There was great and almost continuous pain. By the end of January the distension was so great that she was unable to move about with comfort; latterly she could not lie down, and for a week before I saw her she was unable to sleep.

On examination the abdomen was found to be enormously distended by a central tumour. There was dulness over the whole tumour but resonance in both flanks. Fluctuation could be made out over nearly the whole extent of the tumour. No foetal parts could be felt. During examination an alteration in the consistence of the tumour was perceptible. The foetal heart sounds were indistinctly audible to the right and just below the centre of the tumour. On internal examination the cervix was found normal in position; the vaginal portion was not obliterated; the os admitted the tip of the finger; what seemed to be a portion of the foetus could be felt through the anterior fornix, but it could not be made to ballotte; no fluctuation between anterior fornix and tumour. The finger was pushed through the os and at once came on the membranes and part of the foetus; the former were not tense, and there was little liquor between them and the foetus, which was pressed firmly down on the lower uterine segment and could not be pushed up.

Though the vaginal examination was begun in the belief that the condition was one of hydramnios, the freedom from tension of the membranes, the immobility of the presentation, and the early appearance of the abdominal enlargement raised a suspicion of ovarian tumour and pregnancy. On reviewing the facts, however, I concluded that the distension was due to hydramnios, and that the laxness of the presenting membranes was due to the existence of multiple pregnancy, the upper amniotic sac alone being affected with dropsy. The membranes were ruptured; only about 6 to 8 ounces escaped. The finger was pushed up past the foetus when a second tense bag of

membranes was felt; this was ruptured with a Playfair's probe; the quantity of liquor amnii which escaped was enormous: 13 pints were measured, but some was lost, probably 1 to 2 pints. Labour began twelve hours after and was completed in a few minutes; a small, compressed, pulpy foetus was first expelled; it had evidently been dead for about six to eight weeks; its expulsion was followed by the birth of a six months' child, which lived for twelve hours.

Pelvic Exostosis.—Solid tumours and even tense cysts of the ovary, lying in Douglas's pouch, have been mistaken for bony sacral growths, an error which can only be attributed to negligence. Rectal examination will at once enable us to exclude a sacral attachment. In a case recorded by Kleinwachter¹ Cæsarean section was performed during labour with fatal result for a supposed pelvic exostosis, which proved to be an ovarian fibroma without adhesions, which could readily have been elevated out of the pelvis.

There are other conditions which may simulate pregnancy and ovarian tumour, for example, vaginal, gall bladder, or echinococcus cysts. All these are exceedingly rare in association with pregnancy, and, where they have occurred, the differential diagnosis has usually been easy or devoid of practical significance. The general principles of diagnosis, which have been laid down and illustrated, will serve to distinguish the majority of these unusual complications.

¹ *Loc. cit.*

DIAGNOSIS OF THE COMPLICATIONS OF OVARIAN TUMOUR IN PREGNANCY.

THE diagnosis of the complications of ovarian tumour, though at times rendered more difficult by pregnancy, is essentially the same as in the non-pregnant, and will be briefly considered only in so far as it is influenced by the coexistence of gestation.

The more important symptoms are the same in all the complications. Pain and peritonitis are the chief. Both vary in intensity and duration with the acuteness of onset. Sooner or later they tend to bring on premature labour, which aggravates the pain often to an excruciating degree. A considerable but variable interval—often several days—usually elapses before uterine action is set up, and in many of our cases it was forestalled by operation.

The similarity in the clinical features of the different complications is due to the accompanying peritonitis. If the case is not seen early this may so mask the distinctive signs that a differential diagnosis is impossible. A further cause of difficulty is to be found in the fact that the complications frequently occur in combination. Torsion may give rise to rupture or to suppuration, which in turn may cause rupture, and all give rise to peritonitis. The distinction is of less moment, however, as in all cases operation is indicated. It is of more importance to distinguish the different complications from other conditions which may simulate them. To do this we must know their differential signs.

Peritonitis.—The symptoms of both acute and chronic peritonitis are so essentially the same as in the non-pregnant that discussion of them is unnecessary. The condition with which peritonitis due to ovarian disease is most likely to be confounded is appendicitis. Though not a frequent complication of pregnancy, appendicitis has occasionally been met with, and, as Mundé¹ suggests, is probably more common than is generally suspected. It should, therefore, be kept in view when the symptoms are limited to, or originate in, the right iliac fossa. The differential diagnosis is important, but not always easy. The value of the earlier history will at once suggest itself: an ovarian cyst may have been known to exist, or the patient may have had previous attacks of appendicitis; but that the history may be misleading is seen from an interesting case reported by Mundé,¹ where a woman known to have a small ovarian cyst had a sharp inflammatory attack. This was thought to be due to twisting of the pedicle of the cyst; but on opening the abdomen the cyst was seen to be unaffected, while an abscess was found in the pelvis connected with a gangrenous appendix.

In appendicitis there is no well-defined tumour, at first at least, but the pain and distension may be so great, when first seen, as to make the determination of this difficult. In these cases it is well to regard the attack as due to ovarian disease, which is more common in pregnancy than appendicitis. Exploratory laparotomy is not only legitimate but advisable. Should it prove to be appendicular no harm will result.

Torsion of Pedicle.—The symptoms produced by torsion of the pedicle of an ovarian tumour during pregnancy depend more on the rate than on the degree of the twisting. Considerable twisting may exist, if slowly produced, without any

¹ Mundé, *Amer. Gynecol. Trans.*, 1897, vol. 22.

evidence of disturbance, but more usually there is some discomfort or pain in the region of the tumour, which will be found tender on pressure. In chronic torsion the pain is of a dull, aching character, marked, it may be, by exacerbations, which are sometimes described as resembling the pains of labour. The woman's health is unaffected. The pain gradually disappears, but may recur at intervals during pregnancy.

In subacute torsion the attack is more sudden and severe in its onset, but constitutional symptoms are at first absent or slight. Pain, severe at the beginning, is soon replaced by a dull ache; chronic or subacute peritonitis supervenes, and the temperature may be elevated. In a few cases rigors have been noted. The symptoms last for a few days or for several weeks, in the latter case being usually intermittent. In the more severe forms the woman is usually confined to bed; her strength becomes much reduced, but pregnancy, as a rule, is not interrupted.

When torsion is acute the condition is much more serious. The woman is suddenly seized with violent pain in the abdomen, accompanied usually by vomiting. The pulse is small and quick. There is marked pallor from hæmorrhage into the cyst, which rapidly enlarges. The symptoms of pedicle torsion during pregnancy have been so well described by Cullingworth¹ that I shall state them in his own words: "Sudden, severe abdominal pain, followed by increase in the size of the abdomen and such extreme tenderness as almost invariably to give rise to the suspicion of general peritonitis. These symptoms are accompanied by vomiting and a greater or less degree of collapse. The surface is cold and moist, the features are pinched, the face is anxious, the urine is scanty, the pulse small, feeble and rapid, and the temperature is usually at first subnormal." He concludes that when these symptoms make their appearance

¹ Cullingworth, *Practitioner*, April, 1900.

during pregnancy, the possibility of their being due to twisting of the pedicle of an unsuspected ovarian cyst should immediately suggest itself to the mind of the practitioner in attendance.

The two conditions which most resemble this are rupture of a cystic tumour and acute appendicitis. The existence of a definite and rapidly increasing tumour would serve to distinguish torsion, though the diagnosis between the three conditions may be very difficult unless the patient is seen early before peritonitis has obscured the differential signs. Free fluid in the peritoneal cavity would point to rupture, a high temperature to appendicitis, the temperature being at first subnormal in cases of torsion. Aronson¹ attaches great importance in the diagnosis of torsion not only to the evidence of collapse, but to the repeated oscillations between febrile and collapse temperatures.

Rupture of Cyst.—When an ovarian tumour ruptures during pregnancy, the symptoms vary according to the character of the contents and according to the cavity into which the cyst opens. If, as rarely, it opens into the vagina, rectum or bladder, constitutional symptoms may be entirely absent, though as this occurrence is invariably the result of inflammation or suppuration of the cyst, symptoms of the latter may be found to have preceded rupture.

Rupture most frequently takes place into the peritoneal cavity. In simple cysts with non-irritating contents no trouble may be occasioned beyond a sharp burning sensation at the moment of rupture. In cases recorded by Schauta² and Mighels³ rupture occurred in two successive pregnancies which continued undisturbed to term. This is exceptional; usually peritonitis and premature labour result. In the case of dermoid or suppurating cysts the peritonitis is of a very virulent

¹ Aronson, *loc. cit.*

² Schauta, *Wiener Med. Blatt*, 1882.

³ Mighels, *American Journ. of Med. Sciences*, 1829.

character. Death may rapidly follow rupture. Of the cases of sudden death during pregnancy five were due to this cause.

The diagnosis of cyst rupture will rest on the onset of severe pain, accompanied by a sudden alteration in the shape of the abdomen, which is increased in its transverse but diminished in its antero-posterior diameter. In most cases there is collapse, the temperature being at first normal or subnormal. Signs of peritonitis soon appear.

Little difficulty will in general be experienced in the diagnosis if the case is seen early, and more especially if an ovarian tumour was previously known to exist. On examination of the abdomen no tumour other than the gravid uterus can be made out, unless, as may happen, the rupture affects only part of a multilocular cyst. Besides the alteration in the shape of the abdomen, the most important diagnostic point is the existence of fluid in the peritoneal cavity. For the accumulation of inflammatory exudate several days are required.

Cyst Suppuration.—Suppuration may take place in an ovarian cyst during pregnancy without any symptom to indicate its occurrence. There may be little pain and no rise of temperature. Fortunately, this insidious form of suppuration is exceptional. More usually the process is attended with fever, with wasting, and with pain due to localised peritonitis. The characteristic symptoms are fever and wasting.

The diagnosis of suppuration is of great importance, more especially so in late pregnancy, when temporising measures are more likely to be adopted than in the earlier months.

When fever and wasting are absent diagnosis is impossible, unless percussion reveals the presence of air in the cyst—a rare occurrence found only in suppuration. Anæmia and wasting without fever would suggest malignancy, but malignant tumours are more solid and rarely are cystic. Where tapping has been employed as a palliative measure and febrile symptoms

follow, suppuration may be assumed. For the diagnosis of suppuration in abdominal tumours aspiration should not be employed owing to the danger of peritoneal infection; in pelvic cysts, in which this danger is less, it may sometimes prove useful.

Apart from other complications of the tumour, the condition which most closely resembles suppuration is appendical abscess. The case already quoted¹ shows the difficulty in distinguishing between the two. As in either case operation is indicated the diagnosis is of less moment.

¹ See p. 65.

PROGNOSIS.

THE serious nature of the complication of pregnancy with ovarian tumour has already been alluded to. At the same time it has been seen that many women, the subject of this complication, may pass through pregnancy without any disturbance, and without even being aware of the existence of a tumour.

In a discussion that took place before the Obstetrical Society of London in October and in December, 1869, considerable difference of opinion was manifested as to the dangers attaching to pregnancy associated with ovarian disease. Braxton Hicks stated that "as far as his own experience went he had never seen any serious trouble occur, but thought that it would be highly desirable before coming to any definite conclusion to ascertain the percentage of cases in which serious trouble arose". Dr. Barnes, on the other hand, citing illustrative cases, expressed the opinion that during pregnancy "there was no security against some formidable catastrophe". Spencer Wells, who introduced the discussion in December, related several cases where ovarian disease and pregnancy had progressed and terminated favourably, but added, "I must regard these cases as exceptional, for I cannot remember one other case where pregnancy, complicated with ovarian disease, has gone on to its natural termination in the birth of a living child; or where, in consequence of non-interference, great suffering has not arisen during or after labour, or very grave danger from rupture or rotation of the cyst".

These views were the expression of individual opinions,

based on personal observation, which was necessarily limited. Since that time our knowledge of this complication has been so largely increased by the publication of cases that we are able to determine with a fair degree of accuracy the danger involved and "the percentage of cases in which serious trouble arose".

In attempting to place the prognosis for mother and child on a statistical basis, I would first draw attention to some sources of fallacy which must be kept in view. To begin with, an analysis of published cases is apt to exaggerate the dangers, for the reason that the complicated cases are more likely than the uncomplicated to be placed on record. This, at any rate, is suggested by the unpublished cases which I have obtained. As an example, I may point to Dr. Bruce's case¹ of labour obstructed by a dermoid tumour in the pelvis, which remained unpublished for sixteen years, when I accidentally heard of it and obtained the details, which had fortunately been noted in a private journal. Again, many cases escape recognition. This seems a legitimate inference in those cases in which an ovarian tumour of considerable size has been first detected several months after an apparently normal pregnancy and labour. On the other hand, a study of the symptoms attending the puerperal complications of ovarian tumour, and of the circumstances in which ovariectomy was sometimes undertaken, will leave little doubt that death in the puerperium may not infrequently have been ascribed to puerperal infection when in reality it was due to an ovarian tumour which had undergone some complication. To some extent, then, these tendencies to error will correct each other.

When a woman, the subject of an ovarian tumour, becomes pregnant, the prognosis for the most part depends on how far the tumour escapes serious complication. Although complications are of frequent occurrence, it is seldom that even the

¹ *V.* p. 174.

most serious prove fatal before the termination of pregnancy, for the reason that peritonitis, which is in most cases the immediate cause, excites uterine action, the foetus being expelled before death ensues. Sir John Williams, in his series of 461 cases, notes only 5 deaths before the onset of labour, all the result of cyst rupture. Only one other instance occurs in our collection.¹

The infrequency of a fatal termination during pregnancy inadequately represents the dangers, for it will be found that many of the deaths which took place after labour were attributable to causes originating in pregnancy. But before proceeding to inquire into the risks associated with or dependent on the pregnant condition it may be well to consider the general mortality of the complication.

The early collection of Jetter shows a maternal mortality of 64, or almost 30 per cent. in 215 pregnancies. This corresponds to the time when ovariectomy was in its infancy, and, during pregnancy, unknown. Though of little value in enabling us to determine the dangers under the newer methods of dealing with the complication, Jetter's results furnish us with a means of comparison, and are the measure of the mortality where the cases were left to nature or palliative measures were adopted; and this is the more valuable from the fact that so many cases escape recognition, or are detected only on the onset of some serious complication.

The statistics of Heiberg, which correspond to the twenty years following the publication of Jetter's *Dissertation*, show a marked improvement in the mortality—the result of a partial adoption of operative measures. In his 271 pregnancies there were 66 deaths, or a mortality of 24·3 per cent. So recently as 1897, Sir John Williams, in an analysis of 461 pregnancies,

¹ Cases in which death occurred after ovariectomy without interruption of pregnancy are not included.

found a maternal death rate of 25·1 per cent., a rate which suggests that Jetter's cases are included in his collection.

In our total series of 1,290 pregnancies I find that 198 deaths occurred, or 15·3 per cent.; but owing to the totally different principles which governed the treatment at different times these figures are not of much practical value. With a view to determine the prognosis under the methods at present employed, I have separated and analysed the cases which have been reported since 1890. The division is an arbitrary one; and there is little doubt that several cases are included which belong to an earlier time, but where no date is given in the report these must be accepted as falling within the period selected. No fewer than 543 cases have been recorded in this comparatively short time—a number so large that we are forced to the conclusion that the association of pregnancy with ovarian tumour is not so rare as was supposed. In these 543 cases only 34 mothers died, or 6·2 per cent., a remarkable result when compared with the mortality of the earlier collections. A glance at the accompanying table will show to what this improvement is chiefly due.

CASES OCCURRING OR PUBLISHED SINCE 1890.

	Recovered.	Died.	Mortality.
			Per Cent.
299 cases of ovariectomy in pregnancy . . .	289	10	3·3
94 cases of labour obstructed by a pelvic ovarian tumour	85	9	9·5
150 cases of abdominal tumour not operated on during pregnancy	135	15	10

It will be seen that the removal of the ovarian tumour during pregnancy is the most important factor. This was carried out in 299 cases—or considerably over half—with a mortality of only 10, or 3·3 per cent. Of the 244 cases in

which no treatment was attempted during pregnancy, 24 of the mothers, or nearly 10 per cent., died, but this number would have been greatly increased if operative measures had not been undertaken during labour, or on the onset of complications in the puerperium. Post-partum ovariectomy has had an important influence in reducing the mortality, and has saved many women who would otherwise undoubtedly have perished.

It may be noted that the mortality in the case of tumours situated in the pelvis during labour is less than where the tumour occupied the abdomen. This is the reverse of what we find in the total series. There are two reasons for this. One is to be found in an improved management of the former class of cases. The other is that abdominal tumours are apt to escape detection till the onset of some acute complication. We have here another proof of the importance of early diagnosis.

Such then is the mortality in cases of ovarian tumour complicating pregnancy, and to borrow the words of Sir John Williams it is the "record of a mortality that is appalling in childbed". A closer examination of the results reveals the fact that in the majority of cases death was due to changes or injuries which the tumour sustained during gestation, or more usually in the course of labour or the puerperium.

The share which pregnancy itself bears in this mortality is not inconsiderable, nearly 25 per cent. of the total deaths being due to causes traceable to gestation.

While the mortality of this complication of pregnancy is thus great, it cannot be regarded as the full measure of the danger to which the woman is exposed. In a larger proportion of cases trouble of a more or less serious character arose, but recovery took place either spontaneously or, more usually, as the result of operation. The frequency with which this may be expected has already been mentioned, and if

reference is made to the section dealing with the influence of pregnancy on ovarian tumour, it will show that a complication of one kind or other may be anticipated during gestation in 1 out of every 4, or, if we include malignant disease, in almost 1 out of every 3 cases which are treated expectantly. No period of pregnancy is exempt from this possibility, though complications are more likely to be met with in the intermediate months.

The tendency of all these complications is to lead to a fatal issue, but the interval which elapses before death ensues is variable. In some cases it may be weeks, in others only a few days, though a few instances of almost instantaneous death have been recorded. The importance of this lies in the fact that the danger may usually be averted by operation, which has rescued many women from otherwise inevitable death. The earlier the operation is undertaken the more favourable are the prospects of success. At the same time the records of ovariectomy, post-partum more particularly, show that a successful result may attend operation performed after an interval of several weeks, but, as a general rule, it may be said that the prognosis of the various complications depends on the promptness with which they are recognised and operated on.

The most rapidly fatal of the complications is rupture, and more especially rupture of a suppurating cyst, into the peritoneal cavity. It has been mentioned that all the cases of sudden death during gestation were due to this cause. Of 22 cases in which rupture occurred during pregnancy 15 recovered, and 7, or 31·7 per cent., were fatal. Of the former 5 were operated on, but in none of the fatal cases was an operation attempted.

Suppuration is little less serious than rupture, from the tendency to cause adhesions and from the liability of the cyst wall to give way either spontaneously or during operation. Of 16 cases in which suppuration occurred, 5, or 31·2

per cent., were attended with a fatal result. Of the 5, 3 were operated on, 1 in pregnancy, 2 in the puerperium. One of the great dangers of suppuration lies in its insidious character. Symptoms may be absent or so slight that they do not seem to demand investigation, and the tumour may thus escape detection till rupture occurs.

Twisting of the pedicle is, from its frequency, the accident most to be apprehended during pregnancy. It is a dangerous condition, in its acute form more particularly. Of the 64¹ cases of torsion in pregnancy 52 recovered, but a fatal issue was often prevented only by operation. Indeed, torsion is, of all the complications, the most amenable to operative measures. In the tables of ovariectomy in pregnancy cases will be found in which operation has not only saved the mother, but prevented the otherwise inevitable interruption of gestation.

We may now inquire as to how far the prognosis is affected by the size, site and character of the tumour. It is generally thought that the larger the tumour the greater the danger, a belief which has often led practitioners to advise an expectant treatment in the case of tumours of small size. There is certainly greater pain and discomfort when the tumour is large, but that the danger of serious complication is greater does not seem to be borne out by the actual facts. To begin with the small tumours usually occupy the pelvis, but apart from this danger they are seen to have an equal liability to complication. Among the cases more recently published I find 12 which occupied the abdomen, and are described as from the size of a hen's egg to that of a large orange. Five of these terminated without any serious symptom to the mother, but in 3 early abortion occurred. In the remaining 7 an acute complication supervened, 4 times in pregnancy, during which the

¹ Heiberg's cases included.

tumour was removed by laparotomy, 3 times in the puerperium, 1 proving fatal, while 1 was only prevented from a fatal termination by operation. With these figures compare the results of 10 cases—in the same period—in which the tumour is described as “very large” or “enormous”. Six of these gave rise to serious symptoms, while the remaining 4 were attended merely with the discomfort due to distension. The comparison shows that the dangers attaching to the small tumours are at least as great as to tumours of large size. At the same time the former are not exempt from troublesome symptoms during pregnancy.

While thus in pregnancy the small tumours involve equal danger, during delivery they are even more to be feared from the tendency which they have to occupy the pelvis and obstruct the parturient passage. The increased risk is seen from the following comparison. In the case of tumours in the pelvis during labour the mortality is 24·5, while, as has been noted, the general mortality is only 15·3 per cent. Large tumours seem but little more liable than the small to cause abortion.

The situation of the tumour influences the prognosis. During pregnancy abdominal tumours are more dangerous owing to their greater liability to torsion of the pedicle and to rupture into the peritoneal cavity. One of the chief dangers of tumours in the pelvis lies in the fact that they are more likely to escape detection till the onset of labour. It will be seen later that their removal during pregnancy is in no way more hazardous than in the case of abdominal tumours.

The character of the ovarian tumour is not unimportant. Those of a malignant nature constitute a more serious complication. The fact, which has already been noted, that tumours of this character may be found without any symptom to suggest malignancy must be kept in view in forecasting the issue to the patient or her friends; but even malignant tumours have been successfully removed, and a permanent cure effected. Again,

dermoid tumours are more dangerous than simple cysts, and for the reasons which have already been given, namely, their greater tendency to occupy the pelvis, their increased liability to peritonitic inflammation, and their proneness to suppuration. The irritating character of their contents makes spontaneous rupture of dermoids exceptionally dangerous, and renders their rupture during operation a thing to be guarded against.

So far I have said nothing in regard to the prognosis for the child. I will now inquire to what extent the life of the child is endangered by the complication of pregnancy with ovarian tumour.

The statistics of Jetter show that 76 out of 216 children perished, and that 86 were born alive, while the fate of the others is not mentioned in the reports of the cases. The known mortality is thus 36 per cent. In Heiberg's cases we find the fate of the child noted in 219, and of these 66 died, 24·3 per cent. of the total number of pregnancies, or 30 per cent. of those in which the result for the child is given. In our total series it is noted that 711 of the children were saved, and that 350 were still-born or died soon after birth, a mortality of 27 per cent. of the whole, or nearly 33 per cent. of those in which the result is stated. Taking the more recent cases, I find that in those published during the last twelve years 61 per cent. of the children survived, while the known mortality is less than 20 per cent. Of the 111 cases in which the issue for the child is not recorded the great majority were instances of post-partum complications in which the labour is stated to have been normal, so that it is probable that if the fate of the child could be ascertained, the mortality would be found to be further diminished. It is clear then that recent methods of treatment have done much to rob this complication of its dangers for the child as well as for the mother.

The causes which contribute to the death of the child in

this complication of pregnancy are various. The most common is premature interruption of the pregnancy, and the frequency with which this occurs under the influence of ovarian tumour has already been shown. It is reasonable to assume also, though no distinct evidence can be adduced, that in the case of large tumours the children suffer somewhat in their intra-uterine development, and at birth, as in twins, have less resisting power. Another factor in the foetal mortality is to be found in the more tedious character of the labour. As this protraction is greatest in the case of tumours situated in the pelvis, it is to be expected that the foetal death rate will in these cases be higher. In a series of 263 cases nearly half of the children perished.¹

The more important deductions from the above inquiry may be briefly summarised :—

1. "When an ovarian tumour complicates pregnancy, the life of the woman is imperilled throughout the whole of the term."²

2. The danger lies mainly in the liability to complications having their origin in the tumour.

3. During gestation some complication is to be anticipated in 1 out of every 3 cases.

4. Small tumours are as dangerous as those of larger size.

5. As the frequent latency of ovarian tumour constitutes one of its dangers every untoward symptom occurring during pregnancy should be carefully investigated.

6. Early recognition is the best safeguard against complications and is an important element in the prognosis.

7. If the tumour is recognised and operated on before the onset of a complication, the prognosis for the mother is little, if at all, greater than in ovarian tumour apart from pregnancy; at the same time the prospects of the child are improved.

¹ See p. 180.

² Bland-Sutton, *Lancet*, 1901, vol. i.

TREATMENT OF OVARIAN TUMOUR IN PREGNANCY.

THE treatment of pregnancy complicated with ovarian tumour has within recent years undergone remarkable changes, the history of which forms an interesting chapter in obstetric medicine. On the evolution of these changes it is unnecessary to dwell. At the same time it must be noted that recent literature on this subject, as well as the latest recorded cases, bear evidence that the transition stage has not been passed, and that the views which experienced observers have been led to adopt have not as yet received general adherence ; and that, though the treatment in vogue little more than twenty years ago has been largely superseded, the relative value and scope of the newer methods are still far from being definitely determined. To place the treatment on a more settled and scientific basis by a study of published records and of the views from time to time expressed by obstetric authorities is one of the objects of this work.

Obstetric writers in the early part of last century either ignore this complication or confine themselves solely to the consideration of the treatment during labour. The few who refer to the management during pregnancy recommend interference only where, from overdistension, urgent symptoms are produced. This attitude need not be wondered at, when it is recalled that the treatment of ovarian disease, uncomplicated with pregnancy, was entirely palliative, and may be fairly described in the words of Hunter, "that the dropsy of the ovarium is an incurable disease, and that the patient will

have the best chance of living longest under it who does the least to get rid of it ”.

In a discussion which took place in the Obstetrical Society of London in October, 1869, on the complication of pregnancy with an ovarian tumour, the president, Graily Hewitt, in summing up, remarked that “ with reference to the general question of the proper treatment of cases of this kind, he inferred from what had been said that the feeling of the society would be in favour of inducing premature labour whenever the size of the ovarian tumour was such as to render it likely that the labour would be interfered with to a serious degree by its presence at full term ”.

It is curious to note that, of all those who took part in the discussion, Dr. Wiltshire alone referred to ovariectomy as a possible treatment. At a subsequent meeting in the same year Spencer Wells narrated two successful cases of ovariectomy during pregnancy from his own practice, at the same time citing a few cases in which the operation had been done by others. At that time, as in his work on *Diseases of the Ovaries*, published three years later, Spencer Wells advised operation only in the presence of a serious complication or in the case of tumours unsuited for tapping. In large single cysts he recommended puncture and withdrawal of the fluid, remarking that “ there is no proof that tapping an ovarian cyst is more dangerous during pregnancy than at any other time ; and it will generally afford immediate relief to distension at a very slight risk to the mother, and lead to the natural termination of pregnancy in the birth of a living child ”. Previous to the discussion on Spencer Wells’ paper a series of cases was presented by Braxton Hicks with the view of showing that ovarian disease and pregnancy may in most cases be safely left alone.

A further advance towards the present position is to be observed in a paper on “ Ovariectomy during Pregnancy,” contributed in 1880 by Dr. Wilson to the American Gynecological

logical Society. The writer, after contending for ovariectomy in urgent cases, in preference to any of the other methods, concludes, "Tappings and expectant treatment will not, in my opinion, produce so good results as prompt removal of the ovarian tumour under antiseptics". This view was not allowed to pass without criticism. Several of the speakers raised a note of warning, which showed that the older methods had still strong advocates; indeed, each of them was in turn recommended, and, save that ovariectomy received a larger support, the discussion was practically a reflex of that which took place in the Obstetrical Society of London eleven years before. The meeting derives interest and importance from the fact that it was presided over by the greatest of American gynaecologists, Marion Sims. In summing up he remarked, "I am satisfied that we should not interfere when the tumour is small, no larger perhaps than twice the size of the foetal head, but when it becomes larger I believe that operative procedures are the safest course to pursue".

It will be seen, then, that so late as 1880 opposite opinions were held as to the treatment which should be adopted when an ovarian tumour complicates pregnancy. In a condition so rare experience accumulates slowly, but with the introduction of antiseptics and an improved technique, the advantages of ovariectomy over all other methods became year by year more and more apparent, till it is now the opinion of almost all obstetric authorities that immediate removal of the tumour is not only the soundest treatment but is even more urgently called for than in the case of uncomplicated ovarian disease.

The records of pregnancy with ovarian tumour are now sufficiently numerous to enable us to compare the results obtained by the various methods which from time to time have been employed, and to determine whether the superiority claimed for ovariectomy rests on a basis of fact. Hitherto the

welfare and safety of the mother have been the primary object of treatment, and have formed the test of success, but in this condition the obstetrician cannot forget that an additional factor—the existence of a living child—is introduced, as compared with uncomplicated ovarian disease. Though the life of the mother must be our first consideration—save where we are dealing with intractable malignant disease—that method will be the best which most tends to conserve both lives. To this practical test I propose to submit those measures which, up to the present time, have held a position of recognised utility, namely, non-interference in the absence of urgent symptoms, tapping the tumour, the induction of premature labour, and ovariectomy.

NON-INTERFERENCE.

THAT many patients the subject of ovarian tumour pass through pregnancy and the puerperal period without inconvenience, and even in the case of large tumours without much apparent danger, has been seen. This fact, not unnaturally, led many authorities to advise non-interference in the absence of troublesome or dangerous symptoms. Indeed, till recently this expectant method claimed the largest number of supporters. At the present time, though largely discarded, it is advocated under certain circumstances in most text-books. Playfair, for example, in the last edition of his *Treatise on Midwifery*, states that "the question of interference will only have to be considered with regard to the large tumours";¹ while Galabin, in the fourth edition of his *Manual*, issued in 1897, leaves it to be inferred that active measures are to be resorted to only where troublesome symptoms demand: "In the case of a tumour likely to require interference before the end of pregnancy, the choice will be between ovariectomy, induction of premature labour or abortion, and tapping the tumour".²

In an American text-book of gynaecology, just issued, a similar attitude is adopted. The author dismisses the whole subject of treatment in a single sentence. "In the early months of the pregnancy operative interference for the removal of the tumour has but little influence on the progress of

¹ Playfair, *The Science and Practice of Midwifery*, ninth edition, 1898, vol. i., p. 273.

² Galabin, *A Manual of Midwifery*, fourth edition, 1897, p. 390.

the pregnancy, and should be considered whenever the size and situation of the growth threaten the successful termination of the pregnancy."¹

That the older methods are still recommended in text-books, in which traditional views are but slowly abandoned, is scarcely to be wondered at, but it is surprising to find that so eminent an obstetrician as Fehling advocates expectant treatment in preference to operative interference. At a meeting held at Aix-la-Chapelle in 1900, at which the subject of pregnancy with ovarian tumour was discussed, he expressed the opinion that, unless the indications were pressing, ovariectomy was not justified on account of the great risk of abortion or premature labour.

There is another aspect of this question, however, which the practitioner may have to face, namely, that patients may be met with who refuse to submit to operation, or whose distance from a practised operator leads them to prefer expectant treatment in full knowledge of its increased risk.

In view of these considerations it becomes necessary to ascertain the dangers which non-interference involves, and for this purpose there is ample material at our disposal. It will be shown that, apart from the discomfort due to distension or to slight peritonitic attacks, serious trouble is likely to arise during pregnancy or the puerperal period in at least one out of every two cases which are treated expectantly.² These do not necessarily prove fatal, but they entail risks which have been referred to, and, in a large proportion of cases in which the complication arises during gestation, lead to the death of the child.

In 720 of our cases, or considerably over half, pregnancy was allowed to run its course without interference. Of the

¹ Montgomery, *Practical Gynecology*, 1903, p. 753.

² See p. 231.

mothers no fewer than 152 died, or over 21 per cent. This mortality, high though it be, would have been greater but for operation undertaken during labour, or necessitated by the occurrence of an acute complication during or immediately after the puerperal period. Of the children at least 30 per cent. perished, but many of the reports make no mention of the fate of the child, otherwise, there can be no doubt, this death rate would be increased.

These figures suggest the important practical question of whether in any circumstances expectant treatment is to be advised. There are authorities who still recommend non-interference where no symptoms exist, and where it is believed that excessive distension will not be produced before the end of pregnancy. With many, again, it is the rule to advise expectant treatment in the case of small tumours which remain stationary in growth, or increase but slowly during pregnancy, on the ground that tumours of small size are comparatively free from danger. It has been shown, however, that small tumours, besides tending to obstruct delivery, are as liable to serious complications as those of large size.¹

A difference of opinion is manifest also in regard to the treatment which should be adopted where an ovarian tumour is first detected towards the end of pregnancy. A few urge removal, but the majority seem disposed to regard operation as unnecessary, in the belief that there is little likelihood of trouble arising in the remaining period of gestation. To some extent this is true, though the later months are not exempt from complications; but even if pregnancy be safely passed, there is still the more dangerous periods of labour and the puerperium. Every patient is not so fortunate as in a case reported by Dr. Jardine,² in which symptoms of torsion occurred in the eighth month of gestation. As the symptoms

¹ See p. 76.

² *Glasgow Medical Journal*, vol. liv., 1900.

had passed off before he saw the woman he decided not to operate. The woman was safely delivered at term, and made a good recovery. In contrast to this I may select from several instances a case mentioned by Battey.¹ A woman was found in the fifth month of pregnancy to have a moderate-sized multilocular ovarian cyst. Battey was inclined to operate, but ultimately decided that it was safe to allow her to go to term. She passed through pregnancy without trouble, but died shortly after labour with symptoms of cyst rupture.

It may be well here to anticipate an argument which might be advanced by the advocates of non-interference—that, in the event of a complication supervening, the danger would be removed by immediate operation. In many cases it has been so, but the risks of operation are greatly increased in the presence of an acute complication. In several of the cases of post-partum ovariectomy it will be found that the condition of the woman at the time of operation was such as to cause the greatest anxiety as to the result. That fatal symptoms may develop with such rapidity that the patient's condition is hopeless before operation can be undertaken is shown in a case recently reported to the Obstetrical Society by Professor Spencer.²

Case XIV.—A woman, twenty-eight years of age, had an ovarian tumour which had been known to exist for two or three years. She had refused to have it removed. She became pregnant, and during pregnancy the abdomen was enormously distended, but the labour took place without difficulty, and the progress of the patient was quite satisfactory until the third day, when the cyst ruptured and the patient became collapsed. She was removed to hospital, but died of syncope immediately after admission. Dr. Spencer remarked that this case showed “the advisability of removing all large ovarian tumours

¹ *American Gynecol. Trans.*, vol. v. ² *Obstet. Trans.*, vol. xliii., 1901.

at whatever period of pregnancy they are discovered, and the danger of delay in removing them after labour”.

Sufficient evidence has been adduced to show that there is “no security against some formidable catastrophe,” while a comparison of the effects of non-interference with the results of ovariectomy during pregnancy leaves no doubt of the greater safety of the latter.

The facts which have been presented permit of but one conclusion, namely, that the occasions in which non-interference is to be advised are few, if, indeed, they exist, and that an expectant treatment should be limited to those cases, fortunately rare, in which the woman refuses operation, or where from exceptional difficulties attending ovariectomy in the later months, such as uterine adhesions, she desires to run the additional risk in preference to endangering her offspring. If for either of these, or for other reasons, interference be decided against, it becomes the duty of the medical man to exercise a close supervision of the case. The onset of torsion and of suppuration is often insidious and marked by ill-defined symptoms. When the tumour is small an examination must be made at intervals to ensure that it has not descended into the pelvis. If found in this situation it must be elevated. Should reposition be impossible, it should be represented to the patient that an operation is imperative.

TAPPING.

TAPPING an ovarian tumour, so common a procedure before and in the early days of ovariectomy, has now been practically discarded. At best it is only a palliative measure, while it carries with it certain well-recognised dangers, besides tending to render more difficult the subsequent removal of the tumour. In pregnancy, however, there are circumstances in which it may have to be undertaken, and in which it may be, on the whole, the best treatment to adopt when consideration is had to the life of the child as well as to that of the mother.

Though seldom curative, tapping rapidly relieves distressing symptoms at little risk to the mother, while it usually allows pregnancy to run its course in comfort. The objections to it are the same as in the non-pregnant, namely, that it may permit the escape of cyst fluid into the peritoneal cavity with resulting inflammation, that it may cause adhesions which make ovariectomy more difficult, and that it predisposes to suppuration of the cyst, to rupture, and also, as seen in the cases of Veit and Thornton, to torsion of the pedicle. In uncomplicated ovarian tumour nothing is to be gained by tapping, as the tumour must sooner or later be removed; but in pregnancy there is a different problem, arising out of the fact that the child as well as the mother must be considered. It is the duty of the practitioner to select the method of treatment which is likely to give the best result for both. The problem is one that is not always easy of solution. Though in each case the treatment must be determined by the existing

circumstances, it will help us to a decision if we examine the results which tapping has given in the past.

The earliest investigation into the results of puncture was made by Cohnstein,¹ who collected 22 cases in his paper on "Surgical Operations in Pregnancy". In 15 labour took place at term, in 3 during the ninth month, in the others from the fourth to the sixth months. Deducting 2 cases in which the pregnancy was multiple, he found that interruption of pregnancy occurred, as the result of puncture, in 4, or 18·1 per cent. One puncture sufficed in 11 cases, and the quantity of fluid removed varied greatly. In 1 case iodine was injected. Cohnstein finds that "the repetition of the operation shows no distinctly unfavourable influence on the pregnancy, although interruption is relatively more frequent than after single evacuations". Where the punctures were repeated, however, the maternal mortality was higher, 5 of the 6 who died having been subjected to more than one operation; in the remaining fatal case iodine was injected. While the maternal mortality in Cohnstein's series was 27 per cent., the results in regard to the child were relatively good.

I find that in 51 of our cases tapping formed the sole treatment. It was usually followed by great relief of the distressing symptoms, and in most cases allowed the pregnancy to proceed with comfort and to terminate in the birth of a living child. Of the mothers 12 died, or 23·5 per cent.; in 10 the fatal result was preceded by abortion or premature labour. The fatal cases would have been more numerous had not the inflamed or suppurating cyst been removed during the puerperal period. In only about one-third of the cases did one tapping suffice.

As a direct or indirect result of the tapping, abortion or premature labour occurred 15 times, twice being due to injury

¹ *Klinischer Vorträge*, Volkmann (*Gynäkologie*, No. 20), 1872.

to the uterus; in the remaining cases, with two exceptions, the children seem to have been born alive.

The operation was followed by suppuration of the cyst in at least 11 cases, and probably in others which proved fatal, but in which the records do not state the cause of death. These do not, however, constitute all the cases in which suppuration followed tapping. Besides the above 51 cases tapping was employed in 24 others, but was followed by further treatment during pregnancy, usually ovariectomy. In 4 of these suppuration occurred, in 2 rupture, and it is necessary to include these in endeavouring to ascertain the risks of the operation. We thus find that suppuration or rupture followed tapping in at least 23 per cent. of the cases. Where ovariectomy had subsequently to be undertaken during pregnancy, whether for suppuration or not, the mortality was high (25 per cent.), while only 7 out of 24 children were born alive.

The results yielded by tapping will be found to be very unfavourable when compared with those of ovariectomy during pregnancy; but it must be borne in mind that the comparison is not a fair one, and for two reasons. First, the majority of the cases belong to pre-antiseptic times, which accounts for the large number of cases in which suppuration followed. Better results might be anticipated under present aseptic methods. Secondly, tapping is limited to a small class of cases in which the tumour is so large as to cause distressing symptoms and in which operative removal during pregnancy would be attended with greater difficulty than usual. Discounting these facts, I am satisfied that tapping is attended with as much direct risk as ovariectomy, while the woman is still left with the tumour, which will ultimately demand removal in circumstances nowise more favourable. Unless then it can be shown that tapping gives the child a *better* chance, it must give place to ovariectomy. What are the facts? It is usually stated, in considering the effects of this operation, that the

pregnancy terminates in the birth of a living child, but when we examine the results more closely we find that, of the 75 cases in which it was employed, 34 of the children, or over 45 per cent., were lost. On the other hand, among the cases of ovariectomy in pregnancy, which were not first treated by puncture, are 11 in which the tumour is described as very large or enormous. The operations were performed from the third to the seventh months of gestation. All the mothers recovered, while of the children, if we deduct one case in which abortion was threatening at the time of the operation, just one half were born alive. It will thus be seen that even in those cases specially suited for tapping, the major operation saves almost as many children, and gives not only better immediate results for the mother, but at the same time relieves her of her diseased ovary.

Though thus proved to be less successful than ovariectomy, tapping will continue to occupy a place in the treatment of pregnancy complicated by a large cystic ovarian tumour. The practitioner, as has often happened, may not be consulted till late in pregnancy, when the surroundings and position of his patient make immediate operation impossible, or, again, may find his advice in regard to ovariectomy disregarded. Palliative measures will then have to be adopted, and as tapping is the most important of these it may be well if I summarise the conclusions to which the above facts lead:—

1. Tapping does not give so good results for the mother as ovariectomy, no matter what the period of pregnancy or the size of the tumour.

2. For the child the results are less favourable in the early months; little, if at all, more favourable in the later months.

3. With few exceptions, the radical operation should be preferred.

4. Where extensive uterine adhesions are believed to exist tapping gives the child, in the later months at any rate, an improved chance of life.

5. When the circumstances of the patient, or her decision, prevent operation, tapping will relieve the distressing symptoms which arise in the later months.

6. Tapping should be employed only to relieve symptoms *due to distension*. When inflammatory symptoms occur in the cyst ovariectomy should be performed at once.

7. Tapping is most likely to be successful in the case of simple cysts. It should never be advised when the tumour is in large extent solid.

8. The two great dangers of tapping are :—

- (a) Suppuration of the cyst cavity : this should be guarded against by antiseptic precautions.
- (b) Injury to the uterus : with care this can be avoided ; when the uterus cannot be defined by palpation, the area of the foetal heart sounds may guide us as to its position.

INDUCTION OF PREMATURE LABOUR.

WHILE there is evidence that the treatment of pregnancy with ovarian tumour by the induction of premature labour is practically abandoned, only three cases having been recorded in the last twenty years, there is still to be found in many of the standard works on midwifery, to which the practitioner looks for guidance, an echo of the teaching of Barnes. At the meeting of the Obstetrical Society which pronounced in favour of this method, Barnes,¹ who was its strongest advocate, remarked that "the rapidly increasing pressure must at some time cause such distress that relief must in some way be obtained. In most of the cases he had seen this relief was found in the advent of spontaneous premature labour. He thought we should accept this indication as a guide in practice." In the second edition of his *Lectures on Obstetric Operations*, which appeared in 1871, he still more strongly affirms this view, stating his reasons in the following propositions: First, in a large proportion of cases Nature solves the problem, takes the case into her own hands, and finds relief by the spontaneous induction of premature labour. Secondly, in another series of cases, where labour has been induced artificially, immediate relief and safety have been attained. Thirdly, in another series, where labour has not occurred spontaneously or been induced by art, formidable catastrophes and even death have happened.

An analytical study of our cases fails to support these assertions. As a matter of fact we find that the cases in which

¹ Barnes, *Obstet. Trans.*, vol. xi., p. 201.

Nature solves the problem by spontaneous premature labour are relatively infrequent. Heiberg in his collection found only 16 instances, while our own collection shows that premature labour occurred in less than 6 per cent. of the cases. Further relief and safety have not always been obtained by the artificial induction of labour, in proof of which I may refer to the cases of Hecker,¹ Säxinger² and Playfair.³

Seeing that the Obstetrical Society, in 1869, pronounced in favour of premature labour, a verdict which it has not yet in definite terms recalled, it is not difficult to understand how this practice continues to be recommended in several widely used text-books. Playfair, for example, while inclining to ovariotomy as the best treatment, mentions the induction of premature labour as the alternative, indicating that the selection of one or other must be determined by the skill and experience of the operator. "If the medical attendant has not gained that experience which is so essential for a successful ovariotomist, the interests of the mother would be best consulted by the induction of abortion at as early a period as possible." Galabin adopts the same attitude, giving ovariotomy, the induction of premature labour or abortion, and tapping as alternative methods of treatment without clearly defining the cases to which he regards each as applicable.

In this respect the profession has been wiser than its teachers. It is truly a curious commentary on the finding of the Obstetrical Society in 1869 that, notwithstanding the large number of cases since recorded, artificial interruption of pregnancy should have been undertaken in but 12—indeed, in only 11, if we deduct 1 in which abortion was criminally induced. In all, I find 30 instances in which this treatment was adopted, 5 being in consecutive pregnancies in the same patient.

¹ Hecker, *Monats. f. Geburtsh.*, Bd. vii., p. 98.

² Säxinger, Herdegen, *Dissert.*, Tübingen, 1876.

³ Playfair, *Obstet. Trans.*, vol. xix., p. 198.

Of these, 5 mothers died, or 16·6 per cent., but there were others in whom acute symptoms supervened after the uterus was emptied and in whom operation alone prevented a fatal issue or a protracted illness. Only 6 of the children were born alive, that is to say 80 per cent. perished. No doubt the mother's life must be our first consideration, but are the results in this respect such as to justify so excessive a foetal mortality? The maternal death rate is certainly smaller than that following the methods just considered, but more than double that of ovariectomy in pregnancy, while the woman is still left with her tumour which sooner or later will require removal.

The induction of premature labour has been recommended as a prophylactic measure, in the belief that the elimination of the pregnancy would remove the risk of complication. We have seen, however, that it is not the pregnancy alone that carries danger; there are risks incidental to the puerperal processes, at least as many and as great, which are not removed by this method.

As a palliative treatment it has been occasionally employed when there have been rapid enlargement and distension, but the relief which emptying the uterus affords is usually slight and of short duration. In many cases of spontaneous and artificial premature labour I find that there was little sensible diminution of the abdomen. The actual measurements have been given in a case reported by Williams,¹ who induced abortion in the sixth month, reducing the circumference of the abdomen from 52 to 47 inches. Again, it is expressly stated in not a few cases that, even after delivery at term, the size of the abdomen seemed to be unaltered, while there was little, if any, relief of the distressing symptoms. Olshausen refers to several such instances.

These facts are more convincing than the figures which we have quoted. Both combine to show that the elimination of pregnancy, when that condition is superimposed on an ovarian

¹ Williams, *Lancet*, 1878, vol. i., p. 381.

tumour, is a purely temporising method of treatment which almost certainly sacrifices the child without corresponding benefit to the mother.

Before stating the conclusions to which I have been led as to the value of premature labour I may refer to the following case recorded by Travers.¹

Case XV.—A woman was found during her second confinement to have an ovarian tumour, which to some extent obstructed labour. During her third pregnancy she was advised to have abortion induced with a view to the tumour being removed. She refused, went to term, and was delivered of a living child. She had three further pregnancies which terminated successfully and with no disturbance of the puerperium. In the fifth month of her seventh pregnancy acute torsion of the pedicle occurred. The tumour was removed, and gestation was uninterrupted.

An analogous case is to be found in the *Transactions of the Obstetrical Society*, in which premature labour was induced at the seventh month, on the advice of Barnes. The woman passed through three subsequent full-term confinements without any untoward result.

A review of all the facts confirms the opinion which is now almost universally held, and, for the most part, is expressed in recent works on Midwifery and Gynæcology, that premature labour is contra-indicated in the treatment of pregnancy with ovarian tumour. The exceptions to this rule are few, and are limited to the rare cases in which there is advanced malignant disease, or in which the conditions are such as to contra-indicate operative removal in simple ovarian tumour.

Where this treatment is resolved on, for whatever reason, it should be undertaken as early as possible, the hope of saving the child by delay being, as our figures show, illusory.

¹ Travers, *Lancet*, 1894, vol. ii.

OVARIOTOMY.

History and Early Operations—Investigations into the Effects of Injuries and Operations during Pregnancy—Previous Statistical Collections and Reasons for adding to these—Analysis of Total Series and of more Recent Cases with a view to ascertain the Prognosis for Mother and Child—Bilateral Ovariectomy—Vaginal Ovariectomy.

THE circumstances surrounding the origin and progress of ovariectomy during pregnancy form an interesting study, among other reasons for the light they throw on the accidental way in which important advances are sometimes made in practical medicine. Of this no better illustration could be found than the fact that the first six operations were all performed in ignorance of the existence of pregnancy. It is practically certain that operation would not have been undertaken had the real condition been recognised, so strong at the time was the belief in the danger of surgical interference during pregnancy.

The objections to operation were largely based on *a priori* reasoning. It was held that the physiological changes which accompanied pregnancy, more especially the altered and hydræmic condition of the blood and the increased arterial tension, were calculated to promote hæmorrhage and suppuration and to interfere with the progress of repair. It was further believed that the danger to the child—the danger of producing abortion—was so great as to contra-indicate any but the most urgent operations. These were the views that prevailed in the early days of ovariectomy and for some time after the operation had won an assured position. Ovariectomy

was then held to be unjustifiable during pregnancy, and this attitude would, without doubt, have been longer maintained but for the fortunate circumstance that the operation was several times undertaken in ignorance that the ovarian tumour was complicated by pregnancy. Unexpected success attended these operations, and in this way did much to remove the erroneous beliefs formerly entertained.

Although the abdomen had on previous occasions been opened during pregnancy with a view to extirpating a diseased ovary, the merit of performing the first completed operation must be ascribed to Burd¹ of Shrewsbury. On 15th September, 1846, he removed a multilocular ovarian cyst from a woman who was in the third month of pregnancy, though no suspicion of that condition had been entertained. Abortion followed two days after, but the woman recovered. Four years later Atlee² removed, in the second month, a large ovarian cyst which had been repeatedly tapped. Pregnancy, which was first diagnosed at the operation, was not disturbed, but the woman died one month after, apparently from persistent vomiting. We find no other case recorded till 1862. In that year Marion Sims,³ in removing a large ovarian tumour, found, to his surprise, that the uterus was enlarged and seemingly in the third month of gestation. The woman made an uneventful recovery, and the case is historically interesting as being the first in which the pregnancy continued to term and ended in the birth of a living child.

Spencer Wells,⁴ in his second case—the seventh recorded instance—appears to have been the first to perform ovariectomy *in full knowledge of the existence of pregnancy*. The operation, which was done on 14th August, 1869, was rendered necessary

¹ *London Medical Gazette*, 1847.

² *Diagnosis of Ovarian Tumours*, Case 63.

³ *Medical Times and Gazette*, vol. ii., p. 359.

⁴ *Lancet*, 1869, vol. ii., and *Obstet. Trans.*, vol. xi.

by rupture of the ovarian cyst towards the end of the third month of pregnancy. Though not undertaken for a fortnight after rupture the woman made a good recovery, and gave birth at term to a living child.

The next three years saw 7 further operations, making 14 in all, with a maternal mortality of 4, indeed of only 3 if we exclude Atlee's case, in which death resulted from causes independent of the operation, while 6 children were born alive—a most gratifying result in a disease for which, even when uncomplicated by pregnancy, treatment was only a few years before considered hopeless.

One important effect of these successful results was to awaken a doubt as to the truth of the belief, which we saw was almost universally held, that surgical operations of even a trivial kind were attended, during pregnancy, with special danger. Inquiry was stimulated, and medical literature was found to furnish many instances which showed that the pregnant uterus was markedly tolerant not only to severe bodily injuries, but to operations of a surgical character as well. Owing, however, to the prevailing prejudice against interference during pregnancy the significance of these had been overlooked.

The first investigation on the subject was published by Cornillon¹ in 1872 in a paper entitled *Des accidents des plaies pendant la grossesse et l'état puerpéral*. In the following year there appeared an elaborate statistical inquiry by Massot.² He collected 214 cases of accident or operation during pregnancy and found that in the greater number gestation was not interrupted. About the same time Cohnstein³ published a valuable paper in which he classified a large

¹ Cornillon, "*Des accidents des plaies pendant la grossesse et l'état puerpéral*," Paris, 1872.

² Massot, "*De l'influence des traumatismes sur la grossesse*," Paris, 1873.

³ Cohnstein, *Klinischer Vorträge*, Volkmann (*Gynäkologie*, No. 20).

number of operations of various kinds, undertaken during pregnancy. From an analysis of these he reached the conclusion that surgical operations less often interrupt pregnancy than allow it to run its course. In 54.5 per cent. of his cases labour occurred at term. In regard to the wound Cohnstein notes that, though first intention was rare and suppuration occasionally profuse, healing was not, as a rule, delayed.

An even more valuable contribution, in so far as we are here concerned, is to be found in a paper published by Dr. Mann¹ in the *Transactions of the American Gynecological Society* in 1882, on "Surgical Operations on the Pelvic Organs of Pregnant Women". Of 83 such operations he found that 16 only were followed by abortion, while 3 of the mothers died. He mentions an interesting case in which he performed Emmet's operation for lacerated cervix at the third month without interrupting pregnancy, which ended at term in the birth of living twins.

A further addition to our knowledge, and the last to which I shall refer, was made by Dr. E. Thoman² in a dissertation which appeared in 1889. He collected all the published cases of abdominal and other operations performed during gestation, and from an analysis of these was able to demonstrate the safety with which surgical operations of every kind might be undertaken in pregnant women.

These investigations did much to further the progress of ovariectomy in pregnancy, pointing as they all did to the same general conclusion, that, so far from being intolerant, the pregnant uterus is an exceedingly tolerant organ, and that pregnancy is of itself no contra-indication to any necessary surgical operation.

With the improvement in technique which resulted from

¹ *American Gynecological Transactions*, 1882, vol. vii.

² Thoman, "*Schwangerschaft und Trauma: zur Frage über die Zulässigkeit chirurgischer Eingriffe bei Schwangern*," Wien, 1889.

increasing experience in ovariectomy, and especially with the application of antiseptic principles, even more favourable results were soon obtained. Spencer Wells, more particularly, continued to operate during pregnancy as opportunity offered, and in 1877 was able to present to the Obstetrical Society a series of 9 cases operated on by himself, which resulted in the recovery of 8 of the mothers and the safe delivery of 6 children.

From this meeting of the Obstetrical Society may be dated the recognition of ovariectomy as a legitimate method of treatment in the case of an ovarian tumour complicating pregnancy and *causing or likely to cause troublesome symptoms*. To the latter limitation Spencer Wells himself subscribed, and did not then go the length of advocating a general adoption of ovariectomy. Before this position was to be reached experience had to be acquired and much opposition overcome. Gradually, however, as a rapidly growing number of successful cases were put on record, and as the danger of leaving the complication to nature became more fully recognised, the conviction gained strength that ovariectomy gave immediate results at least as good as any of the alternative methods, while at the same time it relieved the woman of her ovarian tumour.

The question was one that lent itself readily to statistical inquiry, and to this it was early submitted.

The first important collection of cases was made by Heiberg.¹ In 1881 he tabulated a series of 52 cases in which ovariectomy had been performed during pregnancy. In 6 of these the uterus was accidentally punctured, the child being at once removed by Cæsarean section in 4, with the result that all the mothers recovered, while in the other 2 cases abortion and death followed. Of the remaining 46 cases 38 mothers recovered, the fate of 1 not being recorded. The known maternal mortality was thus 17·3 per cent., while just one half of the

¹ Heiberg, *loc. cit.*

children were saved. In 29 cases where the operation was performed before the fifth month, Heiberg found a maternal death rate of 10·4 per cent. and a foetal of 37·9, while in 16 cases after the fifth month there was a maternal death rate of 25, and a foetal of 66·6 per cent.

In 1886 Olshausen,¹ in his classical treatise on diseases of the ovaries, records that the number of ovariectomies during pregnancy to be found in literature amounted to 82. In these a successful result as regards the mother was obtained in 74. He points out, however, that at least 2 of the deaths occurred in pre-antiseptic days, and that in 36 cases of ovariectomy performed by four experienced operators only 1 death occurred.

The next tabulated collection, and the most important hitherto published, is that of Dsirne,² who contributed a valuable paper on the subject of ovariectomy in pregnancy to the *Archiv für Gynäkologie* for 1892. A surprising diminution in the mortality is observed, as the result, no doubt, of more careful antisepsis and of improved methods. Moreover, the more general adoption of the operation favoured better results, as compared with those obtained when ovariectomy was performed only as a matter of necessity in the presence of some actual or threatened complication.

Dsirne's series shows a maternal mortality of only 5·9 per cent., while in only 22 per cent. of the cases did the operation cause interruption of pregnancy, a striking contrast to the results obtained by the older methods of treatment.

More than half of the operations, in which the period of pregnancy is stated, were performed in the third or fourth months. In 30 undertaken at the former period not a single maternal death occurred. As I propose, in analysing my own

¹ Olshausen, *Die Krankheiten der Ovarien*.

² *Archiv für Gynäkologie*, Bd. 43, Heft 3.

series, to make use of Dsirne's figures as a means of comparison, I need not further refer to them, beyond noting that his general conclusions as to the management of ovarian tumours in pregnancy accord, in the main, with those derived from my own collection, but that he was led by the limited number of his cases to formulate opinions which further observations do not entirely corroborate. This is more particularly the case in respect to the period of pregnancy at which operation may with greatest safety be undertaken.

In 1894 Gordon, of St. Petersburg, who dealt exhaustively with the subject, published an analysis of 204 cases. As all my efforts to obtain his paper have failed, I have had to content myself with a short *résumé* of his analysis. Several of his cases, which were published in Russian periodicals, have, I regret to say, proved inaccessible to me. Deducting 7 cases in which the uterus was wounded, and 21 in which the result could not be ascertained, Gordon found a maternal mortality in 176 cases of just over 9 per cent., while in 69·3 per cent. the pregnancy continued unbroken.

The records of ovariectomy performed during pregnancy are now so numerous and the claims of the operation, not only as a safe but as an imperative method of treatment, so well established that it may seem superfluous to add to the existing collections. I venture to do so on the ground that in our own literature there is to be found no tabular evidence of the results to which the practitioner might refer for guidance. It must be admitted, also, that Dsirne's series is too limited to settle all the questions that arise in connection with this complication.¹ For example, writing in 1896, after the appearance of Dsirne's paper and with Gordon's analysis before him, a late distinguished

¹ The above remarks were written before the publication of Orgler's paper in the *Archiv für Gynäkologie* of 1901. Before the paper came to my knowledge I had collected most of the cases which he tabulates.

surgeon in considering the advisability of operation observes: "A good deal of weight would be paid to the nature of the case. The points specially to be attended to in the case are: the rapidity of the growth of the tumour, the period of gestation, and the general condition of the woman. A tumour of rapid growth, discovered in *the early days* of pregnancy, *might* be removed, when another of slow growth, large, and possibly difficult of removal, might be tapped, particularly if the time of delivery were at hand."¹ Operation is here recommended only in exceptional cases, where a rapidly growing tumour is detected in early pregnancy. Statistics which will be submitted later show that these limitations should be discarded.

If further justification for reconsidering the subject were required, it will be found in a perusal of the histories of pregnant women with ovarian tumour. A study of these will not fail to convince one that the dangers of the condition are not fully realised, and that the absolute *necessity* for operation in almost all cases, though, as a rule, maintained by gynaecologists, has not been sufficiently brought home to the general practitioner under whose care the majority of the cases originally come. Many examples could be quoted from the cases occurring within the last few years where ovariectomy was considered, but rejected for quite inadequate reasons and sometimes with serious consequences, and this, too, even by experienced gynaecologists.

Since the publication of Dsirne's paper a surprisingly large number of cases of ovariectomy in pregnancy have been recorded. These, while in the main corroborating Dsirne's conclusions, furnish further interesting and valuable evidence in regard to the periods of pregnancy at which the operation may be safely undertaken, and also as to the gratifying success which has

¹ Greig Smith, *Abdominal Surgery*, sixth edition, vol. i., p. 182. The italics have been added.

attended the removal of both ovaries where that has been found necessary.

Altogether I have collected 345 cases, a few of which are of earlier date than Dsirne's publication, but were overlooked by him. Included in the series are several hitherto unreported cases which have kindly been communicated to me by the operators, and one which occurred in my own practice.

The cases are classified according to the month of pregnancy in which the operation was performed. Only those cases are tabulated which have been recorded since 1890,¹ but to make the series complete I have appended to each table the results of those, including Dsirne's, published previous to that date. The cases of vaginal and bilateral ovariectomy are arranged in separate tables.

Taking first all recorded cases we have a series of 480 ovariectomies performed during pregnancy. Of these no fewer than 451 recovered; 27 mothers died, while the fate of 2 is not stated. The maternal mortality is thus 5·6 per cent., only a fraction lower than the 5·9 per cent. of Dsirne's series; but at least 20 of the earlier cases, operated on before the introduction or general adoption of antiseptics, are excluded from his list. If we deduct the 5 of these which proved fatal, we have a maternal mortality of only 4·6 per cent. Moreover, an examination of the fatal cases, which I have tabulated separately,² reveals the important fact that in 2 death resulted from causes independent of the operation, in 2 the uterus was accidentally injured, while in 9 some complication or unfavourable condition existed which from the first rendered success doubtful. If these are deducted the fatal cases are reduced to 9, or under 2 per cent. This may be taken as the mortality of uncomplicated ovariectomy in pregnancy, and it compares favourably with the

¹ Three earlier cases, not in Dsirne's collection, are included in the table of bilateral ovariectomy.

² See p. 108.

results obtained in the operation apart from pregnancy. In 1896 Greig Smith,¹ while placing the mortality in the hands of surgeons of the greatest skill and experience at about 5 per cent., estimates that the actual death rate of all ovariectomy operations is still over 10 per cent. Burger² has recently published the statistics of 394 ovariectomies performed in Professor Schauta's wards during the last fifteen years. Although it is noted that every operation was performed as early as possible with aseptic precautions, the mortality came to 9·5 per cent.

The success of ovariectomy in pregnancy is made all the more surprising from the fact that the operations were not performed by a few skilled surgeons, but were distributed over a large number of operators. It would almost seem, indeed, that pregnancy diminished instead of increasing the dangers of ovariectomy.

The more recent cases yield even better results. During the last twelve years no fewer than 299 ovariectomies during pregnancy have been recorded. Although in many of these acute symptoms existed at the time of operation, only 10 of the patients died, or a mortality of 3·3 per cent. If these 10, which are placed at the beginning of the table of fatal cases, are examined it will be seen that in 2 the fatal issue was independent of the operation, while in a third, where the tumour was malignant, the woman died eight weeks after, the autopsy revealing metastatic deposits in the lungs, stomach and omentum. In 4 others the operation was performed in unfavourable conditions either of the tumour or of the woman herself. The first 3 may reasonably be excluded. This leaves 7 fatal cases in a series of 296 operations, or a mortality of 2·3 per cent.

These figures are sufficient to show that where no complication exists ovariectomy may be undertaken with almost absolute safety in all circumstances where it would not be contra-

¹ *System of Gynaecology*, Allbutt and Playfair, 1896, p. 873.

² *Monatsschrift für Geburtshülfe und Gynäkologie*, 1900.

FATAL CASES.

No.	Reference.	Diagnosis.	Complications.
1	Noble	Gravidity, iii. month	Successful operation, but criminal abortion induced, followed by sepsis.
2	Winter	Sarcoma of both ovaries: gravidity, iv. month	Abortion 5 weeks after operation: 3 weeks later death: section showed metastatic deposits in lungs, stomach, omentum.
3	Shauta	—	Pregnancy undisturbed when patient left hospital: died 3 months after, seemingly as result of chill.
4	Ahlfeld	Cyst: gravidity, iv. month	Pedicle twisted and cyst filled with dark reddish fluid: abortion on 6th day, death on 18th.
5	Pozzi	Cyst, month of pregnancy not stated	Torsion of pedicle: operation followed by abortion and death on 3rd day.
6	Lovrich	Cyst, suppurating: gravidity, v. month	Suppuration of intraligamentary cyst in pregnancy.
7	Mangiagalli	Cyst, suppurating: gravidity, vii. month	Peritonitis, with fever and vomiting at time of operation: Cæsarean section; death from shock on same day.
8	Cotterill	Bilateral cysts: gravidity, iv. month	Patient poor, half starved: ascites: both cysts markedly adherent: abortion on 2nd day, died 3 hours after; no peritonitis.
9	Konrad	Gravidity, iii. month	Abortion on following day.
10	Simpson	Dermoid, impacted in pelvis: gravidity, v. month	—
11	Atlee: <i>Diagnosis of Ovarian Tumours</i> , Case 63	Cyst, large: gravidity, ii. month	Cyst tapped in 1st month: good recovery from operation, but died 1 month after from hyperemesis, pregnancy being uninterrupted.

FATAL CASES (*continued*).

No.	Reference.	Diagnosis.	Complications.
12	Erschine Mason: <i>Centralbl. f. Gynäk.</i> , 1878, No. 13	Cyst: gravidity, v. month	Cyst previously tapped: at operation uterus punctured: wound sutured with catgut: abortion a few hours, death 18 hours after.
13	Pollock: <i>Lancet</i> , 1862, ii., 257	Multilocular cyst: gravidity, iv.-v. month	Cyst previously tapped: at operation uterus taken for another cyst and tapped: abortion followed by death on 2nd day.
14	Boye: <i>Gynäk. og Obst. Meddelelser</i> , Bd. 2	Cyst, suppurating: gravidity, iii. month	Cyst tapped in 2nd month: abortion on 4th day, tetanus on 10th, death on 15th.
15	Meadows: <i>Lancet</i> , 1873, i., p. 374	Cyst, large: gravidity, v. month	Abortion 28 hours after operation: death on 3rd day: peritonitis.
16	Thornton: <i>Trans. Path. Soc.</i> , 1876	Multilocular cyst: gravidity, v. month	Tapping followed by febrile symptoms: at operation cyst gangrenous.
17	Spencer Wells: <i>Obst. Trans.</i> , vol. xix.	Multilocular cyst: gravidity, vi. month	Enormous distension: cyst previously tapped: ascites: great emaciation: before operation, so ill that hardly expected to live 24 hours: abortion 6 hours after: death 7 days after.
18	Wachenheimer: <i>Dissert.</i> , Strassburg	Multilocular cyst: gravidity, vii. month	Very poor condition at time of operation: abortion on 3rd, death on 10th day.
19	Berry Hart	Dermoid, with twisted pedicle.	Good progress for a week, but on 9th day died of cardiac failure, pregnancy being undisturbed: frozen section showed another dermoid impacted in pelvis.
20	Mundé: in Dsirne	Gravidity, viii. month	Tumour adherent: premature labour followed by ileus and death.
21	Lee: in Dsirne	Malignant ovarian tumour	Death from septic peritonitis, pregnancy being undisturbed.
22	Krassowsky: in Dsirne	Tumour of ovary	No details.

indicated apart from gestation. It must not be imagined that pre-existing complications, though they tend to exercise an unfavourable influence on the result of the operation, by any means generally lead to a fatal issue. In many of the cases it will be seen that successful operations were performed at various intervals after the onset of some acute complication.

With results so favourable it seems scarcely necessary to inquire into the influence which the period of pregnancy exercises on the issue of the operation; but the reluctance often manifested to operate in the later months makes the question one of practical importance.

From his analysis Dsirne was led to the conclusion that operation in the second, third and fourth months gave the best results for the mother. From a study of the tables, and of the causes of death in the fatal cases, it will be seen that, *when the operation is one of election, and not compelled by some serious complication, almost equally good results may be anticipated for the mother at any period of pregnancy.* In the annexed table, in which the cases are analysed according to the period at which the operation was performed, not a single death is noted among the recent cases in four of the months, while 2 of the 7 fatal cases are in the third, and 3 in the fourth, or what have hitherto been regarded as the most favourable months. As will be seen from the table, of fatal cases, however, complications existed in 3 of the 5, while in a fourth, after a successful operation, criminal abortion was induced and followed by sepsis. In the case which proved fatal in the seventh month a suppurating cyst had ruptured, causing septic peritonitis, which necessitated the removal of the uterus.

PROGNOSIS FOR MOTHER AT VARIOUS MONTHS.

Total Series.				Recent Cases.			
Month of Pregnancy.	Number of Operations.	Maternal Deaths.	Percentage Mortality.	Month of Pregnancy.	Number of Operations.	Maternal Deaths.	Percentage Mortality.
2nd	42	1	2.4	2nd	28	0	0.0
3rd	111	6	5.4	3rd	62	2	3.2
4th	92	5	5.4	4th	62	3	4.8
5th	61	7	11.4	5th	41	2	4.8
6th	37	1	2.7	6th	22	0	0.0
7th	25	2	8.0	7th	15	1	6.6
8th	14	1	7.1	8th	7	0	0.0
9th	8	0	0.0	9th	7	0	0.0

So far then as the mother is concerned, ovariectomy gives results superior to those obtained by any other method of treatment. It remains now to consider whether it is equally favourable for the child. Dsirne found that in 22 per cent. of his cases pregnancy was prematurely interrupted. In our total series pregnancy was interrupted in about 20 per cent., if those cases are excluded in which abortion was threatening at the time of operation, and those in which the uterus was punctured. If we restrict ourselves to the tabulated cases, it will be seen that the effect on pregnancy is noted in 289, and that in only 54, or 18.6 per cent., was pregnancy interrupted and the child lost. None of the alternative methods of treatment, it has been shown, gives a foetal mortality of less than 30 per cent.

It is important to note that, of the 54 cases in which premature interruption followed, there were 4 in which abortion was threatening, or actually in progress, at the time of operation, 2 in which the ovum was previously blighted, 1 in which placenta prævia existed, 1 in which removal of the ovarian cyst was combined with the enucleation of ten subserous fibroids, and 1 in which death took place three weeks after abortion,

the post-mortem examination revealing malignant deposits in various organs. If these cases are excluded the number of interrupted pregnancies is reduced to 45, or 16 per cent. A further analysis will show that in 10 of the 45 some acute complication—torsion, suppuration, or peritonitis—existed, while in 1 the cyst was previously tapped, and in 4 the operation was prolonged and difficult from the existence of extensive adhesions. When no complication existed at the time of operation, interruption of pregnancy followed in only 30 cases—or just over 11 per cent. The conclusion seems justified, therefore, that *the risks to the child from the removal of an uncomplicated ovarian tumour during pregnancy are so slight that they may be practically disregarded*. It is probable, indeed, that in the majority of cases in which interruption followed a simple operation the result is to be attributed to the predisposition to abortion which is known to exist in many women, and which would almost certainly have led to a premature interruption of the pregnancy had the case been left to nature.

In considering the effect of ovariectomy on the continuance of pregnancy Greig Smith, relying on Gordon's figures, remarks: "It seems proved, however, that the operation tends to cause abortion".¹ More recently Fehling² has expressed the opinion that the frequency with which abortion follows ovariectomy is too great to justify operative interference where no urgent indication exists. From the statistics of Jetter and Heiberg it was seen that premature interruption of pregnancy resulted in nearly 20 per cent. of the cases which were treated expectantly—a higher percentage than is found after uncomplicated ovariectomy. Moreover, in considering the relative prospects of the child after operation and after expectant treatment we must keep in mind the possibility of the tumour occupying the pelvis during delivery, and the high mortality of the children which results

¹ Greig Smith, *Abdominal Surgery*, sixth edition, vol. i., p. 181.

² See p. 85,

from this complication of labour. Taking this possibility into account, along with the frequency of spontaneous interruption, we cannot agree with the statement of Greig Smith,¹ that "as regards the saving of the child non-interference would certainly be indicated".

It is sometimes stated, and might naturally be supposed, that the removal of intraligamentary tumours, from the greater manipulation required, would be more liable to be followed by abortion. Bland-Sutton² believes that this result is more likely to occur after the removal of parovarian than ovarian cysts. The evidence of our tables furnishes no ground for either belief. In 9 cases the tumour is noted as parovarian, and 4 additional cases are found in Dsirne's collection. In 1 only was pregnancy interrupted as the result of the operation, and in this case secondary hæmorrhage occurred and necessitated reopening of the abdomen. In the case reported by Kelly³ the parovarian disease was bilateral, while in 2 others an ovarian cyst of the opposite side was simultaneously removed. In Merkel's case⁴ a small cyst was also resected from the ovary of the same side.

The cases in which the tumour is stated to have been intraligamentary are too few to permit of any definite conclusion. Including 1 in Dsirne's table I find only 4. In 1 suppuration had occurred during pregnancy, and operation was followed by the death of the mother. Of the remaining 3, 1 aborted on the fifth day, 1 went to term, and in 1 premature labour took place in the seventh month. Although intraligamentary tumours are few, 10 cases are found in the tables in which the tumour is described as extremely or universally adherent, 3 times in the pelvis. In 1 of the latter only did interruption of pregnancy result from the operation.

¹ Greig Smith, *loc. cit.*, p. 182.

² Bland-Sutton, *Lancet*, 1901, vol. i.

³ See table ii., case 30.

⁴ See table xi., case 32.

Although the prospects of the child are thus seen to be better after ovariectomy than from any of the other methods of dealing with this complication, there still remains to be considered the practical question as to whether the operation may be undertaken with equal safety at any period of pregnancy.

Dsirne found that the best results for the child were obtained in the third and fourth months of gestation; of 28 operations in the former month pregnancy was interrupted only 4 times, and of 21 in the latter, only twice. The following table shows the frequency with which the child was saved or pregnancy undisturbed after operation at the various months in the total series as well as in the tabulated cases:—

PROGNOSIS FOR CHILD AT VARIOUS MONTHS.

Total Series.			Recent Cases.		
Month of Pregnancy.	Number of Operations.	Pregnancy interrupted and Child lost.	Number of Operations.	Pregnancy interrupted and Child lost.	
				All Cases.	Excluding Complicated Cases.
		Per Cent.		Per Cent.	Per Cent.
2nd	39	10 = 25·6	28	6 = 20·7	5 = 18·5
3rd	102	19 = 18·6	60	9 = 15·0	5 = 8·8
4th	84	12 = 14·2	60	7 = 11·6	3 = 5·3
5th	55	14 = 25·4	38	8 = 21·0	2 = 6·2
6th	32	11 = 34·3	22	8 = 36·3	4 = 22·2
7th	23	9 = 39·1	15	5 = 33·3	3 = 20·0
8th	14	6 = 42·8	7	4 = 57·1	4 = 57·1
9th	7	1 = 14·2	6	0 = 0·0	0 = 0·0

Both tables point to the ninth month as giving the best results for the child, the latter showing 6 operations all of which ended in the birth of living children. In other respects they bear out Dsirne's contention as to the greater safety for the child from operations in the third and fourth months. Where no complication exists it will be seen that equally good results may be anticipated in the fifth month. The greater tendency

to interruption in the later months is to be explained partly by the formation of adhesions as pregnancy advances, partly by the greater manipulation of the uterus required during operation ; but even in these months the prospects of the child from operation are better than from any of the other methods. Operations in the eighth month would appear to be the most dangerous for the child. In 3 of the 7 cases in which premature labour resulted the child was born alive but soon died. The cases are too few, however, to support what would seem to be the natural conclusion, that when a tumour is detected in the eighth month ovariectomy should be postponed in the interests of the child till the ninth month is entered on. Against this course it must be urged that the delay would increase the danger to the mother and the difficulty of the operation.

The analysis of past experience, therefore, supports the opinion, which has been gradually gaining ground, but is not yet by any means universal, that the rule to extirpate all ovarian tumours so soon as detected should apply equally to cases which are complicated by pregnancy. Indeed, as in pregnancy the danger of ovarian tumour is greater, so in pregnancy their removal is even more urgently called for. The risks to the mother are no greater than in the absence of pregnancy, no matter at what period of gestation the operation is undertaken, while the prospects of the child are improved. Operation should be advised in all cases as soon as the condition is recognised, as the danger to the child increases with the duration of pregnancy. There are few occasions in which, in the interests of the child, postponement is warranted. *Neither for mother nor child is there any elective period for ovariectomy in pregnancy.*

It has not infrequently been found necessary to remove both ovaries, and table xi., in which the cases of double ovariectomy are arranged according to the month of operation, shows that

the risks are little, if at all, increased. Since Mainzer¹ published his paper on bilateral ovariectomy during pregnancy, 33 additional cases have been recorded, so that our list includes 50 operations. Of these only 2 mothers died, while in at least 40 pregnancy was uninterrupted. Only 8 children were lost from abortion, indeed only 5 if we exclude complicated cases—1 in which the ovum was previously degenerated, and 2 in which the operation was prolonged and difficult; in 2 the result is not stated. In one of the cases which proved fatal to the mother both ovaries were cystic and markedly adherent, while the woman is described as being in a much reduced condition; in the other the tumours were sarcomatous, the woman dying eight weeks after from metastasis. The cases reported by Merkel, Jovanovic, Lowenberg and Matthaei² are of special interest in showing that conservative operations may be practised with safety during pregnancy. At the beginning of the fifth month Merkel removed a right ovarian cyst and a left parovarian, at the same time resecting a small cyst from the left ovary. Not only was pregnancy undisturbed, but the value of the operation was further demonstrated by a subsequent conception. In Matthaei's case, where there was placenta prævia, abortion occurred, but the woman again became pregnant. In the two other cases in which resection was practised pregnancy was undisturbed.

The fact, then, that both ovaries are found diseased is no contra-indication to their removal during pregnancy, indeed, as Mainzer points out, the frequency with which bilateral disease is malignant furnishes an even more urgent reason for immediate operation.

It will be seen from table x. that the ovarian tumour was on 9 occasions removed *per vaginam*, and that the result was uniformly successful for the mother, while in 2 cases only

¹ Mainzer, *Münch. Med. Wochenschr.*, 1895.

² See table xi., cases 32, 20, 21, 36.

was the pregnancy interrupted. In one, however, the ovum was blighted before operation, and in the other the danger seemed past, the woman being allowed up on the twenty-fifth day, when the temperature rose without warning to 106° , and abortion followed.

Notwithstanding the success which has attended the operation in the few occasions on which it has been performed, vaginal ovariectomy does not, meantime, find favour with most operators. The strongest objection to it, and one which is exemplified in Braun's case, is the uncertainty as to the extent of the adhesions. If extensive these may make complete removal impossible. In addition, also, to the greater difficulty of controlling hæmorrhage there is the fear of infection should abortion result, though the cases show no instance in which this occurred.

The operation, moreover, has a limited field. It is applicable only to pelvic tumours and can be safely undertaken only when there are few or no adhesions, and even in these circumstances the abdominal is in my opinion to be preferred to the vaginal route. Löhlein,¹ who in favourable conditions advocates the vaginal method, regards it as unsuitable in cases where the pelvis is narrow or the vagina not roomy, and also where the tumour is a multilocular cyst and partially solid, as well as in cases where it is fixed above the brim.

The ease with which vaginal extirpation may be carried out and the rapidity of the subsequent recovery are well illustrated in Jakobs' case,² where the woman was allowed up on the fifth day after operation.

¹ Löhlein, *Gynäkologische Tagesfragen*, Heft v., 1898.

² Jakobs, *Gazette Médical de Paris*, 1895, No. 29.

PRACTICAL OBSERVATIONS ON OVARIOTOMY DURING PREGNANCY.

It is no part of my intention to enter into the technique of ovariectomy during pregnancy, which is fully described in many text-books of gynaecology. One or two practical points, however, suggested by a perusal of numerous cases, may be mentioned.

In operating during pregnancy the possibility of bilateral disease should always be kept in view, and after the removal of the tumour the other ovary should be examined. In a case recorded by Berry Hart this was omitted. A dermoid of the left ovary was removed from the abdomen; and though the woman progressed satisfactorily for the first few days, she ultimately succumbed, when a frozen section of the pelvis showed a second dermoid incarcerated in the hollow of the sacrum.

In the case of a tumour impacted in the pelvis towards the end of pregnancy it may sometimes be found difficult to elevate the tumour owing to the presence of the enlarged uterus. To secure more free manipulation, the uterus may be brought through the abdominal wound. When this is done the tumour can usually be readily dislodged and removed. So far as I can gather, this was first practised by Fenger,¹ but the credit of drawing attention to the value of this procedure belongs to

¹ Fenger, *Trans. Gynecol. Society, Chicago*, 1891.

Professor Spencer,¹ who describes a case of ovariectomy during labour in which he found this necessary, and at the same time cites a few instances in which this method had been employed by others. In a case recently seen by the writer, in which labour was obstructed by a pedunculated myoma, the uterus had to be drawn through the wound before the tumour could be elevated. When thus removed, the uterus must be protected from injury. It should be surrounded by gauze or towels wrung out of sterilised water or salt solution. Herman² has recently expressed doubt as to the necessity for bringing the uterus out of the abdomen, which, he says, "means a longer incision and longer exposure of the peritoneum, and therefore greater shock". He thinks that little difficulty will, as a rule, be experienced in elevating the tumour if the operator press the uterus towards one side, while an assistant pushes the tumour upwards out of the pelvis.

Another point of importance relates to the management of dermoid tumours, which have been seen to be especially frequent in pregnancy. With the object of preventing their rupture during operation Alban Doran³ advises that the incision should be large enough to allow the tumour to be removed, if possible, entire, recording a case in which he accomplished this.

In several cases, in which the ovarian tumour was first detected in the later months of pregnancy and occupied the pelvis, the operator seems to have performed Cæsarean section before making any attempt to remove the tumour.⁴ This involves an increased risk, and should rarely be necessary if

¹ Spencer, *Obstet. Trans.*, vol. xl., p. 14.

² Herman, *Journal of Obstet. and Gynæcol. of British Empire*, vol. ii., p. 230.

³ Alban Doran, *Lancet*, 1902, i., p. 357.

⁴ See two cases by Braithwaite, *Lancet*, 1898, ii., p. 1763.

the expedient of first withdrawing the uterus from the abdomen be kept in mind. In a case reported by Hergott,¹ however, a dermoid tumour was found so firmly adherent in the pelvis that, even after performing Cæsarean section, it was decided not to attempt its removal at that time.

In vaginal ovariectomy the hæmorrhage, which is one of the dangers of the operation, may be lessened by making, as Jakobs does, the incision through the posterior cul-de-sac with the thermocautery. After removal of the tumour he employs forceps to control the bleeding. These are left on for two or three days, as in Doyen's vaginal hysterectomy. This plan answered so well in the case which he reports² that the woman was allowed up five days after the operation.

It will be found that in a few of the cases symptoms of threatening abortion first directed attention to the condition and led to the detection of the tumour. In these circumstances it becomes a question whether operation should be at once performed. The imminence of abortion or of labour does not contra-indicate ovariectomy; indeed, in at least two of our cases the operation seems to have averted a threatened miscarriage.³

Several cases are recorded in which the uterus was injured during operation, sometimes from the abdominal incision being too small to permit of accurate manipulation, but more often from ovariectomy being undertaken in ignorance of the pregnancy, and the uterus punctured in the belief that it was a second cyst. The question arises as to how the uterus, thus

¹ Hergott, *Annal. de Gynécol.*, April, 1899.

² Jakobs, *Gazette Médical de Paris*, 1895, No. 29.

³ Martin, A., *Zeitschr. f. Geburt. u. Frauenkr.*, Bd. i. (see Dsirne, case 37); and Gördes, table xi., case 1.

injured, should be dealt with. That will depend on the extent of the injury. Spencer Wells recommended that in all cases the uterine contents should be removed by Cæsarean section; and where the uterine wall has been penetrated in its whole extent, and the foetal sac entered, experience shows that this is the best treatment.

In 9 of our cases the foetal sac was penetrated; 1 was left untreated, with the result that the woman aborted and died on the second day; in 2 the uterine wound was sutured, both aborted, and 1, where the placental attachment was injured, died; 6 were treated by Cæsarean section, all the mothers surviving. These facts point to the conclusion that, where the membranes as well as the uterus are involved, the best results are to be obtained by enlarging the wound and removing the uterine contents.

Where the uterine wall alone is injured, the foetal sac being unaffected, it will not usually be necessary to empty the uterus. Even wounds of the ovisac do not always produce abortion. A most remarkable case is reported by Dr. Stickney,¹ in which the pregnant uterus was tapped under the impression that it was an ovarian tumour, a quart of fluid being drawn off. After several weeks' interval it was again tapped. Some time after a third tapping was arranged for, but the woman was found to be in labour, and soon gave birth to a living child.

In those cases in which the injury is limited to the uterine wall, the wound should be treated on general surgical principles. This has the merit of giving the child at least a chance. In 2 of our cases this plan was successfully followed; in both pregnancy was undisturbed, though in Lee's case, which is quoted below, severe hæmorrhage occurred as the result of a fall five weeks after operation and led to abortion.

Case XVI.—A married woman, aged twenty-eight, was two

¹ Stickney, *Boston Med. and Surg. Journal*, 1876, p. 114.

years before delivered of her fourth child after a severe labour, "lasting four days"; child still-born; after labour there was discovered in the right side of the pelvis a small movable tumour, which had probably retarded labour. After this she had two miscarriages; in the third month of her next pregnancy she was seen by Lee, who performed ovariectomy on 11th November, 1882. On opening the abdomen the tumour was found above the uterus. The patient was rolled on her side, the change in position throwing the cyst upward and bringing the uterus over the incision. As this was not observed, the trocar was thrust into the uterus. The tumour, a mixed dermoid, was removed. From examination of the uterine wound it was believed that the ovisac had not been injured; the wound was sutured with fine carbolised silk. The woman made a good recovery, and was discharged from hospital on 12th December. Five days later she fell down a flight of stairs; accidental hæmorrhage ensued, for which the cervix was dilated and the foetus removed.

Lee,¹ in his excellent paper, briefly summarised the conclusions to which a study of these and similar accidents led him. (1) "If it be certain that the uterine contents are involved in the injury, whether by knife or trocar, the uterus should be at once incised and Cæsarean section effected." (2) "If, on the contrary, there be no evidence that the foetus, placenta or membranes have been directly injured, the uterine wound should be treated on general surgical principles. If a deep puncture or incision of the uterine wall, it should be carefully and minutely closed with carbolised sutures, the utmost care being taken to secure exact coaptation of the edges." He advises that hæmorrhage from uterine wounds should be arrested by the cautery and not by ligatures, which readily cut through the soft uterine tissues.

¹ Lee, *Trans. Amer. Gynecol. Soc.*, 1884.

In order to diminish the risks of abortion after ovariectomy some operators administer opium for a few days, a practice which is, I think, to be advised. At any rate, it is a good rule to give a hypodermic injection of morphia before the patient leaves the operating table. In several cases a full dose has warded off threatening symptoms.

There is another point to which it may be well to refer. Though the operation in pregnancy is in no way more dangerous than in the non-pregnant, it may prove more difficult. Further, it involves two lives. It should not, therefore, be undertaken by operators whose experience of ovariectomy is casual and infrequent, but should, if at all possible, be placed in the hands of a practised gynaecologist.

A final observation may be added in reference to the subsequent management, where ovariectomy has been performed during pregnancy. The tension on the abdominal wound is greater, and thus hernia of the abdominal wall is more liable to occur, than after simple ovariectomy. To prevent this a well-fitted abdominal belt should be continuously worn. As the strain on the cicatrix increases with the duration of pregnancy, it has been proposed, with a view to diminish the risk of hernia, to induce labour as soon as the child is viable. Among the tabulated cases will be found several in which this was done. As a rule it is unnecessary. In the majority of the cases it will be found that pregnancy went to term and labour was completed, often spontaneously, without any undue yielding of the cicatrix. The strain on the scar is greatest during labour. At this time the abdominal wall should be supported by a tight, carefully adjusted bandage. It will further diminish the danger of yielding, which is greatest during the second stage of labour, if delivery is aided by the forceps as soon as dilatation permits.

SUMMARY OF TREATMENT OF OVARIAN TUMOUR IN PREGNANCY.

THE evidence bearing on the various methods of dealing with pregnancy complicated by ovarian disease has been fully discussed in the preceding chapters. The more important conclusions to which a study of this evidence leads may be briefly restated. For convenience of reference this will be done in the form of a series of propositions, which may be taken as a concise summary of the principles to be followed in the treatment of ovarian tumour during pregnancy.

- I. The recognition of an ovarian tumour during pregnancy should be followed as soon as possible by ovariectomy.
- II. No exception should be made in the case of small tumours, which, besides their greater tendency to obstruct labour, are both in pregnancy and the puerperium as liable to serious complication as those of larger size. It is safer to remove them than to treat them expectantly, as is often advised when they occupy the abdomen and are stationary in growth.
- III. An exception may be made in the case of a tumour discovered in the later months and found densely adherent. As in these circumstances ovariectomy would probably lead to interruption of the pregnancy, operation may be postponed, in the interests of the child, till near the end of gestation.
- IV. It is of the first importance to anticipate complications. Apart from acute complications, pregnancy favours the

occurrence of adhesions. Delay, therefore, serves only to increase the dangers of operation.

- V. The existence of a complication, arising from the tumour, makes immediate ovariectomy imperative. Though adding to the dangers of the operation, acute complications do not preclude a successful result for both mother and child. The prognosis is more favourable the sooner the operation is undertaken after the onset of symptoms.
- VI. There is no elective period for ovariectomy in pregnancy. Experience shows that for the mother equally good results are to be obtained at any month, while for the child the difference in the risks is inappreciable, more particularly if the danger of interruption of the pregnancy from delay be taken into account.
- VII. If possible, the date of what would have been the normal menstrual period should be avoided. This will tend to diminish the risk of abortion.
- VIII. Where difficulty is experienced in elevating a pelvic tumour in the later months of pregnancy, removal may be facilitated by first drawing the uterus forward out of the abdomen, protecting it meantime with sterile gauze or towels wrung out of normal salt solution.
- IX. In the case of dermoid tumours the abdominal incision should be sufficiently large to permit of the tumour being removed entire if possible.
- X. If during operation the uterus should be injured, the subsequent procedure will depend on whether the uterine wall alone is injured or whether the ovisac as well is entered. In the former simple suture of the wound will suffice; in the latter the uterine contents should be removed.

- XI. A full dose of morphia should be administered hypodermically after operation, before the patient has recovered from the anæsthetic.
- XII. Where ovariectomy is refused, or for any reason is decided against, the patient should be examined at intervals in order to insure that the tumour has not prolapsed into the pouch of Douglas. Where this occurs and the tumour is found to be irreducible, or where urgent symptoms supervene, operation should be insisted on.
- XIII. Tapping the ovarian cyst should be reserved solely for those cases where symptoms of distress, due to distension, arise, and where ovariectomy is refused or is impossible.
- XIV. Artificial premature labour is contra-indicated in all circumstances where the urgent symptoms are due to the presence of the ovarian growth ; where due to the pregnancy—as in nephritis—and likely to be relieved by its termination, the condition must be treated as if no ovarian disease coexisted.

CASES OF OVARIOTOMY IN PREGNANCY.

TABLE I.—OPERATIONS IN 2ND MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un- disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Altas: <i>El Siglo Med.</i> , 1890	Ovarian tumour	R.	+	+			
2	Kaltenbach: <i>Bischoff, Dissert.</i> , Halle, 1891	Cyst, size of child's head	R.	+	+			Aet. 25: i. gravida, great discomfort on supervision of pregnancy.
3	Eberhard: <i>Centralbl. f. Gynäk.</i> , 1893	Dermoid	R.	+	+			
4	Raether: <i>Münch. Med. Wochens.</i> , 1893	Cyst, size of fist	R.	+	+			
5	Von Herff: <i>Gyn. Journ. d. Hallesch. Frauen-Kl.</i> , 1894	Multilocular cyst, extending into pelvis	R.	+				Aet. 32: viii. gravida, last period 6 weeks before: increase in abdomen, with pain for 6 months.
6	Landau: <i>Pick, Dissert.</i> , Königsberg, 1895	Simple cyst, with pedicle twisted 3 or 4 times	R.	+				Aet. 16: no marked symptoms produced by torsion: other ovary enlarged to size of apple, but not removed.
7	Löhlein: <i>Gynäk. Tagesfragen</i> , H. iv., 1895	Cyst, with pedicle twisted 2½ times	R.	+	+			Aet. 34: 5 normal labours, 1 abortion 5 months before: a fortnight before operation sub-acute torsion, followed by vomiting and fever: temperature slightly elevated at time of operation.
8	Kochurova: <i>J. Akush. i gensk. bolez.</i> , St. P., 1896	Dermoid	R.	+	+			
9	Giessner: <i>Winter, Dissert.</i> , Giessen, 1896	Multilocular cyst	R.	+				Aet. 34: v. gravida.
10	Da Costa: <i>Amer. Journ. of Obstet.</i> , vol. xxxvi., 1897	Cyst	R.	+				Aet. 21: 1 child, after which very ill in puerperium: as irregular bleeding for 5 or 6 weeks pregnancy not suspected. At operation uterus found retroflected and adherent.

<i>stet. Trans.</i> , 1898							
12 Phillips: <i>Obstet. Trans.</i> , vol. xl., 1898	Dermoid, impacted in pelvis	R.	+				ous delivery, having been several times pushed up out of pelvis during pregnancy.
13 Purslow: <i>Lancet</i> , 1898	Cyst, strangulated from torsion of ped- icle	R.	+				1 abortion at 4th month: in 7th week of present pregnancy seized with abdomin- al pain, collapse and vomiting: ruptured tubal pregnancy suspected.
14 Noble: <i>Amer. Gyn. and Obstet. Journ.</i> , 1899	Tumour of left ovary and small right par- ovarian cyst	R.	+	+			
15 Bland-Sutton: <i>Lancet</i> , 1901	Cyst, size of fist	R.	+				iv. gravida, in 3 previous pregnancies abor- ted: after last abortion tumour detected.
16 Bland-Sutton: <i>ibid.</i>	Dermoid	R.	+				Torsion of pedicle 2 months before con- ception, which diagnosed a threatened miscarriage at 5th month.
17 Landau: Orgler, <i>Archiv f. Gynäk.</i> , 1901	Cyst	R.	+	+			Delivery effected without artificial help.
18 Landau: <i>ibid.</i>	Cyst, size of two fists	R.	+	+			
19 Murphy: <i>Lancet</i> , 1895, i., p. 148	Ovarian tumour, size of hen's egg	R.	+	+		+	Before operation suffered intense pain: premature labour at 8th month from albuminuria: child dead.
20 Duncan: <i>Obstet. Trans.</i> , vol. xxxvi., 1894	Cyst, in pelvis, rupt- ured 1½ hours before on vaginal examin- ation	R.				+	Abortion on 4th day.
21 Macks: <i>Beitr. z. Geburt. u. Gynäk.</i> , 1895	Cyst, size of an apple	R.				+	Abortion on 5th day.
22 Landau: Orgler, <i>loc. cit.</i>	Dermoid, size of child's head	R.				+	Hæmorrhage for 8 days, 3 weeks before operation, which very difficult owing to tumour being intraligamentary and markedly adherent: abortion on 5th day.
23 Herman: unpublished	Cyst	R.				+	Abortion on 11th day.

The earlier cases include 11 operations at the 2nd month, with 1 death which took place a month after operation from hyperemesis. Two pregnancies only were interrupted, if we exclude 1 in which abortion was artificially induced. Total, 34 operations, 33 recoveries, and 28 uninterrupted pregnancies.

TABLE II.—OPERATIONS IN 3RD MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Konrad: Cit. Frommel, <i>Bericht über</i> , 1892		D.			+		Abortion on the day after operation.
2	Altas: <i>El Siglo Med.</i> , 1890		R.	+	+			
3	Heinricius: <i>Schmidt's Jahrb.</i> , 1890		R.	+				
4	Gördes: <i>Zeitsch. f. Geb. u. Gynäk.</i> , 1890	Cyst	R.	+	+			Labour at term, but child dead.
5	Gördes: <i>ibid.</i>	Cyst	R.	+	+			
6	Kreutzmann: <i>Amer. Journ. of Obstet.</i> , 1892	Unilocular cyst, partly in pelvis	R.	+	+			Aet. 32: 4 children, several miscarriages.
7	Kreutzmann: <i>ibid.</i>	Multilocular cyst, reaching almost to umbilicus	R.	+				Aet. 28: 2 children: pedicle found twisted $\frac{1}{2}$ turn, with blood in cyst: pregnancy progressing at time of writing.
8	Delagénière: <i>Arch. Provenc. de Chir.</i> , 1894	Cyst	R.	+	+			Peritonitis from torsion a week or two before operation: marked adhesions.
9	Simpson: <i>Obst. Trans.</i> , Edin., 1894	Parovarian cyst	R.	+	+			Abortion $5\frac{1}{2}$ months before at 3rd month: for sometime before operation suffered from pain in abdomen.
10	Hirst: <i>Amer. Journ. of Obstet.</i> , vol. xxxii.	Dermoid, partly in pelvis	R.	+				Multipara, diagnosis doubtful till abdomen opened: pedicle twisted 1 turn.

11	Rosen: <i>Inaug. Dissert.</i> , Berlin, 1895	Parovarian cyst	R.	+	+	Child lost through prolapse of cord: tumour gave rise to painful micturition, with occasional retention.
12	Murphy: <i>Lancet</i> , 1895, i., 148	Parovarian cyst	R.	+	+	Suddenly seized in 3rd month with abdominal pain, prostration and vomiting: cyst strangulated from pedicle torsion.
13	Macks: <i>Beitr. z. Geb. u. Gynäk.</i> , 1895	Cyst, size of an apple	R.	+	+	Aet. 40: vi. gravida, duration of operation 4 minutes.
14	Bossard: <i>Thèse de Toulouse</i> , 1896	Dermoid	R.	+	+	Pregnancy not recognised with certainty till operation.
15	Mangin: <i>Arch. de Gyn. et Tocol.</i> , xxiii., p. 629	Cyst, large	R.	+	+	Torsion of pedicle.
16	Monprofit: <i>Thèse par Cocard</i> , Paris, 1896	Dermoid	R.	+	+	Aet. 34: mother of 4 children.
17	Fehling: <i>Gyn. Journ. der Halles. Frauen-Kl.</i> , 1899	Multilocular cyst	R.	+	+	Aet. 33: vi. gravida.
18	Fehling: <i>ibid.</i>	Small tumour of ovary	R.	+	+	
19	Noble: <i>Amer. Gyn. and Obstet. Journ.</i> , 1899	Tumour of ovary	R.	+	+	
20	Noble: <i>ibid.</i>	Cyst	R.	+	+	
21	Jarman: <i>Amer. Journ. of Obstet.</i> , 1900	Cyst	R.	+	+	
22	Küstner: Sonnenfeld, <i>Dissert.</i> , Breslau, 1900		R.	+	+	
23	Pinard: <i>Soc. d'Obst. de Gynécol.</i> , Paris, 1900	Fibrosarcoma	R.	+	+	Torsion of pedicle: operation did not take place till 1 month after first symptoms of torsion.
24	Landau: Orgler, <i>Archiv f. Gynäk.</i> , 1901		R.	+	+	Aet. 26: 1 child: though tumour malignant, patient in good health and well nourished.

OPERATIONS IN 3RD MONTH (*continued*).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
25	Landau: Orgler, <i>Archiv f. Gynäk.</i> , 1901	Ovarian and parovarian cyst	R.	+	+			Aet. 17: i. gravida, for 6 weeks before operation pain in abdomen, with pain on defæcation and micturition.
26	Landau: <i>ibid.</i>	Parovarian cyst	R.	+	+			Aet. 23: i. gravida.
27	Landau: <i>ibid.</i>	Dermoid, size of fist	R.	+	+			Aet. 37: vii. gravida.
28	Hellier: <i>Lancet</i> , 1901, ii., 1727	Multilocular cyst, large	R.	+	+			Aet. 32: abdomen had remained large since last confinement 2 years before: cyst contained 164 oz. fluid.
29	Kelly: <i>Operat. Gynecol.</i> , pt. ii., p. 408	Cyst, in pelvis	R.	+	+			Cyst adherent in pelvis.
30	Kelly: <i>ibid.</i>	Parovarian cyst of right and two small parovarian cysts of left side	R.	+	+			The two cysts of left side were removed without removing tube or ovary.
31	Spencer: unpublished	Multilocular cyst, size of Tangerine orange	R.	+			+	Aet. 30: ix. gravida, cyst did not grow during several weeks in which under observation: premature labour induced: child alive.
32	Spencer: unpublished	Multilocular cyst	R.	+			+	Aet. 28: i. gravida, a month before operation peritonitis from pedicle torsion: labour induced towards end of pregnancy: child alive.

33	Rosen: <i>loc. cit.</i>	Cyst, size of small apple	R.				For a fortnight before operation suffered labour-like pains and bleeding: a month after rigors and fever, and in a few days fetus expelled.
34	Macks: <i>loc. cit.</i>	Cyst	R.	+			Abortion in progress at time of operation: ovum expelled soon after.
35	Giessner: Winter, <i>Disser.</i> , Giessen, 1896	Ovarian tumour	R.	+			Aet. 27: ii. gravida, abortion on 4th day.
36	Neugebauer: <i>Selbstb. in Frommel</i> , 1897	Cyst, size of adult head	R.	+			Abortion next day due to torsion, with necrosis and peritonitis: for 8 months patient had observed continued growth of abdomen.
37	Downes: <i>Amer. Gyn. and Obstet. Journ.</i> , 1898	Cyst	R.	+			Operation for fibroids, during which ovarian cyst discovered: 10 subserous fibroids enucleated: abortion next day.
38	Noble: <i>loc. cit.</i>		D.	+			Criminal abortion induced after operation, followed by sepsis and death.
39	Puchowsky: <i>Petersb. Med. Wochens.</i> , 1899		R.	+			Abortion on 3rd day.
40	Segond: <i>Soc. d'Obst. de Gyn. et de Pédiatr.</i> , 1900		R.	+			Abortion on 8th day: diagnosed extra-uterine gravidity.
41	Landau: <i>loc. cit.</i>	Unilocular cyst	R.	+			Aet. 24: ii. gravida, cyst contents escaped into peritoneal cavity at operation: abortion on 11th day, probably as result of hyperemesis.

The earlier cases include 47 operations in the 2nd month, with 42 recoveries, 4 deaths, and 1 in which the result is not stated: in 13 pregnancy was interrupted, but in 1 the uterus was injured, and in 1 Cesarean section was performed.

TABLE III.—OPERATIONS IN 4TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Lomer: <i>Centralbl. f. Gynäk.</i> , 1890	Cyst, size of two fists	R.	+				
2	Schiffer: <i>Dissert.</i> , Breslau, 1890		R.	+				
3	Kaltenbach: Bischoff, <i>Dissert.</i> , Halle, 1891	Dermoid	R.	+	+			Torsion of pedicle: severe pain for 2 months before: uterus retroverted, replaced, but on 4th day great discomfort and uterus found again retroverted.
4	Fancourt Barnes: <i>Tr. Brit. Gyn. Soc.</i> , 1892	Multilocular cyst	R.	+				Tumour detected a year before previous pregnancy: enlarged rapidly before and with pregnancy: markedly adherent.
5	Saenger: <i>Centralbl. f. Gynäk.</i> , 1892	Cyst, size of child's head	R.	+	+			Attack of pneumonia 2 weeks after operation.
6	Lewers: <i>Lancet</i> , 1893	Multilocular cyst	R.	+			+	Aet. 25: ii. para, tumour freely movable, separated by distinct groove from uterus: hand could be sunk between 2 tumours to promontory: spontaneous labour at 7th month.
7	Byford: <i>Trans. Gyn. Soc.</i> , Chicago, 1893	Dermoid	R.	+	+			Tumour discovered a year before, but operation refused: completely imbedded in adhesions: enucleation tedious and attended with rupture of cyst.

8	Valeroni: <i>Gaz. Med. di Torino</i> , 1893	Multilocular cyst	R.	+	+	+	Cyst markedly adherent.
9	Mangiagalli: <i>Berl. Klin. Wochens.</i> , 1894	Cyst, of enormous size	R.	+	+	+	Multipara: uterus pushed into right iliac fossa: cyst very adherent: labour at 8th month.
10	Travers: <i>Lancet</i> , 1894, ii., p. 146.	Cyst	R.	+	+	+	10 days before operation seized with severe pain, which continued: abdomen so distended that palpation to be of any value impossible: pedicle twisted 2 full turns.
11	Rubeska: <i>Monats. f. Geb. u. Gynäk.</i> , 1895	Dermoid	R.	+	+	+	Pains like those of labour set in after operation, but were arrested by opium.
12	Löhlein: <i>Gynäkolog. Tagesfr.</i> , Heft iv., 1895	Dermoid, size of child's head	R.	+	+	+	Aet. 30: 1 child: no trouble during pregnancy save from pressure on bladder.
13	Rosen: <i>Dissert.</i> , Berlin, 1895	Papillary cyst, size of child's head	R.	+	+	+	Peritonitis 3 to 4 weeks before, from which still suffered at time of operation.
14	Kehrer: Schwan, <i>Dissert.</i> , Heidelberg, 1895	Cyst	R.	+	+	+	
15	Cortiguera: <i>Ann. de Obst. Gyn. e Paediatr.</i> , 1895	Dermoid, large, with ascites	R.	+	+	+	
16	Toogood: <i>Brit. Med. Journ.</i> , 1896, i., p. 1144	Parovarian cyst, incarcerated in pelvis	R.	+	+	+	Aet. 26: i. gravida, during pregnancy slight discharge at periods: constant pain, which had increased during last month: diagnosed extra-uterine pregnancy.
17	Sutton: <i>N. Y. Med. Journ.</i> , 1896	Cyst, intraligamentary	R.	+	+	+	Pregnancy not recognised with certainty till operation.
18	Bossard: <i>Thèse de Toulouse</i> , 1896		R.	+	+	+	Peritonitis, with severe pain in end of 3rd month: tumour non-adherent.
19	Denny: <i>Boston Med. and Surg. Journ.</i> , 1896	Dermoid, partly in pelvis	R.	+	+	+	V. p. 173.
20	Riddell: McKerron, <i>Trans. Obst. Soc.</i> , 1897	Dermoid	R.	+	+	+	

OPERATIONS IN 4TH MONTH (*continued*).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
21	Lawrie: <i>Brit. Med. Journ.</i> , 1897, ii., p. 1491	Multilocular cyst, large	R.	+	+			Operation difficult owing to numerous adhesions.
22	Richardson: <i>Boston Med. and Surg. Journ.</i> , 1897	Cyst	R.	+	+			At operation uterus punctured in belief that it was a second cyst: wound sutured with catgut.
23	Winckel: Petritschek, <i>Dissert.</i> , München, 1898	Multilocular cyst	R.	+			+	Aet. 22: ii. gravida, symptoms of subacute torsion 18 days before operation: pedicle twisted 2½ times, with congestion of cyst and hæmorrhage into it: labour induced 3 weeks before term.
24	Alban Doran: <i>Obstet. Trans.</i> , 1898	Dermoid	R.	+	+			
25	Spencer: <i>Obstet. Trans.</i> , 1898	Dermoid	R.	+	+			Aet. 22: 2 children: tumour detected during last pregnancy, but as not larger than hen's egg, advised by obstetric physician and a surgeon <i>not</i> to have removed. In beginning of present pregnancy pain and hæmorrhage, pain continued till operation.
26	Halliday Croom: <i>Obstet. Trans.</i> , Edin., 1899		R.	+				Torsion of pedicle: v. p. 31.
27	Ehrendorfer: <i>Wien. Klin. Wochens.</i> , 1899		R.	+				

28	Ehrendorfer: <i>ibid.</i>	R.	+			
29	Ehrendorfer: <i>ibid.</i>	R.	+			
30	Nowak: <i>Monats. f. Geburts. u. Gyn.</i> , Bd. xii.	R.	+			
31	Lund: <i>Boston Med. and Surg. Journ.</i> , 1900	R.	+		+	Aet. 27: iii. gravida, seized in 4th month with severe pain in right inguinal region and vomiting: temperature 100°: appendicitis diagnosed.
32	Jovanovic: <i>Centralb. f. Gynäk.</i> , 1900, p. 928	R.	+		+	
33	Haig Ferguson: <i>Obstet. Trans.</i> , Edin., 1900	R.	+			ii. gravida, tumour discovered accidentally: densely adherent in pelvis, slightly to uterus.
34	Bossi: <i>Ann. di Ost. e Gin.</i> , 1900	R.	+		+	
35	Küstner: Sonnenfeld, <i>Dissert.</i> , Breslau, 1900	R.	+		+	
36	Küstner: <i>ibid.</i>	R.	+		+	
37	Küstner: <i>ibid.</i>	R.	+		+	
38	Herman: <i>Obstet. Trans.</i> , 1901	R.	+		+	Aet. 35: 6 children, 3 miscarriages, last 6 months before: losing flesh for 3 months: at time of operation somewhat cachectic: no ascites: a few small black specks seen on omentum and anterior surface of uterus. After leaving hospital patient lost sight of. Extensive adhesions to omentum and small intestine.
39	Hellier: <i>Lancet</i> , 1901, ii., p. 1727	R.	+		+	Aet. 29: iv. gravida, abdominal enlargement noticed before onset of pregnancy: incision enlarged to allow of extraction entire.
40	Doran: <i>Lancet</i> , 1902, i., p. 357	R.	+		+	

OPERATIONS IN 4TH MONTH (*continued*).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
41	Hardon: <i>Amer. Journ. of Obstet.</i> , 1902	Ovarian tumour	R.	+	+			i. gravida.
42	Hardon: <i>ibid.</i>	Ovarian tumour	R.	+	+			i. gravida.
43	Dakin: unpublished	Cyst, size of adult head	R.	+	+			Aet. 29: iii. para, nothing abnormal observed during pregnancy, save size.
44	Spencer: unpublished	Multilocular cyst	R.	+	+			Aet. 27: iv. para, torsion of pedicle: living twins born at term.
45	Stratz: <i>Nederl. tidschr. v. Verlosk. en Gyn.</i> , Jahrg. v.	Cyst	R.	+	+			Cyst growing rapidly during pregnancy.
46	Kelly: <i>Operat. Gynecol.</i> , pt. ii., p. 408	Cyst	R.	+	+			iv. gravida, menstrual periods continued with slight irregularity till a week before operation: cyst extensively adherent.
47	Ahlfeld: Hintze, <i>Disser.</i> , Marburg, 1891	Cyst	D.			+		Aet. 37: v. gravida, pedicle twisted and cyst filled with dark reddish fluid: abortion on 6th day, death on 18th from septic peritonitis.
48	Mangiagalli: <i>loc. cit.</i>	Cyst	R.			+		Good recovery, but as patient much reduced by persistent vomiting, abortion induced 1 month after.

49	Jones: <i>Med. Record</i> , N. Y., 1897	Cyst	R.		+	Early in 4th month severe pain, followed by peritonitis, with elevated temperature and rapid pulse: pedicle twisted. Abortion on 26th day, preceded by rise of temperature. Abortion 3 days after operation.
50	Lachmann: <i>Dissert.</i> , Greifswald, 1897	Dermoid	R.		+	
51	Petritschek: <i>loc. cit.</i>	Cyst, size of hen's egg, in pelvis	R.		+	Aet. 21: i. gravida, symptoms of subacute torsion: pedicle twisted 2 turns: good recovery, but spontaneous labour before end of 6th month: child alive, but soon died. Abortion on 13th day.
52	Anderodias: <i>Gaz. heb- dom.</i> , 1900		R.		+	
53	Worral: <i>Med. Press and Circ.</i> , 1900	Cyst and uterine myoma	R.			Irregular growth occupied abdomen, reaching 2 in. above umbilicus, hard but towards left cystic: in right loin cyst size of orange thought to be hydronephrosis, but proved ovarian: hysterectomy.

The earlier cases include 25 operations, with 24 recoveries and 1 death; in 4 pregnancy was interrupted.

TABLE IV.—OPERATIONS IN 5TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Fenger: <i>Trans. Gynecol. Soc.</i> , Chicago, 1891	Dermoid, size of child's head, in pelvis	R.	+	+			Aet. 30: i. gravida, during pregnancy suffered from colicky pains, with loss of health and flesh. To elevate tumour uterus everted through wound and wrapped in warm aseptic cloths.
2	Dohrn: Bandisch, <i>Disser.</i> , Königsberg, 1892		R.	+				
3	McMordie: <i>Lancet</i> , 1892, vol. i.		R.	+	+			
4	Condamin: <i>Lyon Médical</i> , 1894	Cyst	R.	+	+			
5	Mangiagalli: <i>Berlin Klin. Wochens.</i> , 1894	Cyst, size of head	R.	+				
6	Delagènière: <i>Arch. Provenç. de Chirurg.</i> , 1894	Dermoid	R.	+	+			
7	Hall: <i>Amer. Journ. of Obst.</i> , vol. 31, 1895	Unilocular cyst	R.	+	+			Multipara: about 1½ hours after operation labour pains began, but were controlled by morphia.
8	Macks: <i>loc. cit.</i>	Cyst, size of fist	R.	+	+			Aet. 30: iii. gravida, duration of operation 6 minutes.
9	R. Morison: <i>Trans. Gynecol. Soc.</i> , 1896	Cyst, semi-solid	R.	+	+			
10	Stretton: <i>Lancet</i> , 1896, ii., p. 1684	Ovarian tumour	R.	+	+			Torsion of pedicle.
11	Coe: <i>Med. News</i> , 1897		R.	+	+			

OPERATIONS IN 5TH MONTH (continued).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
26	Braun: Weiss, in <i>Beit. z. Chirurg. Festsch.</i> , 1892	Ovarian tumour	R.				+	Aet. 24: i. gravida, pedicle twisted 1½ times: spontaneous premature labour 5 weeks after: child alive, but soon died.
27	Lewers: <i>Lancet</i> , 1893, vol. ii.	Cyst	R.			+		Aet. 31: iv. gravida, peritonitis before third pregnancy when tumour discovered: in 3rd month of present pregnancy peritonitis, with constant vomiting and prostration: abortion on 2nd day.
28	McKee: <i>N. Y. Med. Journ.</i> , 1893	Cyst	R.					At operation uterus punctured in belief that it was another cyst: Caesarean section.
29	Toeherning: Meyer, <i>Svanger. og ovariotomie</i> , 1893	Cyst	R.			+		Severe pain in abdomen during pregnancy: at first thought to be extra-uterine: cyst, with twisted pedicle and gangrenous walls: abortion 4 days after.
30	Lovrich: <i>Centralbl. f. Gynäk.</i> , 1900, S. 880	Cyst, intraligamentary, suppurating	D.					Abortion on 6th day.
31	Landau: <i>loc. cit.</i>	Dermoid	R.			+		Aet. 26: 1 abortion at 2nd month: at time of operation in very bad condition, temperature 101°: cyst had been twice tapped, contents semi-purulent.
32	Dakin: unpublished	Multilocular cyst	R.			+		
33	Simpson: unpublished	Dermoid, impacted in pelvis	D.			+		

The earlier cases include 19 operations, with 17 recoveries and 2 deaths: 8 pregnancies were interrupted, but in 1 the uterus was punctured during operation.

TABLE V.—OPERATIONS IN 6TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed	Labour at Term.	Abortion.	Premature Labour.	
1	Pernice: Schwarz, <i>Dissert.</i> , Greifswald, 1891	Sarcoma	R.	+	+			Aet. 20: i. gravida, during pregnancy suffered from abdominal pain: no wasting or cedema.
2	Dohn: Bandish, <i>Dissert.</i> , Königsberg, 1892	Ovarian tumour	R.	+				Torsion of pedicle.
3	Peeples: N. Y. <i>Med. Journ.</i> , 1893	Fibroma	R.	+	+			Multipara: abdominal enlargement and pain increasing in severity: pregnancy not suspected owing to menstrual irregularities: unlimited adhesions: uterus thought to be another tumour, but decided to leave.
4	Mangiagalli: <i>loc. cit.</i>	Multilocular cyst of enormous size	R.	+				
5	Cushing: <i>Boston Med. and Surg. Jour.</i> , 1897	Ovarian tumour	R.	+	+			
6	McCone: <i>Amer. Journ. of Obstet.</i> , 1897, p. 693	Multilocular cyst, large	R.	+	+			Cyst tapped 2 years before: large quantity of ascitic fluid: hydramnios thought likely, but no definite diagnosis till abdomen opened.
7	Giles: <i>Obstet. Trans.</i> , 1898	Dermoid in pelvis	R.	+	+			
8	Pozzo: Frommel, 1899		R.	+	+			
9	Wagner: <i>ibid.</i>		R.	+	+			
10	Tull: <i>ibid.</i>		R.	+	+			
11	Bossi: <i>loc. cit.</i>	Cyst, size of child's head	R.	+	+			Torsion of pedicle.

OPERATIONS IN 6TH MONTH (*continued*).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
12	Kelly: Swan, <i>Johns Hopkins Bull.</i> , 1898	Fibroma, in pelvis	R.	+			+	Aet. 22: i. gravida, tumour gave rise to no symptoms: it measured 12 x 7 cm. of density of cartilage: adherent to sacrum posteriorly: artificial premature labour. Spontaneous labour at 8th month: child lived.
13	Macks: <i>loc. cit.</i>	Ovarian tumour	R.	+			+	
14	Dohrn: <i>loc. cit.</i>	Parovarian cyst	R.				+	Abdomen had to be reopened on account of secondary hæmorrhage.
15	Frank: <i>Centralbl. f. Gynäk.</i> , 1893, p. 47	Cyst, large	R.			+		Abortion imminent before operation: foetus expelled 36 hours after.
16	Murphy: <i>Lancet</i> , 1895, i., p. 148	Sarcoma, round celled, weighing 2 lb.	R.			+		Aet. 32: during pregnancy no symptoms to indicate malignancy: numerous adhesions: labour pains commenced 24 hours after.
17	Walcher: Späth, <i>Corresp. Blatt</i> , 1897	Cyst, large	R.			+		Aet. 25: i. gravida, cyst adherent to transverse colon: severe symptoms of obstruction: miscarried 3 weeks after.
18	Mowat: <i>Lancet</i> , 1899, p. 513	Cyst, colloid	R.			+		Aet. 31: iv. gravida, patient refused operation 2 months before: cyst grew rapidly: first tapped: pains began 2 hours after.
19	Michie: <i>Lancet</i> , 1899, p. 306	Cyst, suppurating	R.			+		Premature labour in progress at time of operation, and completed 4 hours after: condition for some days critical.
20	Quenu: <i>Soc. d'Obst. de Gynécol.</i> , Paris, 1900	Dermoid	R.			+		Tumour recognised before pregnancy, but refused operation: though operation simple and apparently no uterine traumatism abortion followed.
21	Hellier: <i>loc. cit.</i>	Dermoid, size of orange, in pelvis	R.				+	Torsion of pedicle: tumour deeply congested: free ascitic fluid: pregnancy arrested before or at time of operation: foetus expelled at 8th month only 8 in. long.

The earlier cases include 11 operations, with 10 recoveries and 1 death: in 4 pregnancy interrupted.

TABLE VI.—OPERATIONS IN 7TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Braun: <i>loc. cit.</i>	Dermoid	R.	+				At time of operation suffering from peritonitis, the result of torsion.
2	Winckel: <i>Münch. Med. Wochens.</i> , 1893	Dermoid, size of orange	R.	+	+			
3	Rubenska: <i>loc. cit.</i>	Cystosarcoma	R.	+	+			Soon after labour at term rapid emaciation set in, and death took place 2 months 11 days after.
4	Becking: Frommel, 1896		R.	+				
5	Wagener: Frommel, 1899		R.	+				
6	Küstner: Sonnenfeld, <i>Dissert.</i> , Breslau, 1900		R.	+	+			
7	Küstner: <i>ibid.</i>		R.	+				
8	Doran: <i>Lancet</i> , 1902, i., 357	Cyst, in pelvis	R.	+	+			Act. 25: ii. gravida, in 4th and 5th months attack of abdominal pain, lasting for several days: pedicle, twisted 2 turns, was found stretched tightly across the back of the uterus.
9	Dakin: unpublished	Cyst, size of foetal head at 5th month	R.	+	+			
10	Feilchenfeld: <i>Berlin. Klin. Wochens.</i> , 1893	Multilocular cyst	R.			+		Sudden unexpected expulsion of child with membranes on 13th day.

OPERATIONS IN 7TH MONTH (*continued*).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
11	Schaeffer: <i>Zeitsch. f. Geburt. u. Gynäk.</i> , 1893	Multilocular cyst deep in pelvis	R.			+		Aet. 22: i. gravida, no discomfort during pregnancy: premature labour 7 days after, child dead.
12	Mangiagalli: <i>loc. cit.</i>	Cyst, suppurating	D.					Towards end of 7th month suddenly seized with pain, vomiting, fever and symptoms of peritonitis. Child removed by Cæsarean section, lived. Death from shock on same day.
13	Halliday Croom: <i>Edin. Med. Journ.</i> , vol. xl., p. 290	Adenoma, semi-solid, large	R.			+		Aet. 35: multipara, sent as case of large ovarian tumour: pregnancy not suspected as amenorrhœa for over a year: sacculation of uterus: signs of labour 2 days after: artificial dilatation and delivery.
14	Bacon: <i>Journ. Amer. Med. Assoc.</i> , 1896	Cyst, large	R.				+	iii. para, no suspicion of abnormality during pregnancy, though excessive distension and weakness: premature labour 4 weeks after: child alive, but soon died.

The earlier cases include 10 operations, with 9 recoveries and 1 death: in 6 pregnancy interrupted, but in 1 Cæsarean section necessary from puncture of uterus.

TABLE VII.—OPERATIONS IN 8TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un- disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Bell: <i>Brit. Med. Journ.</i> , 1893	Cyst, large	R.	+				Child lived.
2	Duncan: <i>Lancet</i> , 1899, i., p. 301	Dermoid, in pelvis	R.	+				Aet. 22: i. gravida, no symptoms during pregnancy: tumour accidentally discovered in making routine examination toward end of pregnancy.
3	May: <i>Brit. Med. Journ.</i> , 1893	Cyst	R.			+		Aet. 22: ii. gravida, great abdominal distension, anxious expression, emaciated: parietal and omental adhesions: labour began at once, and 12 hours after healthy child born.
4	Rubeska: <i>loc. cit.</i>	Cyst	R.	+			+	Cyst adherent: labour began 14 days after: child lived 7 days.
5	Fehling: <i>Gyn. Journ. der Halles. Frauen-Kl.</i> , 1899	Multilocular cyst	R.			+		Aet. 22: i. gravida, labour began 6 days after, forceps used: child died next day.
6	Jarman: <i>Amer. Journ. of Obstet.</i> , 1900	Dermoid	R.				+	Patient complained of pain in 2nd month: tumour size of walnut found, which grew rapidly: premature labour 3 weeks after operation, child soon died.

The earlier cases include 7 operations, with 6 recoveries and 1 death: in 3 pregnancy interrupted, but in 1 a living child was delivered by Cæsarean section.

TABLE VIII.—OPERATIONS IN 9TH MONTH.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Homans: <i>Boston Med. and Surg. Journ.</i> , 1892	Dermoid in pelvis	R.	+				As tumour threatened obstruction to labour, ovariectomy carried out at end of pregnancy. Aet. 27: i. gravida, tumour discovered accidentally as result of routine examination. Aet. 30: multipara, tumour impacted, uterus removed from abdomen to permit of elevation: pedicle twisted 1 turn and pus in cyst: labour at term 25 days after operation.
2	Duncan: <i>Lancet</i> , 1899, i., p. 301	Dermoid in pelvis	R.	+	+			
3	Morse: <i>Obstet. Trans.</i> , 1896	Dermoid, impacted in pelvis	R.	+	+			
4	Löhlein: <i>Gynäkolog. Tagesfragen</i> , 1895	Cyst, size of apple	R.				+	Aet. 26: ii. gravida, operation at end of 9th month: during vigorous disinfection of abdominal wall upper loculus of tumour burst with discharge of contents into peritoneal cavity: child born alive next day: footling presentation: partial adherence of placenta.
5	Bland-Sutton: <i>Lancet</i> , 1895, i., p. 461	Dermoid, size of turkey's egg, in pelvis	R.				+	Aet. 31: ii. gravida, seen in beginning of 8th month, but decided to keep under observation till near end of pregnancy: good recovery but labour induced 2½ days after operation for anuria: child lived.
6	Newman: <i>Brit. Med. Journ.</i> , 1902, i., p. 836	Cyst	R.				+	Aet. 37: 2 children, 1 abortion: absolute dulness front and flank save small area in epigastrium: two distinct swellings visible: loss of flesh and anemia: labour imminent at time of operation: child born alive next day.

Previous to 1890 only 1 operation in the 9th month is recorded: the mother survived, but labour supervened prematurely, and the child was lost.

TABLE IX.—MONTH UNCERTAIN.

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Procopeff: <i>Russk. Med.</i> , St. Peters., 1891		R.	+				
2	Gardner: <i>Montreal Med. Journ.</i> , 1891		R.	+				
3	Gardner: <i>ibid.</i>		R.	+				
4	Gardner: <i>ibid.</i>		R.	+				
5	Riedinger: <i>Prag. Med. Wochens.</i> , 1891		R.	+				
6	Riedinger: <i>ibid.</i>		R.	+				Torsion of pedicle.
7	Riedinger: <i>ibid.</i>		R.	+				Torsion of pedicle.
8	Kotschau: <i>Centralbl. f. Gynäk.</i> , 1893, p. 47		R.	+	+			
9	Kotschau: <i>ibid.</i>		R.	+	+			
10	Kotschau: <i>ibid.</i>		R.	+	+			
11	Page: <i>Russk. Med.</i> , vol. xviii.		R.	+	+			
12	Page: <i>ibid.</i>		R.	+	+			
13	Lebendeff: <i>Repert. d'Univers. d'Obstét. de Gynec.</i> , 1894		R.	+	+			
14	Lebendeff: <i>ibid.</i>		R.	+				
15	Allemand: <i>Loire Méd.</i> , 1895	Dermoid	R.	+				
16	Zinke: <i>Amer. Journ. of Obstet.</i> , 1895		R.	+				

MONTH UNCERTAIN (continued).

No.	Operator and Reference.	Diagnosis.	Result for Mother.	Effect on Pregnancy.				Remarks.
				Un- disturbed.	Labour at Term.	Abortion.	Premature Labour.	
17	Giessner: Winter, <i>Dis- sert.</i> , Giessen, 1896	Dermoid	R.	+				
18	Blanc: <i>Gaz. des Hôp. de Toulouse</i> , 1896		R.	+	+			
19	Etheridge: <i>Amer. Jour. of Obst.</i> , 1897		R.	+	+			
20	Richardson: <i>Boston Med. and Surg. Jour.</i> , 1897		R.	+	+			
21	Schally: <i>Zeitschr. f. Heilkunde</i> , 1898, s. 151	Cyst	R.	+				
22	Schally: <i>ibid.</i>		R.	+				
23	Schally: <i>ibid.</i>		R.	+				
24	Schally: <i>ibid.</i>		R.	+				
25	Boyd: <i>Amer. Gyn. and Obstet. Journ.</i> , 1899		R.	+				
26	Marx: <i>Med. Rec.</i> , N. Y., 1899, ii., p. 721		R.	+	+			
27	Marx: <i>ibid.</i>		R.	+	+			
28	Marx: <i>ibid.</i>		R.	+	+			
29	Schauta: <i>Burger, Mon. f. Geb. u. Gynäk.</i> , ix., s. 1		R.	+	+			
30	Schauta: <i>ibid.</i>		R.	+				
31	Schauta: <i>ibid.</i>		R.	+				
32	Schauta: <i>ibid.</i>		R.	+				
33	Schauta: <i>ibid.</i>		R.	+				

34	Vavra: <i>Monats. f. Geb. u. Gynäk.</i> , i., s. 373	R.	+
35	Vavra: <i>ibid.</i>	R.	+
36	Vavra: <i>ibid.</i>	R.	+
37	Pfannenstiel: <i>Veit's Handb.d.Gyn.</i> , Bd.iii.	R.	+
38	Pfannenstiel: <i>ibid.</i>	R.	+
39	Pfannenstiel: <i>ibid.</i>	R.	?
40	Meyers: <i>Amer. Journ. of Obstet.</i> , 1892	R.	?
41	Bell: <i>Brit. Med. Journ.</i> , 1893	R.	?
42	Bell: <i>ibid.</i>	R.	?
43	Chambers: <i>Austral. Med. Gaz.</i> , 1893	R.	?
44	Custodio Cabeca: <i>Med. Contemp.</i> , Lisbon, 1896	R.	?
45	Staudé: <i>Geb. Gesellsch.</i> , Hamburg, 1900	R.	?
46	Wagener: Frommel, 1899	R.	+
47	Lebendeff: <i>loc. cit.</i>	R.	+
48	Lebendeff: <i>loc. cit.</i>	R.	+
49	Schally: <i>loc. cit.</i>	R.	+
50	Debaissieux: <i>Ann. de Gyn. et d'Obstét.</i> , vol. xxxviii.	R.	+
51	Pozzi: <i>Brit. Gyn. Jour.</i> , xxxi., p. 289	D.	+
52	Sehauta: <i>loc. cit.</i>	D.	+

In 39 of the earlier operations the month is not mentioned: 35 mothers recovered, 4 died: in 4 pregnancy was interrupted, in 21 the effect on pregnancy is not stated.

TABLE X.—VAGINAL OVARIOTOMY.

No.	Operator and Reference.	Diagnosis.	Month of Pregnancy.	Result for Mother.	Effect on Pregnancy.				Remarks.
					Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Jakobs: <i>Centralbl. f. Gynäk.</i> , 1894, p. 1310	Cyst, lying behind uterus	III.	R.	+				V. p. 120.
2	Barrows: <i>N. Y. Med. Journ.</i> , 1896, ii., p. 135	Cyst, size of small orange, behind uterus	II.	R.	+				Aet. 28: 5 children, 4 abortions: suffered almost constant pain since birth of last child: tube, adherent to cyst, also removed: operation occupied 20 minutes.
3	Löhlein: <i>Gynäkol. Tagesfrag.</i> , 1898, H. v.	Cyst, somewhat larger than fist	IX.	R.	+	+			Aet. 22: i. gravida, tumour intraligamentary and adherent, could not be pushed out of pelvis: colpotomia posterior: spontaneous labour 5 weeks after.
4	Braun-Fernwald: <i>Mon. f. Geb.u. Gynäk.</i> , 1899	Dermoid, deep in pelvis and firmly adherent	V.	R.	+	+			Aet. 33: multipara, sigmoid flexure, closely adherent to tumour, was torn: repaired with fine silk sutures: iodoform gauze drain.
5	Craigie: <i>Med. Rec.</i> , N. Y., 1899, ii., p. 721	Dermoid, adherent in pelvis	IV.	R.	+	+			
6	Löhlein: <i>Deutsch. Med. Wochens.</i> , 1900		IV.	R.	+				

7	Stone: <i>Med. Rec.</i> , N. Y., 1899, ii., p. 721	Unilocular papillomatous cyst, in pelvis	VIII.	R.			+	Cyst could not be completely delivered owing to pregnant uterus: labour began on 3rd day, and on 5th small living child born.
8	Drummond Robinson: <i>Obstet. Trans.</i> , 1898, p. 219	Dermoid, size of Tangerine orange, in pelvis	II.	R.			+	Patient missed 2 periods, but as they returned pregnancy discounted: tumour movable: carneous mole expelled a few hours after.
9	Amand Routh: <i>Obstet. Trans.</i> , 1898, p. 217	Dermoid, in pelvis	IV.	R.			+	Aet. 23: i. para, when first detected tumour movable, but became impacted: in removing cyst part of wall left, but snipped off: good recovery till allowed up, when temperature suddenly rose to 106°, and abortion soon followed.

TABLE XI.—BILATERAL OVARIOTOMY.

No.	Operator and Reference.	Diagnosis.	Month of Pregnancy.	Result for Mother.	Effect on Pregnancy.				Remarks.
					Un- disturbed.	Labour at Term.	Abortion.	Premature Labour.	
1	Gördes: <i>Zeitschr. f. Geb. u. Gynäk.</i> , 1890	Bilateral cysts	II.	R.	+	+			Abortion imminent at time of operation.
2	Blazejezyk: <i>Dissert.</i> , Greifswald, 1898	Bilateral dermoids	II.	R.			+		Tumour detected 2 years before: towards end of 2nd month sudden pain in abdomen: diagnosis, ovarian tumour with tubal pregnancy. Good recovery, but on 6th day abortion.
3	Landau: Orgler, <i>Archiv f. Gynäk.</i> , 1901, i., p. 130	Left ovary, cyst size of orange, right ovary contained number of small cysts	II.	R.			+		
4	Bantock: <i>Trs. Gynaecol. Soc.</i> , vol. vi.	Bilateral dermoids	III.	R.	+			+	Premature labour at 8th month from independent causes.
5	Flaischlen: <i>Zeitschr. f. Geb. u. Gynäk.</i> , Bd. 29, s. 48	Bilateral dermoids, size of child's head	III.	R.	+	+			
6	Montgomery: <i>Amer. Journ. of Obstet.</i> , vol. 21		III.	R.	+	+			
7	Meredith: <i>Obstet. Trs.</i> , vol. xxxiv., 1892	Bilateral papillomatous cysts	III.	R.	+	+			Aet. 25: i. gravida, operation complicated by very extensive adhesions.
8	Meredith: <i>ibid.</i>	Multilocular cyst of left, dermoid of right ovary	III.	R.	+	+			Aet. 31: multipara, pedicle of cystoma twisted.
9	Polailon: <i>Arch. de tocol.</i> , 1892, vol. xix.	Bilateral cysts	III.	R.	+	+			

BILATERAL OVARIOTOMY (continued).

No.	Operator and Reference.	Diagnosis.	Month of Pregnancy.	Result for Mother.	Effect on Pregnancy.				Remarks.
					Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
20	Jovanovic: <i>Centralbl. f. Gynäk.</i> , 1900, s. 1334	Bilateral cysts	III.	R.	+	+			Enlargement of abdomen observed for a year: cyst of left ovary contained 29 litres, a fist-sized cyst resected from right: correction of retroflected uterus.
21	Lowenberg: <i>Centralbl. f. Gynäk.</i> , 1901, No. 51	Bilateral dermoids	III.	R.	+		+		Aet. 26: ii. gravida, right dermoid livid from torsion of pedicle, dermoid resected from left ovary: long axis of uterus exaggerated from traction.
22	Pfannenstiel: <i>Veit's Handb. d. Gyn.</i> , Bd. iii., i., p. 451	Bilateral cysts	III.	R.			+		A multilocular cyst filled pelvis and reached up to umbilicus: for several days severe pain and vaginal hæmorrhage: aspiration yielded only blackish blood, so ruptured tubal pregnancy diagnosed: 2 days after operation profuse bleeding, which necessitated emptying uterus: vesicular mole.
23	Spencer: unpublished	Dermoid of right ovary size of fist, of left ovary size of lemon	III.	R.			+		

Aet. 44: persistent constipation, 107 3	weeks no action of bowels: enemata ineffective: pelvic tumour thought to be malignant growth from sacrum: no suspicion of ovarian disease: anæmic and ill looking: colotomy, and at operation tumour found in front of rectum: 2 days after ovariectomy.		
25 Galabin: <i>Obstet. Trans.</i> , 1896, p. 101	IV. R. +	Dermoid + mixed dermoid and adenoma	+ dermoid, right follicular cyst
26 Rutherford Morison: <i>Trans. Gynecol. Soc.</i> , 1896	IV. R. +	Bilateral dermoids, one firmly impacted in pelvis	+ +
27 Cheney: <i>Amer. Journ. of Obstet.</i> , 1897, p. 265	IV. R. +	Bilateral cysts	+ +
28 Cotterill: <i>Lancet</i> , 1892	IV. D. +	Sarcoma of both ovaries	+ +
29 Winter: Kropel, <i>Dissect.</i> , Königsberg, 1901	V. R. +	Cyst of right ovary, with left hæmato-salpinx	+ +

BILATERAL OVARIOTOMY (continued).

No.	Operator and Reference.	Diagnosis.	Month of Pregnancy.	Result for Mother.	Effect on Pregnancy.				Remarks.
					Un-disturbed.	Labour at Term.	Abortion.	Premature Labour.	
31	Landau: Pick, <i>Dissert.</i> , Königsberg, 1895	Bilateral dermoids, one size of child's head, other of goose egg	V.	R.	+	+			Aet. 25: i. gravida, pains in abdomen during pregnancy: woman nursed child notwithstanding removal of both ovaries.
32	Merkel: <i>Münch. Med. Wochens.</i> , 1895, s. 864	Right ovary cystic, left partially cystic, left parovarian cyst	V.	R.	+	+			Aet. 36: vii. gravida, melancholia increasing with growth of uterus: symptoms of torsion of right cyst in 4th month: pedicle $1\frac{1}{2}$ times twisted: resection of left ovarian cyst. On recovery from narcosis mental disturbance gone.
33	Mainzer: <i>Münch. Med. Wochens.</i> , 1895	Bilateral dermoids, size of foetal head and goose egg	V.	R.	+	+			Aet. 25: multipara, patient suckled child.
34	Sontag: Karl Koch, <i>Dissert.</i> , Freiburg, 1899	Cyst of left ovary size of foetal head, of right ovary size of hen's egg: both in abdomen	V.	R.	+	+			Aet. 25: i. gravida.
35	Selhorst: <i>Centralbl. f. Gynäk.</i> , 1900, s. 505		V.	R.	+				

36	Matthaei: <i>Zeitschr. f. Geb. u. Gynäk.</i> , 1894, s. 351	Left dermoid size of ostrich egg incarcerated in pelvis: right walnut-sized dermoid	V.	R.				Right dermoid resected: abortion on 14th day, with profuse hæmorrhage caused by placenta prævia: 14 months after patient became pregnant.
37	Wiedow: Karl Koch, <i>loc. cit.</i>	Cyst of left ovary in abdomen, dermoid of right ovary in pelvis	VI.	R.	+	+		Aet. 28: i. gravida, eclamptic seizure during labour, for which forceps used: child lived.
38	Ruge: Olshausen, <i>Die Krankh. der Ovarien.</i>	Myxosarcoma of both ovaries	VI.					No details of result.
39	Ludwig: <i>Monats. f. Geb. u. Gynäk.</i> , 1899, ix., 665		VII.	R.	+			
40	Prokoeff: <i>Russk. Med.</i> , St. Petersburg, 1891	Bilateral cysts		R.	+			
41	Lebendeff: <i>loc. cit.</i>	Bilateral dermoids		R.				
42	Stratz: <i>Zeitschr. f. Geb. u. Gynäk.</i> , Bd. v.			R.				
43	Olshausen: <i>ref.</i> , Karl Koch, <i>loc. cit.</i>			R.	+			
44	Olshausen: <i>ibid.</i>			R.	+			

Dsirne's series include 6 cases of double ovariectomy: all the mothers recovered and only 1 abortion followed, but in 2 premature labour occurred, both children being born alive, but 1 did not survive. This gives a total series of 50 cases in which both ovaries were removed during pregnancy, with only 2 deaths.



SECTION II.

LABOUR WITH OVARIAN TUMOUR.

SUMMARY.

I. ABDOMINAL TUMOURS, 163.

Influence of Tumour on Labour, 163.

Effect of Labour on Tumour, 165.

Symptoms, 166.

Diagnosis, 167.

Treatment, 167.

II. PELVIC TUMOURS, 169.

Introductory, 169.

Historical, 175.

Number of Collected Cases on which Description Based, 177.

Points of Interest in Connection with Them, including Maternal and
Foetal Mortality, 178.

Analysis of Cases in regard to Treatment, 182.

1. Left to Nature, 182.
2. Reposition, 183.
3. Puncture and Incision, 184.
4. Version, 185.
5. Forceps, 186.
6. Craniotomy, 186.
7. Cæsarean Section, 187.
8. Abdominal Ovariectomy, 187.
9. Vaginal Ovariectomy, 187.

Practical Observations on the Various Methods of Treatment, with
the Indications and Contra-indications for each, 187.

More Recent Views and General Summary of Treatment, 200.

Tabulated Cases, 211.



OVARIAN TUMOURS IN LABOUR.

THE advent of labour in a woman who has an ovarian tumour brings with it special dangers. Not only is the tumour at this time exposed to greater pressure and risk of injury, but its presence, in many cases, exercises a detrimental influence on the course of labour. These reciprocal effects vary according to the situation of the tumour. The distinction between pelvic and abdominal tumours during delivery is in this respect, and from the point of view of treatment, so important that I shall deal with the two conditions separately.

I. ABDOMINAL TUMOURS.

WHEN an ovarian tumour occupies the abdomen during labour the effects which it produces depend chiefly on the size of the tumour, on its relation to the pelvic brim and on the nature and extent of its adhesions. An examination of the records of several hundred cases shows that the labour is generally in greater or less degree retarded, though several cases are described as having been unusually rapid, and many are stated to have been of normal duration. As instances of almost precipitate labour I may refer to a case reported by Cullingworth,¹ in which the labour is described as "very short, consisting of little more than one long violent pain," and to one recorded by Hardy,²

¹ Cullingworth, *Practitioner*, April, 1900.

² Hardy, *Lancet*, 1845, vol. i.

which so well illustrates the dangers of ovarian tumour during labour that I append the following abstract :—

Case XVII.—An ovarian tumour was discovered in the pelvis of a woman in labour with her first child. It was with difficulty pushed above the brim, after which labour terminated normally. She passed through her next pregnancy without any trouble, and labour was so rapid that the child was born before Hardy arrived. Great pain was complained of thereafter, and the woman died on the fourteenth day with symptoms of peritonitis. At the post-mortem examination there was found a dermoid tumour with twisted pedicle which had ruptured during labour.

As a rule, however, ovarian tumours, small as well as large, exercise a retarding influence on the progress of labour. The delay is usually in the second, though it may occur also in the first, stage of labour. It is due to several causes. Large tumours push the uterus to one side, and with it may carry the head so far towards the iliac fossa that it cannot engage the pelvic brim. Another factor in the delay is the obliquity in the uterine axis, which is always associated with the larger tumours, and which leads to a greater or less waste of uterine force. Smaller tumours, fixed in the iliac fossa and projecting over the pelvic brim may give rise to a similar obliquity, and, as in several reported cases, prevent the presentation from entering the pelvic inlet. It is possible also that, where uterine adhesions exist, the activity of the muscular contractions may be interfered with, while in the case of large tumours the power of the uterus will be impaired by the distress and discomfort to which the woman is subjected during pregnancy. Where there is great distension delay will occur in the second stage from interference with the expulsive action of the abdominal muscles. It is reasonable to assume also that, where adhesions exist between uterus and tumour, retraction will be hindered in the third stage of labour, though no definite

proof of this can be adduced beyond the occasional occurrence of post-partum hæmorrhage. Fortunately extensive adhesions in the end of pregnancy do not seem to be common, probably owing to the rapid growth of the uterus which breaks down old and prevents the formation of new adhesions. A case has been quoted where the tearing of adhesions from this cause produced hæmorrhage and collapse (p. 23). That adhesions of the uterus to neighbouring structures, apart altogether from ovarian disease, may be a cause of post-partum hæmorrhage has been maintained by Graily Hewitt.¹ Several instances have been reported where hæmorrhage in the third stage was so profuse as to demand immediate removal of the placenta, but in one case only—that of Webb²—does post-partum hæmorrhage seem to have proved fatal.

Effect of Labour on Ovarian Tumour.—In addition to the above influences exerted by the tumour on the course of labour, we have to consider the effects of the parturient processes on the tumour itself. These are largely mechanical. During the uterine contractions the tumour is subjected to increased pressure, which may cause rupture or other injury. Rupture during labour is reported in 34 cases. Almost equal danger lies in the production of torsion, which is especially liable to occur in the third stage owing to the greater movement of the tumour allowed by the increased space in the abdominal cavity. In some cases torsion was favoured by the existence of adhesions to the uterus. In the presence of adhesions, too, may be found a cause of the greater frequency of rupture of ovarian cysts during labour. It is easy to understand how the dragging on a thin cyst wall, which must take place when the uterus contracts in the final effort of expulsion, will favour this accident. As a factor in the production of both torsion

¹ *Obstet. Trans.*, vol. xi., p. 108.

² Jetter, *loc. cit.*, p. 13.

and rupture, Herman,¹ with considerable probability, mentions the abdominal manipulations of the medical attendant. That rupture may occur in this way is seen in a case recorded by Löhlein,² in which a cyst ruptured during a somewhat vigorous disinfection of the abdominal wall preliminary to ovariectomy. Another common effect of labour is an alteration in the position of the tumour. Several cases are recorded in which an abdominal tumour was displaced into the pelvis during the third stage, thereby interfering with the removal of the placenta. Though obvious effects on the tumour during the actual progress of labour are not so frequent as might be expected, there can be no doubt that many of those which manifest themselves in the puerperium have their origin intra-partum.

Symptoms.—There are no special symptoms which uniformly mark the presence of an ovarian tumour during labour. The character and duration of the process may be in every way normal. In many cases the tumour was not detected during or even immediately after delivery. Here, as in other cases where the tumour was discovered during labour or known to exist before, no unusual symptoms were observed. This, indeed, would seem to be the rule where no complication, such as torsion or suppuration, exists. On the other hand, it is often stated that the labour was accompanied by more than the usual degree of pain. For example, in eight of Aust Lawrence's cases³ the suffering is stated to have been excessive, or to have been greater than in previous confinements, and in all complications ensued soon after delivery. In some cases the pain was continuous, being usually referred to the region of the tumour; in others it accompanied the

¹ *Diseases of Women*, p. 755.

² *Gynäkologische Tagesfragen*, Heft iv., Fall ix.

³ *British Medical Journal*, 1893, ii., p. 622.

uterine contractions only, which were then described as of an excruciating character.

The symptoms being thus uncertain, the diagnosis must rest on the physical evidence of a double tumour in the abdomen. The contractions of the uterine portion make the differentiation less difficult than during pregnancy. After the birth of the child the lax abdominal wall will usually make the recognition of the tumour easy, though on several occasions a second child was diagnosed. A little care should prevent this mistake.

While the detection of an ovarian tumour during or on the completion of labour presents little difficulty, the value of a knowledge of its presence is great. From omitting to make the discovery acute symptoms, arising during the puerperium, have not uncommonly been regarded as due to puerperal infection, and many lives have thus been lost that would have been saved by timely operation.

Treatment.—What treatment should be adopted when an ovarian tumour is detected in the abdomen during labour? Although it is conceivable that ovariectomy during labour, which has been, at least, fifteen times performed successfully for pelvic tumours, may come to be the recognised treatment of these cases in suitable conditions, yet it would not, at the present time, be undertaken save under exceptional circumstances. So far at any rate it has not been recommended. Even Mr. Bland-Sutton,¹ one of the most intrepid of surgeons, who advocates ovariectomy in all cases of pelvic tumour during labour, advises that “if the tumour offer no obstacle to the passage of the fœtus it should not be interfered with till after the puerperium”.

¹ “The Surgery of Pregnancy and Labour Complicated by Tumours,” *Lancet*, 1901, vol. i.

Our aim must be to facilitate labour, to aid dilatation where necessary, and to complete delivery at the earliest possible moment. By this means the risk of injury to the tumour is reduced to a minimum. Care must be taken not to injure the tumour in the manipulations for the removal of the placenta. Till the removal of the tumour, which should be effected as soon as possible after labour, the case must be closely watched.

II. OVARIAN TUMOURS IN THE PELVIS DURING LABOUR.¹

THE presence of an enlarged ovary in the pelvis during labour forms so serious an obstruction that it must always give rise to the greatest anxiety on the part of the medical attendant. It is a condition in which early and active interference, in the interests of both mother and child, is imperatively called for, and it will be admitted that in so formidable a complication it is of the greatest importance that the nature and the time of this interference should be clearly determined and clearly defined. To quote the words of Dr. D. Davis,² "the rules for the management of such cases can never be made too explicit and circumstantial".

Hitherto the subject has not received the consideration in obstetric works which its importance merits. Its discussion

¹ This chapter was read as a paper, entitled "The Obstruction of Labour by Ovarian Tumours in the Pelvis," before the Obstetrical Society in 1897. My original intention was to bring it into conformity with the sections on pregnancy and the puerperium by altering the whole text and incorporating the more recent cases and views, but on fuller consideration I decided to leave it unchanged. The cases obtained since 1897 are tabulated, and form a supplement to the tables in the original paper, while the additions that have been made to the text are included in brackets. With the view of bringing the treatment into accordance with more recent opinion a short chapter is added summarising the views expressed by the Fellows of the Obstetrical Society in the discussion which followed the reading of the paper, and those since expressed in medical literature.

² *Elements of Operative Midwifery*, p. 109.

has been left largely to occasional papers and to casual contributors. It is not surprising, then, that the general practitioner when confronted with a case of this character should be in doubt as to the appropriate treatment to adopt, or even at times, as will be seen from the cases I propose to review, be in doubt as to the nature of the condition with which he has unexpectedly been called to deal. The consequence has too often been an expectant policy, based on the hope that nature would of herself overcome the obstacle. But, as experience teaches us, nature can succeed in these cases only at a great risk, and if she fail the delay has aggravated the danger and allowed the most favourable time for treatment to pass. Here, as in all cases of obstructed labour, the results are the more favourable the earlier the necessary treatment is instituted. In not a few of the recorded instances the fatal issue is to be attributed not to the measures adopted, but to the delay in adopting them.

It may be well at the outset to indicate the limits and scope of this paper. It deals only with *ovarian* tumours *situated in the pelvis* and forming a mechanical impediment to the progress of labour. We are not here concerned with the influence or treatment in pregnancy, even where the tumour is found to occupy the pelvic cavity. The results of artificial premature labour require separate consideration, and are therefore not included. It is surprising in how few of the cases was the existence of any abnormality suspected during pregnancy. In the great majority the complication was not detected till vaginal examination during labour, and in consequence the necessary treatment had frequently to be adopted in unfavourable circumstances and with insufficient assistance. To this may be attributed a considerable share of the excessive mortality.

Before proceeding to review the results of the various methods of treatment which have been directed against this obstruction, I propose briefly to submit the clinical history of two cases, one of which came recently under my own observa-

tion, while the other occurred some years ago in the practice of Dr. Bruce, of Dingwall.

Case XVIII.—On the evening of 25th August, 1895, I was summoned to attend Mrs. W—— in her fifth confinement. She was thirty years of age, strong and well built. Her previous labours were very tedious, and, with the exception of the last, instrumental. Her recoveries were good, save after the second child, when she had an inflammatory attack lasting several days during the second week of the puerperium. Towards the end of the present pregnancy she was much troubled with down-bearing pain and with irritability of the bladder. For the last three months of gestation she felt something protrude from the vulva on straining during urination. This increased till latterly it was the size of an egg, probably a cystocele, but no mention of it was made till after delivery.

Labour began on the afternoon of 25th August. When seen at 8 P.M. the os was the size of a shilling, thick, but soft and dilatable; pains weak, at intervals of ten minutes; head presented; pelvis and vagina apparently normal. At 12.30 A.M., when next seen, the os was about the size of a florin, and much thinner; pains of moderate strength and frequency. At 4 A.M. it was found she had made considerable progress, the os being more than half dilated, and the uterine contractions much stronger. The posterior vaginal wall was now felt to be occupied by a flattened fleshy mass of about the size and thickness of a well-developed placenta. The swelling was thickest at its centre; its lower border reached almost to the vulva, while above it tapered gradually to the promontory, where it seemed to end. It completely filled up the hollow of the sacrum. No tenderness was complained of on pressure. With each pain the tumour could be felt to become tense and more elastic. It seemed uniform, and gave the impression of being entirely cystic.

About 5 A.M. the membranes were ruptured, but the head did not descend, though the pains were frequent, strong and

down-bearing. The swelling increased in size, and it was now seen that it would form a serious obstacle to the passage of the head, narrowing as it did the conjugate of the cavity by over 2 inches.

Finding it impossible to remove the obstruction, and uncertain, I confess, as to its nature, I sent for Professor Stephenson.

After careful examination he endeavoured to push the mass up, but without success. The patient, who had been partially under chloroform, was now deeply anæsthetised, when, with his whole hand closed in the vagina, Dr. Stephenson succeeded by steady pressure in raising the tumour above the brim. It passed up with a jerk towards the right iliac fossa. I then examined, found the pelvis clear, at once applied the forceps, and delivered with a few tractions a living male child considerably over the average size. The placenta was removed by expression. To our surprise, the tumour could not be felt in the abdomen. The woman made a most satisfactory recovery, interrupted only by an attack of pain in the right inguinal region on the fifth day. This lasted only for a few hours, and did not in any way retard her recovery.

As I left town soon after her confinement she was not again examined till 21st September. For several days she had been affected with a dragging pain in the back, and occasional down-bearing—so troublesome as to interfere with her domestic duties. She complained also of an uncomfortable fulness in the abdomen. On examination the uterus was found well involuted but retroverted, the fundus lying in Douglas's pouch. The hypogastrium was occupied by a rounded uniform tumour almost the size of a foetal head, and resembling in position and in consistence the uterus at about the third day of the puerperium. It was freely movable and quite distinct from the uterus, which could readily be elevated into its normal position.

On 24th September Professor Stephenson saw Mrs. W—— along with me. The tumour, it was found, passed readily into either iliac fossa, and could be pushed up under the ribs. By strong pressure it could be pushed downwards and backwards into the pelvic brim, giving the impression that further effort would force it into the position it occupied during labour.

At the end of six months the condition was practically unchanged, save that the tumour had lost its central position, and now lay in the right iliac fossa, while the uterine axis was normal.

The woman willingly consented to the removal of the tumour, and it was decided to operate on the completion of lactation. Examining her, however, on 18th July, 1896, a few days after weaning, I found to my disappointment that she was already pregnant about the eighth week. The operation was accordingly postponed till 29th August, when ovariectomy was performed by Dr. Scott Riddell. The recovery was excellent, save for a rise of temperature on the fifth day, attended with sore throat, the pyrexia continuing for five days.

The tumour, which I now show to you, proved to be a dermoid of the right ovary. It weighed 1 lb. 12 oz., and consisted of two parts—a cystic part which formed the lower and anterior third, and a solid part forming the upper and posterior two-thirds, and containing fatty matter, hair and bone. It had “the longest pedicle I have seen in any case of ovarian tumour, and was quite free from adhesions”.¹

On 15th January, 1897, Mrs. W—— was delivered of a small, living, female child. The labour, a contrast to her previous experiences, was so rapid that the child was born quite unexpectedly half an hour before my arrival. The child was smaller than on former occasions, and weighed only 6 $\frac{3}{4}$ lb. She made an uneventful recovery.

¹ Note by Dr. Scott Riddell.

Case XIX.—M. McH——, single, aged twenty-nine, i.-para. Labour began on 6th March, 1879; seen early in labour; head presenting; a fulness observed in posterior vaginal wall which was thought to be due to a loaded rectum. A strong purge was ordered, but though this acted freely twice, the fulness still remained. A more careful examination now revealed the presence of a tumour in the posterior vaginal wall, occupying the hollow of the sacrum. Repeated efforts were made, *per vaginam*, to dislodge the tumour, both without and with an anæsthetic. As these were unsuccessful, an examination was made *per rectum*, when the tumour unexpectedly slipped up above the pelvic brim. Continuous downward pressure was then made on the uterus to prevent the tumour from again descending. Labour now progressed satisfactorily, but had to be completed by the forceps. The child was over the average size, and living. After labour the tumour was readily felt in the abdomen, and could be pushed up till it disappeared behind the ribs on the right side. A medical friend who saw the patient next day had difficulty in finding the tumour, only detecting it on searching the right hypochondrium, where it lay just under the ribs. Convalescence without any bad symptom. Subsequent history unknown.

To these hitherto unrecorded instances I venture to add a short abstract of the most recently published case, which was communicated by Ostermayer to the *Centralblatt für Gynäkologie* for 29th May, 1897. The case possesses several features of great interest, and of value in their bearing on treatment, which must be my excuse for troubling the society with the following brief description.

Case XX.—Ostermayer, called in consultation to a woman in labour over thirty hours with her seventh child, found a nonfluctuating doughy swelling, harder at parts, filling up the hollow of the sacrum and preventing the head from entering the brim; difficult to decide as to cystic or solid character of tumour;

reposition failed under narcosis ; the great tension of the lower uterine segment demanded immediate action ; resolved to perform craniotomy in interest of mother, in preference to risking either trial puncture or incision of tumour on account of great danger of infection of peritoneum through the exudation of cyst contents ; after perforation unable to extract ; determined to try incision before resorting to Cæsarean section ; incision 6 cm. in extent into vaginal wall without result ; enlargement of incision with no success. Ostermayer now inserted his finger into the opening and found obstructing it a ball of hair the size of a small apple ; its removal followed by the escape of about 1 litre of thick grey matter ; three more balls of hair removed ; tamponaded sac with iodoform gauze ; prevented from suturing by descent of head ; child extracted with cranioclast ; tamponaded uterus and vagina ; in two days all gauze removed, that in cyst cavity giving putrid stench ; proposal to extirpate sac rejected by patient ; sac accordingly secured to vaginal wall and treated by drainage and irrigation ; six weeks after there was still a secretion of thick foetid liquid from the sac, which is now much contracted ; ambulatory treatment continued till the time of writing.

The gravity and importance of the complication which these cases illustrate have led not a few obstetricians to direct attention to the condition, so that there exists a not inconsiderable amount of literature on the subject. While Park in 1811 recorded in the *Medico-Chirurgical Transactions* a series of six cases that came under his own observation, the merit of making the first important collection of published cases belongs to Merriman. In 1819 he submitted to the Medical and Chirurgical Society, in his well-known paper, an analysis of eighteen cases collected from various sources. Reference is next found to the subject in Puchelt's admirable work, *Commentatio de tumoribus in pelvi partum impredientibus*, published in 1840, in

which he detailed the clinical histories of 32 instances of obstruction due to ovarian tumours. On similar lines was the paper by Lever in the *Guy's Hospital Reports* for 1842-3, in which he added to Merriman's series 6 further cases of ovarian obstruction. We find the subject next very exhaustively dealt with by Professor Litzmann, of Kiel, in a series of able articles in the *Deutsche Klinik* for 1852. To Puchelt's cases he was able to add 24 new observations. In 1854 and 1861 appeared the valuable dissertations of Hirsch and Jetter, which were followed in 1867 by the classical paper read by Dr. Playfair before this society, in which a detailed analysis was given of previously published cases, 57 in number. This paper has formed the basis on which most subsequent writers have founded their descriptions and their treatment. It contains, however, several inaccuracies both of fact and of inference, as will subsequently be pointed out.

Since 1867 no attempt has been made in this country to deal with this important form of obstructed labour. In Continental medical literature, however, there have appeared several valuable contributions, notably the excellent dissertation of Heiberg, of Copenhagen, published in 1881, which is without doubt the most careful and accurate compilation hitherto published. In the *Archiv f. Gynäkologie* for 1882 there is published a critical review by Lomer, who added 4 hitherto unrecorded cases. More recently Staude,¹ Rubeska² and Hohl³ have discussed this subject, on the great importance of which all are agreed.

Notwithstanding these various attempts to establish on a satisfactory basis the treatment of labour obstructed by ovarian tumours, there still exists a divergence of opinion among

¹ *Zeitschr. f. Geburt. u. Gynäk.*, 1895.

² *Monatsschr. f. Geburt. u. Gynäk.*, 1895.

³ *Archiv f. Gynäk.*, Band li.

obstetric authorities—evident even in the more recent contributions—which affords sufficient justification for redirecting attention to the subject. In the thirty years that have elapsed since Dr. Playfair read his paper, so many cases have been recorded that a review of our position in the light of further experience seems desirable.

The cases which I now propose to submit to analysis include Playfair's series, which, however, has been corrected in one or two particulars. Case 57, for example, must have been included through an oversight, as the tumour was a malignant growth from the sacrum, and *not* ovarian. Again, case 15 is the same as that reported by Ashwell (Playfair, No. 53). For these 2 cases I have substituted 2 others (table i., 21 and 25), where the labours were in the same patients as No. 5 and No. 7 of Playfair's collection, which thus remains at 57.

To these 57 I have been able to add 126, making a total of 183 cases of labour obstructed by an ovarian tumour. To borrow the words of Professor Stadfelt,¹ in his elaborate paper on labour obstructed by pelvic tumours: "It has been an onerous task to compile the cases adduced in this paper, and I am far from flattering myself I have succeeded in gathering all the published cases".

[Eighty additional cases have been collected. These will be found appended to their respective tables. The total number of cases is thus increased to 263.]

In the accompanying tables² the cases have been arranged according to the treatment adopted. Playfair's cases, similarly classified, are kept separate for purposes of comparison.

In analysing the results I have endeavoured to eliminate as far as possible the errors to which statistical deductions are always liable, by determining, with as much accuracy as

¹ *Obstet. Journal of Great Britain*, vol. vii., p. 202.

² See *Obstet. Trans.*, vol. xxxix., p. 363.

the data permit, the pathological character of the tumour, the duration of labour, and its effects on the physical condition of the woman antecedent to treatment. A statistical inquiry which ignores these factors must be largely deprived of its value.

The mere comparison of deaths and recoveries following any individual treatment tends to lead to erroneous conclusions. In many of the fatal cases the untoward result is to be ascribed, not to the operative measures, but to the preceding exhaustion from delay, which, as their history shows, might in many have been avoided.

Further, in estimating the value of any method the character of the convalescence must not be overlooked. In case 20, table iii., for example, the record concludes: "but after a protracted convalescence, seemed to recover in some measure from the effects of her confinement". Again in case 42, table iii., we find that the patient "had a tedious and difficult recovery, if, indeed, it could be termed a recovery". After a miserable existence she was at length released "from her sufferings about eighteen months after her delivery". Results such as these, and they are not uncommon, though classed as recoveries, can scarcely be adduced in favour of the treatment which was employed.

A few points of general interest may with advantage be here noted. The surprising infrequency with which the existence of any abnormality was suspected during pregnancy has already been pointed out. In 33 only—or in 18 per cent.—was ovarian disease discovered previous to the actual onset of labour, and in few of them was the discovery due to symptoms referable to the disease. The cause obviously lies in the fact that its situation in the pelvis implies a tumour so small as to occasion no great inconvenience; but be that as it may, from the point of view of treatment it is an important consideration. It follows that radical measures

during pregnancy were possible in only a small percentage of cases, and thus, that two of the three methods recommended by Sir John Williams¹ for preventing injury to the ovarian growth, namely, removal of the tumour during pregnancy, and the anticipation of labour by the Cæsarean section, are comparatively seldom applicable.

Another interesting point bears on the character of the tumour. In 70 cases the evidence is insufficient to form a reliable opinion. In 113 the nature of the tumour had been ascertained with comparative certainty. In 49 the enlargement was a simple or multilocular cyst, while it was a dermoid in 46, in 1 of which the other ovary, enlarged and cystic, also occupied the pelvis; in 9 the tumour was malignant in character; in 5 a fibroma; in 2 colloid; in 1 fibro-cystic; and in 1 a cystic adenoma. In 12 cases the abdominal ovary also was found affected.

It is generally believed that the dangers are greater when the obstructing tumour is a dermoid, and this belief is fully borne out by experience. In the 49 cases where the ovary was cystic 10 deaths occurred, if we deduct 2 in which death was due to eclampsia. In the 46 cases of dermoid, 18 deaths are found—a mortality almost double.

[Of the 80 cases which have since been obtained no fewer than 37 were dermoids, while 26 were simple or multilocular cysts, and 2 were sarcomatous. Of the fatal cases the tumour proved to be a dermoid in 5; in 1 a semi-solid adenoma; in 2 a simple cyst.]

The total number of maternal deaths is 56, or 30·5 per cent. Of the children whose fates are noted, over one half perished. The causes of this high maternal mortality are various, but almost all are referable to the injuries sustained by the tumour during the process of labour.

¹ Williams, *loc. cit.*

[Eight maternal deaths occurred in the 80 more recent cases. The mortality in the total series of 263 cases is thus 24·5 per cent. Of the children 19 are stated to have perished, giving a total mortality of over 47 per cent.]

The severity and result of the subsequent inflammation seem to depend more on the character of the tumour contents than on the degree of pressure and contusion to which it has been subjected. As may be surmised, the most frequent immediate cause of death is peritonitis, due at times to rupture of the cyst, at times to infection and suppuration of the cyst contents, which, as recent investigations show, are peculiarly liable to follow slight injuries, or even to originate without apparent cause in the case of dermoid tumours.

Although the maternal death rate in all recorded cases is nearly 31 per cent., it would be unfair to take this as representing accurately the risk attending this complication with the improved methods and knowledge of to-day. An interesting comparison might be made between our collection and Playfair's, but the contrast will be still more striking if we compare the mortality of the last twenty years with the mortality in all earlier cases. Since 1876 there have been recorded 48 instances of this complication; 6 of the mothers, or only 12·5 per cent., and 17 children were lost—the fate of 2 children being unknown.

In the 135 earlier cases the maternal death rate is 37 per cent., while the foetal mortality of 60·5 per cent. compares unfavourably with 34·7 per cent. in the later group. Though probably a mere coincidence, it may be noticed that the decrease in the maternal and foetal death rate is almost exactly the same, 24·5 per cent. This improvement might naturally be attributed to antiseptic methods; but that antiseptics are not the sole or even the most important cause may reasonably be concluded from the great increase in the proportion of children saved. A study of the tables shows two other contributing

factors, namely, an earlier resort to treatment and the greater frequency with which reposition has been attempted and effected. In 34 of the later cases in which the duration of labour is more or less accurately ascertainable, the average duration is almost exactly twenty-four hours. Of the 135 earlier cases it is possible fairly to approximate the duration in 70 only, a few being assumed as of forty-eight hours' duration, where the labour is described as "very protracted". In these 70 the average duration is almost forty hours. Thus, in later years there is evidence of an abandonment, with beneficial results, of the old policy of giving nature a "full and fair trial" before attempting any remedial measures.

Rupture of the cyst occurred during labour in 15 cases, death resulting in 9. In 5 the cyst ruptured spontaneously, in almost all after a protracted labour; 2 of the mothers died. In 3 rupture took place during attempts at reposition, which was successful in 2, but gave rise to fatal peritonitis; in the third the mother made an excellent recovery, labour lasting only 7 hours. In 1 case rupture occurred during vaginal examination, and proved fatal; in 1 during version; in 3 during traction with the forceps, all proving fatal; and in 2 during craniotomy, 1 mother recovering.

[In 2 other cases (Schwarz and Spencer) rupture of a dermoid cyst took place during version, in both with a fatal result; in a third rupture, also of a dermoid, occurred during reposition: the woman died three days after.]

In 5 cases of great interest there occurred what Playfair terms a "natural ovariectomy," the tumour prolapsing through a rent in the recto-vaginal septum; in 2 of them the tumour passed *per rectum*, in 1 soon after birth, in the other during labour, the former proving fatal; in 3 the tumour escaped by the vulva, in 1 suddenly slipping out during strong efforts with the forceps, the mother making a slow recovery, in 1 the tumour was expelled with the placenta, and in the third it

passed a few hours after birth, both the latter proving fatal. The interest of these cases lies in the illustration they afford of the ease with which, in certain circumstances, vaginal ovariectomy may be performed during labour.

[Among the recent cases 8 additional examples of this accident are to be found. In 2 the tumour was spontaneously expelled, once *per rectum*, once *per vaginam*; in the other 6 extrusion took place during traction with the forceps—4 times *per rectum*, twice *per vulvam*. Notwithstanding this rough and ready ovariectomy, 7 of the mothers made good recoveries; 1 died in thirty-two hours of pelvic peritonitis. In the 7 cases in which its character is mentioned the tumour was a dermoid.]

Rupture of the uterus was the cause of death in 2 cases (Ward and Lee); while in 1 of Nathan's cases the lower uterine segment ruptured, the mother recovering after a protracted convalescence.

[In the *Obstetrical Transactions* for 1900 Lewers reports a case in which rupture of the uterus occurred in a labour obstructed by a dermoid tumour; whether the rupture was spontaneous or took place during version is uncertain. Death supervened in fifty-seven hours.]

Three women died undelivered (Schamberg, Basc, Lomer). In the case recorded by Lomer version was performed, but in the efforts at extracting the trunk was torn from the head, which was not removed before death supervened; the woman had been over eighty hours in labour.

Two cases—not included in the tables—are recorded, 1 by Gooch and 1 by Denis, in which death occurred before delivery, but in both it is doubtful if the diseased ovary was in the pelvis.

Of the 183 cases with which this analysis deals, the termination of labour was left to the natural powers in 35, with a fatal result to the mother in 12; while of the children 16 are

known to have been lost, the fate of 8 being doubtful. To this group are referable 6 of the cases of cyst rupture, 4 of the mothers recovering. In Fischel's case (table i., case 3) rupture took place into the peritoneal cavity during attempts at reposition; the labour lasted only seven hours, and the puerperium was afebrile. One death (case 10) occurred with delivery uncompleted, while 2 were due to rupture of the uterus. In Hohl's case, owing to inflammatory symptoms, ovariectomy was successfully performed on the seventh day of the puerperium. In case 12, where the woman is stated to have recovered, death occurred five and a half months after from suppuration of the cyst and consequent pyæmia.

Of the mothers who recovered, a note of the convalescence is found in 9; of these, 4 are expressly stated to have had a protracted and unsatisfactory recovery.

Reposition of the tumour was effected in no fewer than 41 instances, and this number could have been greatly augmented had the attempt been more frequently made. In at least 60 of the cases the possibility of dislodging the obstruction seems never to have been entertained. It is significant of the improved knowledge and management of cases of this kind that in 35 instances in our collection, or 28 per cent., the tumour was pushed above the brim, while in Playfair's series we find reposition in only 10·5 per cent.

In 2 cases reduction was effected *per rectum*, in 1 by the aid of Barnes' bags in the knee-elbow position. In our own case and in Hardy's the tumour resisted all efforts at reduction till the whole hand was inserted into the vagina.

It will be seen that 6 deaths followed reposition, while only 7 of the children are stated to have been still-born; in 6 cases the fate of the children is not recorded.

Of the mothers who recovered, the convalescence was in almost all cases normal. Of the 6 deaths, 1 resulted from eclampsia, 1 from puerperal fever during an epidemic, and in 1

the tumour was malignant, causing premature labour. Neglecting these 3 results as accidental, we find only 3 deaths attributable to treatment—a mortality of 8 per cent. In 1 the tumour slipped unexpectedly above the brim during attempts to turn after a protracted labour; in the remaining 2 death was due to rupture of the cyst into the abdominal cavity. It is expressly stated in these cases that many fruitless attempts were made, in 1 extending over many hours.

In 22 of the 41 the labour was completed by the natural powers; in 7 reposition was followed by the forceps, all the mothers recovering, in 2 by turning. In the 1 which proved fatal attempts at turning preceded reduction, which occurred accidentally.

In 5 cases the tumour was afterwards successfully removed—in 1 on the fourth day of the puerperium; in 1 three months after; in 2 a year after, in 1 of which the woman was in the fourth month of pregnancy; and in 1 three years after.

[Twenty-one cases have been added to table ii. With 2 exceptions the result was successful for the mother. In Bland-Sutton's case torsion of the pedicle occurred on the third day of the puerperium. Ovariectomy was performed, but did not prevent a fatal issue. What interval elapsed between the onset of torsion and operation is not mentioned. In the other fatal case a dermoid cyst ruptured into the peritoneal cavity. In 2 cases only, in 1 of which spontaneous premature labour occurred, is the child stated to have been lost.]

Puncture or incision of the tumour was resorted to 43 times, resulting in the death of 8 mothers and of 24 children. In 3 cases the puncture was made from the rectum, in the others from the vagina. Incision was substituted for puncture on 3 occasions, 2 of the mothers recovering. Discounting 1 death which was due to eclampsia, we get a maternal mortality following puncture of 18·6 per cent. If we inquire into the character of the convalescence, we find that in no fewer than 15

of the 18 cases in which it is noted it was unsatisfactory, in some cases the febrile symptoms extending over several weeks. To not a few of them, indeed, the description may be applied with which Wheelhouse closes the admirable record of his case, "long in a critical condition, but ultimately seemed to recover in some measure from the effects of her confinement". In Hohl's case the dangers of the puerperium were avoided through the removal of the tumour by abdominal section two hours after delivery.

It is true these figures embrace not only those cases where puncture formed the sole treatment, but also those where it was followed by embryotomy, forceps or version. Clearly, however, these cannot be excluded, as Playfair excludes them, in appraising the value of puncture, for we find that in most of them nature was given "a fair and full trial," and not till she failed was a resort made to further measures. In case 43, for example, embryotomy was not performed till fifty hours after the beginning of labour, and over sixteen hours after puncture, the puncture having only partially removed the obstruction.

In 11 cases puncture was followed by the forceps, 10 mothers recovering; 8 times by craniotomy, 6 mothers recovering; in 3 the forceps failing, craniotomy was resorted to, 2 mothers recovering; in 1 case, which proved fatal, puncture was followed by turning.

[In the 13 recent cases in which aspiration or incision was employed all the mothers save 1 recovered, while the puerperium was in most cases normal, but in 1 suppuration followed, and in 2 the convalescence was complicated by febrile or peritonitic symptoms.]

Table iv. shows that version formed the sole treatment in 17 cases, with a maternal mortality of 6; while of the children 10 were still-born, the fate of 3 being unknown.

In 4 of the 5 cases in which it is noted, the convalescence was febrile and protracted, necessitating in 1, a few months

after, the removal of the tumour, while in another death took place at the end of a year from enlargement and suppuration of the cyst. In the cases where version was combined with other measures, the result was in no way more satisfactory: once it followed puncture with a fatal issue to both mother and child; twice it was employed after reposition, both children and one mother being lost.

[Further evidence but serves to confirm the dangers of version. It will be seen that 3 of the 5 cases in which it was employed proved fatal.]

In only 14 cases was the forceps alone relied on—a proof of the inefficacy of ordinary obstetric operations in this complication. The results were even more disastrous than followed version; 8 of the mothers died, while only 4 of the children are known to have survived. Of the mothers who survived, the convalescence, where noted, is found to have been unsatisfactory; in 2 necessitating the removal of the tumour after the puerperium. In 2 cases the cyst ruptured during traction, both mothers succumbing; in 2 others, as already mentioned, the tumour escaped through a rent in the posterior vaginal wall.

[The danger of attempting to drag the head past the obstructing tumour with the forceps is further illustrated in the cases which have been added to table v. Though 1 only of the 11 proved fatal, in no fewer than 7 the recto-vaginal septum was torn and the tumour extruded either *per vaginam* or *per rectum*.]

The forceps were employed 22 times in combination with other measures, 7 times after reposition, 15 times after puncture, in 3 of which they failed, delivery being completed by craniotomy.

In 18 cases labour was terminated by embryotomy alone: 10 mothers recovered, in 7 of whom the convalescence is noted; in 4 it is pronounced favourable, in 3 unsatisfactory.

Further, embryotomy was employed once after reposition as the child was known to be dead, and 11 times after puncture, in 3 proving fatal.

On 10 occasions delivery was effected by Cæsarean section; 2 mothers recovered and 6 children were saved. In all, with 2 exceptions, it will be seen that the operation was not undertaken till the woman was exhausted by a protracted labour, which in 4 of the cases lasted at least three days.

[The recent cases of Cæsarean section show a marked improvement on the earlier results. Only 1 of the 12 cases was unsuccessful. In all the tumour was at the same time removed, while in 3 it was found necessary to remove the uterus.]

Abdominal ovariectomy, intra-partum, was performed on 2 occasions. Both labours were, on full dilatation of the os, at once completed by the forceps. The mothers made excellent recoveries.

[Increased experience of abdominal ovariectomy during labour confirms the promise of the first operations. Six further cases are recorded with a successful issue for the mothers and, where ascertained, for the children.]

In 3 cases the obstructing ovary was removed *per vaginam* during labour, with a successful result to both mothers and children. In Rubeska's case, though the puerperium was normal till the eighteenth day, an operation was subsequently necessary owing to febrile symptoms with refilling of the tumour. This was successfully accomplished.

[Four further cases of vaginal ovariectomy during labour have been added. All were successful.]

From a perusal of the literature of this subject, and a careful study of the clinical histories of published cases, I venture to make the following observations and practical suggestions.

The diagnosis of this complication of labour presents, as a

rule, little difficulty. Doubt may occasionally arise as to the actual character of the tumour, but the determination of this, in such cases, is of relatively little practical moment.

The important point is to be aware of the *possibility* of an enlarged ovary occupying the pelvis. In the history of several of the cases we find a good illustration of the truth of the dictum that "to diagnose you must suspect".

An elastic tumour in Douglas's pouch, more particularly if fluctuating, is in all probability ovarian. As an aid to diagnosis, rectal examination should never be omitted. From neglect of it the obstruction was in more than one instance regarded as due to a defective pelvis. In a few cases it was concluded that the tumour was an extra-uterine pregnancy. Jetter recommends simultaneous rectal and vaginal examination with a view to ascertain the character and consistence of the tumour.

Diagnosis of the condition should at once be followed by an attempt at reposition. This should not be delayed till the membranes are ruptured, as is usually recommended. It is true the diminution in the uterine bulk from evacuation of the liquor amnii may favour the attempt and be necessary to success in some cases; but the elevation of the tumour should be effected as early as possible, if for no other reason, because it facilitates dilatation, which the presence of an obstruction in the pelvis undoubtedly retards. In cases recorded by Granville¹ and Sir John Williams² the tumour was pushed up towards the end of pregnancy, and remained in the abdomen during labour. The danger of delaying till the membranes are ruptured is well seen in the case related by Lahs;³ more or less active pains were present for eight days, the patient was exhausted, but when seen by Lahs the pains were sus-

¹ Granville, *Lancet*, 1849, ii., p. 630.

² Williams, Communicated.

³ Lahs, *Deutsche Medicin. Wochens.*, 1875, No. 5.

pended, and the lower uterine segment showed signs of rupture, though the membranes were still intact. A further illustration is found in Lomer's case (table iv., case 12), where the os was only the size of a four-shilling piece on the fourth day of labour; the membranes were still unruptured, and the uterus was found under chloroform to be almost as thin as paper.

The attempt to dislodge the tumour may be made without an anæsthetic, but if it fail it should be repeated under full anæsthesia, the advantage of which is sufficiently illustrated in the case that came under my own observation.

The whole hand may be introduced into the vagina, as in table ii., cases 31 and 33, and a steady continuous pressure exerted. Cases which resisted the first attempts at reposition have yielded to taxis extended over a considerable time. That this procedure, urged especially by American authors, is not free from danger will be seen from table i., case 3, and also from table ii., cases 13 and 30, where, though the attempts at reposition succeeded, the tumour ruptured into the peritoneal cavity with fatal result. In these cases it is expressly stated that repeated efforts were made before reduction was effected, and it may be concluded very considerable force was employed. A further illustration of this danger is to be found in the case recorded by Dr. W. Duncan in volume xxxvi. of this society's *Transactions*, where in the early months of pregnancy a pelvic ovarian cyst ruptured into the peritoneal cavity during an ordinary vaginal examination. This unfortunate result is not to be wondered at when it is remembered that spontaneous rupture may take place. The importance, as Dr. Duncan points out, of great care and gentleness in palpating a pelvic cyst should never be forgotten. The opinion expressed by Fischel that forcible reposition, even though rupture should be induced, is safer than puncture from the vagina, cannot be entertained. Where the attempt to effect reduction *per vaginam* fails, an effort should be made from the rectum. Not a few of the

cases illustrate the value of this method, and more particularly our second case, where the tumour, irreducible *per vaginam*, unexpectedly slipped up during rectal examination. The knee-elbow or semi-prone position—favouring reduction—may be found useful in obstinate cases.

[In one of his cases Löhlein (table ii., case 15) found it impossible to dislodge the tumour in the knee-elbow position even under narcosis. He succeeded, however, in the left lateral position under deeper narcosis by getting the uterus simultaneously pushed to one side by an assistant, thus securing more room for the tumour to pass the pelvic brim. This expedient is well worth keeping in mind.]

Where all attempts at reposition fail, the case assumes a much more serious aspect. The prognosis is then influenced mainly by the character and consistence of the tumour, and, little less important, by the duration of labour and its effect on the woman and the uterus. These same factors determine our treatment. It will not now be questioned that active intervention is in all cases imperative. Nothing is to be gained, and much risk may be incurred by an expectant policy. After a careful consideration of all the circumstances, the method best suited to meet the existing conditions must be selected and *at once* put in operation.

Eight methods exist, as will be seen from the annexed tables, whereby either singly or in combination labour may now be terminated, namely, the unaided natural powers, puncture or incision of the tumour, version, forceps, craniotomy, Cæsarean section, laparotomy for the removal of the obstruction, and vaginal ovariectomy.

A priori considerations combine with the statistical evidence to show the dangers of leaving the labour to the unaided natural powers. The older writers on midwifery, however, claimed that nature should first have a full trial, where the obstruction was

of moderate size. Their attitude and teaching, which is undoubtedly accountable for much of the earlier mortality, may be shortly stated in the words of Dr. Davis :¹ " In cases of partial or a very moderate confinement of the parturient passage from this cause it will be prudent to give Nature the fullest opportunity that may be allowed to her, compatibly with the probable safety of the lives and living structures interested in the struggle to effect her own delivery by her own unassisted exertions ".

The risks involved in leaving the case to Nature, apart from the danger of protracted labour, are contusion of the tumour with subsequent inflammation and peritonitis, rupture of the cyst into the peritoneal cavity, and rupture of the uterus. Recorded cases furnish illustrations of all these complications. The danger, therefore, is sufficiently grave to warrant the conclusion, that even in the case of tumours so small as to present an apparently insignificant obstacle to delivery, some measure of artificial aid is imperatively required.

Diminution of its bulk by puncture has been the method most frequently adopted in dealing with an irreducible tumour. The simplicity of the procedure has done much to recommend it as the line of least resistance. Playfair, misled by his statistics, was induced, as already indicated, to give it priority even to reposition.

Where the tumour is entirely cystic, puncture *per vaginam* with a good-sized trocar is, on the whole, the safest method of treatment, although it is not so absolutely free from danger as Playfair's statement indicates. There is evidence more recently of a growing distrust of puncture. The opinion of Fischel that it is more dangerous even than rupture into the peritoneal cavity has already been alluded to. One of the dangers attaching

¹ Davis, *loc. cit.*, p. 109.

to the operation is the difficulty of making certain that the tumour is purely cystic, and, where partially solid, in inducing the belief that the diminution effected in its bulk will allow the labour to be completed, either naturally or artificially, without danger. There is, too, the risk of infection. Gottschalk,¹ in an able paper on the influence of child-bed on ovarian cysts, lays great emphasis on the part played by puncture in the subsequent suppuration and decomposition of the cyst contents. Among others, Hirst's case,² where laparotomy was necessary on the seventeenth day, illustrates this danger. Further, the possibility of peritoneal infection must not be forgotten. It was this possibility that led Hohl,³ when puncture showed the cyst to be a dermoid, to perform ovariectomy two hours after delivery—an operation which the event justified, as part of the cyst contents, it was found, had escaped into the peritoneal cavity. We cannot agree with Lomer⁴ that this danger is imaginary. The existence of adhesions in tumours that are irreducible he holds to be a complete protection against this accident, but the present collection supplies several instances where irreducible tumours were found on post- or ante-mortem section to be entirely free from pelvic adhesions. Experience supports rather the view set forth by Hohl⁵ in the most recent contribution to this subject, that a puncture carried out under all antiseptic precautions still conceals within it several dangers. He concludes, however, that in doubtful cases puncture should be the rule, if only to arrive at a sure diagnosis. Where the cyst contents are found to be infective, and more particularly in dermoid cysts, puncture should, it is now generally admitted, be followed by ovariectomy. Even in those cases where the

¹ "Über den Einfluss des Wochenbetts auf Cystische Eierstocksgeschwülste," *Berlin Med. Gesellsch.*, 1897.

² Hirst, *Medical News*, Philadelphia, 1890.

³ Hohl, *Archiv f. Gynäk.*, 1896.

⁴ *Deutsche Med. Wochenschr.*, 1890.

⁵ Hohl, *loc. cit.*

tumour seems entirely solid, it is usually urged that an experimental puncture should be made before resorting to more formidable measures. Instances are on record where the swelling, apparently a solid mass, proved on puncture to be a tense cyst.

Fritsch¹ prefers incision to puncture of the cyst, believing it to be more free from danger. He makes an incision $1\frac{1}{2}$ inches long in the mesial line of the vagina, beginning at the posterior lip of the os uteri. The cyst wall is at once secured by a suture to the vagina. The incision is then enlarged, and the edges of the cyst united with the edges of the vaginal wound. This was the method adopted by Ostermayer,² who, however, was unable to complete the suture before delivery owing to the descent of the head. Whether the danger of infection is lessened by this plan, Hohl regards as very questionable.

To sum up, then, puncture supplies in many cases the form of treatment relatively best. It should be adopted, where reposition has failed, in all purely cystic tumours, in which it sometimes effects a permanent cure. Even tumours that are partially solid it is permissible to puncture where there would be danger in delaying till further, perhaps unskilled, assistance could arrive. Puncture may in these circumstances form the readiest and safest means of completing delivery, at the same time furnishing indications for future treatment. Puncture is also useful for diagnostic purposes, or as a preliminary to further measures; its dangers, however, must never be lost sight of.

In all cases where the pelvic diameters are encroached on by an ovarian tumour, version, forceps, and craniotomy are contra-indicated as the sole means of treatment. The two latter may legitimately follow reposition, or ovariectomy, or puncture, which has completely removed the obstruction; where,

¹ *Klinik der Geburtsh. Operat.*

² See Case XX., p. 174.

however, puncture has effected only partial diminution, both forceps and craniotomy should, if possible, be avoided. Version is in all circumstances contra-indicated.

The claims of Cæsarean section as a method of treatment in this complication are now undisputed. The fallacy of statistics is well illustrated in our table, which gives an erroneous conception not only of the present dangers of the operation, but also of the relative frequency with which it ought to be undertaken. We find in the history of the cases that, though performed only ten times, the advisability or necessity of it was frequently entertained, but from its terrible mortality the operation was rejected, and other measures, in reality more dangerous, were preferred on account of their more easy performance.

Improved knowledge and technique, I need not remind this society, have in large measure removed the dangers of the operation, and of this Staude's case furnishes a good illustration, for a successful result followed, though the operation was not performed till the labour had dragged on for nearly two days after full dilatation. In Mayo Robson's case, again, mother and child were saved under circumstances by no means favourable. Labour had not begun, but the woman was extremely ill, with a temperature of 103° . The ovarian cyst was full of pus, while behind the uterus, bounded above by the intestines, was a large septic abscess. In both these cases it was found necessary to remove the uterus and appendages.

Within recent years the field of the operation has become narrowed from the introduction of two comparatively new methods—intra-partum ovariectomy by the abdomen or by the vagina. Nevertheless, it must still be regarded as a measure calculated in many cases to give the most favourable results. Hirst¹ even goes the length of expressing the conviction that

¹ Hirst, *loc. cit.*

Cæsarean section followed by the removal of the tumour is preferable to puncture, on the ground that "by this plan many dangers in the puerperium are escaped". I may here refer also to the conclusion at which Dr. Griffith arrived, in discussing the treatment adopted in his case,¹ that "Cæsarean section would have given the patient the best chance of recovery, and that it would be the best plan to adopt under similar circumstances, whatever the nature of the obstructing tumour".

The operation should be performed as early in labour as possible, or, as Sir John Williams² recommends, should anticipate the onset of labour where the tumour is detected during pregnancy. This is the practical lesson which our cases teach.

Briefly, the indications for the Cæsarean section are, an irreducible tumour which puncture has failed to completely diminish, which does not meet the conditions for vaginal ovariectomy, and which on abdominal section is found to be extensively adherent in the pelvis.

Removal of the pelvic tumour by abdominal section intra-partum has been recommended by various authors, but so far it has remained a purely theoretical operation. No instance of it has been put on record. *A priori*, however, it has much to commend it, and demands consideration.

These remarks were written before the publication of Sir John Williams' Cavendish Lecture of this year, in which two instances are recorded, the details of which he very kindly communicated to me. In one the abdomen was opened in the belief that the case was one of extra-uterine foetation, but the child was found *in utero*, and a cyst occupying the pelvis. This could not be drawn up before it was tapped *per vaginam*, and then the operation was successfully completed. Labour

¹Table iv., case 16 (*Obst. Trans.*, vol. xxxix.)

²Williams, *loc. cit.*

pains recurred directly after the operation, and the woman was delivered by the forceps of a living full-term child about twenty-two hours after. In the second case the tumour occupied the right side of the pelvic inlet, pushing the head to the left iliac fossa. It was thought best to operate as soon as labour began, and this was done. The mother, as in the former case, made a good recovery, but the child was born dead.

The utility and safety of this method are thus demonstrated. The cases, however, to which the operation is applicable, are seen on reflection to be limited. In the majority, though not by any means in all, of the cases where reposition has been found impossible, pelvic adhesions exist which render the complete removal of the tumour in the presence of the full-term uterus a measure of the greatest difficulty.

Where the tumour is found to be extensively adherent, the attempt should be abandoned, and the Cæsarean section substituted. The extirpation of the tumour may now be more readily effected, and if possible should be performed.

Where removal of the tumour has been successful without opening the uterus, delivery should be completed by the forceps as soon as the os is fully dilated, in order to prevent injury to the abdominal wound. Hohl,¹ it must be mentioned, pronounces strongly against this operation, not so much on the ground of the alleged danger of asphyxia to the child, as from the risk of hæmorrhage from the strain to which the pedicle is subjected during the subsequent course of labour.

The special indication of this operation is a tumour which on abdominal section can be readily elevated from the pelvis and completely removed. In these circumstances it ought to be preferred to Cæsarean section.

Extirpation of the tumour *per vaginam*, of which we fir

¹ Hohl, *loc. cit.*

two instances recently recorded, is a procedure still on its trial. Frequent reference to it is found even in the earliest writers on this subject, but almost all conclude in deprecating it as a form of treatment neither very practicable nor safe. So early as Merriman the possibility of the operation was discussed. He writes, "on the whole, therefore, I am disposed to believe that where the tumour in the vagina occupies a large space, it would be a more warrantable practice to remove it by excision, if it consisted of a solid substance . . . rather than expose the child to certain death and the mother to great hazard by employing the perforator".¹ Davis, again, in his *Operative Midwifery*, while admitting the operation as practicable, sees no sufficient reason for giving it preference to abdominal ovariectomy. Ramsbotham concludes that "the removal of the diseased mass" (*per vaginam*) "would be both very difficult and hazardous on many accounts, and horrible as the alternative is, I should in my own practice rather destroy the child than subject the mother to such a formidable operation".²

Though thus frequently referred to in the earlier literature of the subject, we find no instance of its actual performance till 1895, notwithstanding that nature had herself more than once demonstrated the ease and safety with which it might be accomplished. The first published case is that of Rubeska, in which, however, owing to the impossibility of reaching the upper limits of the tumour, a small abdominal incision was made. By this means the upper attachments of the ovary were freed. Staude, in commenting on his case, and in illustration of the ease with which the extirpation can be carried out, mentions that he performed the operation with the sole assistance of a pupil midwife. Puncture and incision were first tried, but failed to sufficiently reduce the tumour, and the idea of total extirpation seems to have occurred to him from the

¹ *Med. Chirurg. Trans.*, vol. iii.

² *Obstetric Medicine*, p. 236.

protrusion of the cyst wall, thus verifying the statement of Lomer, that "from the incision of the posterior vaginal wall to the depression of the cyst and ligature of the pedicle, there appears to be but a step".¹

In his admirable paper Staude carefully defines the cases for which the operation is suited. Briefly, the conditions he lays down are, a tumour which lies wholly and deep in the pelvis, is movable, pedunculated, with no or but slight adhesions, and whose upper limit is accessible from the vagina. Rubeska's case illustrates the importance of these conditions.

Dr. Dakin recommends this operation in preference to puncture. In his *Handbook of Midwifery*, just issued, he says: "If the tumour is immovable, the best thing is to do vaginal ovariectomy; puncture is recommended by some, but it has many dangers".

It will naturally suggest itself that where the antecedent conditions for vaginal extirpation are present, reposition, which by universal agreement is to be preferred to all operative measures, should almost always be possible.

Vaginal ovariectomy is strongly condemned by Hohl,² who regards it as a difficult and dangerous procedure, and in no circumstances as a justifiable substitute for Cæsarean section. With this view I am not disposed to agree. The operation has its difficulties and its dangers, but that in certain circumstances it affords the readiest and safest means of terminating labour must, I think, with Staude's case before us, be admitted.

The operation requires less assistance and technical skill than Cæsarean section—a no small advantage when it is considered that treatment has occasionally to be carried out without the aid of skilled assistance. The main objections to it are the impossibility of securing and maintaining asepsis,

¹ *Archiv f. Gynäk.*, Bd. 19.

² Hohl, *loc. cit.*

and, as pointed out by Hohl, the increased vascularity and liability to laceration of the vaginal tissues.

Sufficient practical experience is still wanting to establish its position. Personally, I look forward with interest to hearing the opinions of members as to the relative value of this operation, of Cæsarean section, and of abdominal ovariectomy as methods of treatment in this complication.

[In a recent communication Dr. Haultain¹ has dealt with the question of vaginal ovariectomy. He considers the operation a safe, and at the same time a ready, method of treatment. He points out that the tumour, being pushed down in front of the advancing head, can be comparatively easily reached, while the incision through the vaginal wall is the same as that required for simple disintegration. "From every point of view it commends itself as the operation to be employed by the isolated general practitioner, as its efficient performance requires a very small armamentarium compared with that necessary for laparotomy." He prefers to stitch the vaginal wound before completing delivery; but if the child be expelled before suturing can be done, packing and draining with sterilised gauze alone may be adopted.]

¹ Haultain, *Journal of Obstet. and Gynæcol. of the Brit. Empire*, vol. i., p. 386.

MORE RECENT VIEWS, AND SUMMARY, OF TREATMENT OF LABOUR OBSTRUCTED BY AN OVARIAN TUMOUR IN THE PELVIS.

SINCE the foregoing chapter, which formed the subject of a paper read before the Obstetrical Society in 1897, was written, several valuable communications have been published. In the main they support the views which I have expressed above, and, along with the discussion which followed the reading of the paper, go far towards establishing on a definite basis the treatment of labour obstructed by a pelvic ovarian tumour. A short summary of these more recent opinions is desirable, and will form an appropriate, and I hope profitable, conclusion to this part of our subject.

In the *Transactions of the Obstetrical Society* for 1898 there is ample evidence of the importance which obstetricians attach to the complication of labour with an ovarian tumour in the pelvis. At several meetings the subject occupied the attention of the society, and one naturally turns for guidance to the views which were expressed by the recognised leaders of obstetric opinion. Although there was a general agreement as to the principles on which the treatment should be based, there are still to be found differences not only in details but as to the exact method which should, in given circumstances, be preferred.

In the discussion which took place in January, 1898, the society was practically unanimous that an effort to push the tumour out of the pelvis should be our first aim. Where this

proves unsuccessful we do not find quite the same unanimity. The differences, however, are apparent rather than real, and arise from the difficulty of reconciling what is theoretically the best treatment with what may be the only practicable method in the circumstances.

It was generally held that the best treatment for incarcerated ovarian tumour which could not be pushed up was ovariectomy. This method found its strongest supporter in Professor Spencer, who has devoted much attention to this complication, of which he has had exceptional experience. He maintained that Cæsarean section was not in ordinary circumstances required and inflicted an unnecessary injury on the patient; and in this opinion Dr. Horrocks and others concurred. Dr. Spencer believed that in many cases the Cæsarean operation could be avoided by the expedient of withdrawing the uterine fundus from the abdomen, after which the tumour could often be readily elevated and removed. He recorded a case in which this had been successfully done.

On the other hand, Playfair and Herman, while agreeing that ovariectomy was the most scientific practice, pointed out that there must always be cases in which it could not be judiciously carried out. As to what was the best course to pursue in these circumstances there was some difference of opinion. Playfair advocated puncture or aspiration, which he thought was attended with practically no risk, provided anti-septic precautions were observed. As has been pointed out, however, the danger of puncture lies less in the possibility of introducing sepsis from without than in infecting the peritoneum by the contents of the cyst—a danger which the utmost care may not exclude. To avoid this risk Herman advised incision of the tumour in preference to puncture. In this way the emptying of the cyst contents outside the peritoneal cavity was secured. He emphasised the danger of simple aspiration in the case of dermoid tumours. After making his incision Herman

would stitch the opening in the cyst to the margin of the vaginal wound.

Spencer opposed this method of dealing with the incised cyst, preferring to plug it with iodoform gauze, as a temporary measure to be followed after the completion of labour by the removal of the cyst either by the vaginal or abdominal route. In his opinion stitching the cyst to the vaginal wound was a difficult operation and was often rendered impracticable by the descent of the child's head.¹ Dr. Horrocks, on the other hand, drew attention to the fact that, as a rule, these tumours were driven well down into the pelvis during labour, so that, as they could be opened low down, it was not difficult to sew them to the vaginal wall.

In summing up, the president, Dr. Cullingworth, briefly focussed the discussion. He concluded that "the ideal treatment was the removal of the tumour there and then by abdominal section. Where this was impracticable the proper course, if the tumour could not be pushed out of the way, was to endeavour to deal with it temporarily by tapping or incision *per vaginam*, and to perform ovariectomy as soon as possible after the labour was over." He did not think the alternative of Cæsa-rean section should be adopted unless under very exceptional circumstances.

In the communications which have appeared since the discussion on the management of labour obstructed by ovarian tumour, the views expressed by the writers are for the most part in accord with those which obtained among the Fellows of the Obstetrical Society. I shall refer to two only. Semon,² of Danzig, in reporting a case in which he performed ovariectomy intra-partum, reviews the methods which have previously

¹ In several cases this occurred, and it was found impossible to stitch the wound before completing delivery.

² *Monats. f. Geburt. u. Gynäk.*, 1901.

obtained in the treatment of labour obstructed by an ovarian tumour. While recognising reposition as a useful and apparently safe method, he draws attention to the cases in which it was followed by a fatal result. He sums up his conclusions in the following propositions :—

(1) It is in every case a mistake to attempt operative delivery before removal of the obstruction.

(2) Removal of the obstruction can be effected by (a) reposition; (b) puncture and incision per vaginam; (c) ovariectomy intra-partum.

(3) Reposition and puncture are not without danger. Forcible attempts at reposition are to be avoided. Puncture can be successful only in cystic tumours; in dermoids a long incision with evacuation (Fritsch) is to be preferred.

(4) Ovariectomy intra-partum gives, of all the methods, the best prognosis for mother and child, and it is the most rational procedure where it is possible to carry it out. The choice of the vaginal or abdominal route must be determined by circumstances. The vaginal operation is possible only in cystic tumours which are not adherent and have good pedicles.

(5) Cæsarean section is to be reserved for those cases in which the attempt at abdominal ovariectomy fails, for cases of inoperable tumour, for tumours imbedded in dense adhesions, and for those which are intraligamentary.

Bland-Sutton,¹ who for long has interested himself in the surgery of pregnancy and labour associated with tumours, reaches conclusions which make it necessary to refer at some length to his paper.

In the treatment of ovarian tumour obstructing labour he is strongly opposed to any attempt to raise the tumour out of the pelvis—a procedure which he characterises as “decidedly in

¹ *Lancet*, 1901, vol. i.

opposition to all the canons of surgery". He admits of one, and one only, method of dealing with this complication, namely, immediate laparotomy and removal of the tumour. Seeing that reposition not only so recently received the sanction of the Obstetrical Society, but is still recommended by the most advanced obstetric authorities as the method best suited in the majority of cases to meet existing circumstances, it may be well to examine the grounds on which Bland-Sutton bases his objections to its employment, and the evidence in favour of the position which he takes up.

While much can be said from a theoretical point of view in favour of his contention that laparotomy is the only admissible treatment where an ovarian tumour is found in the pelvis during labour, he seems to me to be unfortunate, not only in the several reasons he advances, but also in the particular instances which he cites in support of his argument. He states his general objections to reposition in the twofold proposition that "pregnancy exerts a baneful influence on ovarian tumours, and ovarian tumours are, as a rule, inimical to successful pregnancy". These reasons, though valid in regard to operation during pregnancy, are, it seems to me, irrelevant where an ovarian tumour blocks the pelvis during labour. In labour the problem is a totally different one. While in pregnancy there is time to secure suitable preparation and environment and to obtain the services of an operator skilled in abdominal work, along with the requisite assistance, experience shows that this is exceptional in the case of a tumour discovered in the pelvis during the actual progress of labour. In comparatively few of the published cases where reposition was effected would circumstances have permitted the services of an expert operator to be called in. The mere removal of the patient to a suitable environment and the time occupied in the necessary preparations may involve an amount of delay which would materially add to the dangers of the

operation. This danger is well illustrated in the case which Bland-Sutton himself cites, where firm impaction of the head resulted, and it was found necessary to perform Cæsarean section before the tumour could be brought out of the pelvis. It will not be denied that this must add to the dangers of ovariectomy. Whether in this case reposition was attempted earlier in labour is not stated.

On *a priori* grounds it would seem that to push the tumour out of the pelvis is a procedure comparatively free from danger and calculated to give immediate obstetric results quite as good as ovariectomy undertaken in unsuitable surroundings. *A posteriori* evidence confirms this view; but before inquiring into this evidence let us first examine the cases on which Bland-Sutton claims to establish the superiority of ovariectomy in all circumstances over what he terms "the ancient method" of reposition. He cites two cases which came under his personal observation.

Case XXI.—Primipara, aet. twenty-eight, in labour for twenty hours. On admission to hospital hollow of sacrum found filled with large tense cystic mass which completely occupied the true pelvis. Immediate operation; head of fœtus so firmly impacted in pelvis that finger could not be inserted between uterus and pelvis brim; Cæsarean section; child alive; mother "convalesced with as little trouble as after normal labour". The tumour was a dermoid, measuring 10 by 8 cm.

Case XXII.—A multipara, aet. thirty-three, found in her third confinement to have pelvis obstructed by tumour. Bland-Sutton was consulted and, though he did not see patient, advised her removal to hospital for ovariectomy. Instead, another practitioner was called in, and together they succeeded in pushing up tumour and extracting child with the forceps. On third day severe pain in abdomen accompanied by vomiting, an accelerated pulse and high temperature. Sent to hospital in critical condition; abdomen greatly distended and tender; pulse 150,

temperature 100 ; gentle examination of the abdomen revealed no tumour ; concluded that had burst, a conjecture which proved erroneous ; operation performed ; a large quantity of purulent fluid escaped on incision ; general peritonitis ; an ovarian tumour the size of a foetal head found and removed ; its pedicle was twisted through a complete revolution ; no signs of injury observed in uterus or in pelvis ; tumour was a semi-solid ovarian adenoma. Death eighteen hours after the operation.

We have here one successful case of ovariectomy intra-partum contrasted with a case in which reposition was effected with a fatal issue to the mother. No note is made of the important point as to the interval which elapsed between the onset of acute symptoms and operation in the latter case. It will be admitted, too, that, with fuller evidence at our disposal, one unsuccessful case is insufficient to found an unqualified condemnation of a method which in the past has yielded satisfactory results ; indeed, the above case is, so far as I know, the sole published instance in which axial rotation followed reposition, with the doubtful exception of a case reported by Camden.

While emphasising this unsuccessful case, Bland-Sutton dismisses the evidence in favour of reposition with the remark that "it is easy enough to draw up a list of half a score successful cases, but the unsuccessful cases are unrecorded, and thus we are deprived of any means of comparison". There is no proof that such is the case. On the contrary, one would more naturally expect the unsuccessful cases to be recorded ; indeed, of the previously unpublished cases of which I have been able to obtain the details all have been successful save one of ovariectomy in pregnancy, and one of post-partum ovariectomy.

We may, then, rely with tolerable confidence on the published results. It may be recollected that the mortality following reposition was 8 per cent., but of the cases included in this analysis a large number occurred in the early days before antiseptics and before the nature of the complication was generally

understood. If we confine ourselves to the cases of the last twenty years we find that reposition has, with but two exceptions, been attended with success. It is true that intra-partum ovariectomy shows even better results, all the published cases being successful; but in all the operations were performed by experienced ovariectomists, and their numbers are still too few to justify dogmatic conclusions. A fairer comparison is to be found in the statistics of ovariectomy in general and of ovariectomy in pregnancy. The general mortality of ovariectomy is still, as has been seen,¹ nearly 10 per cent., while in pregnancy, notwithstanding that the operations were, for the most part, undertaken under favourable conditions of time and place and with the strictest aseptic precautions, the maternal mortality was 5·6 per cent., little better than that obtained by reposition during the actual progress of labour.

It may be argued that by the radical method the woman is at the same time permanently relieved of her tumour, whilst to the mortality of reposition must be added the mortality of the subsequent ovariectomy. This is no doubt true, and it is never claimed for reposition that it is more than a temporary measure; but there is another point which has been so far left out of account, namely, that in the event of a complication, such as torsion, ensuing after reposition, an immediate operation gives every prospect of a successful issue, as will be seen from a consideration of the statistics of post-partum ovariectomy.²

Enough has been said, I think, to show that reposition cannot be justly discarded as a method of treatment. That it is entirely free from danger I do not for a moment maintain, but in certain circumstances it is the best method of dealing with this complication of labour.

¹ Greig Smith, Allbutt and Playfair's *System of Gynecology*, p. 873 (see p. 107).

² See p. 250.

It will be seen from what has just been said that the views which I expressed in 1897 have been somewhat modified. I then stated, however, that sufficient practical experience was wanting to establish the relative value and position of the more recent operative measures. At that time only 2 cases of abdominal, and 3 of vaginal, ovariectomy intra-partum were on record. Several cases have since been published, and the promise of the earlier operations has been maintained. Ovariectomy has been performed during labour on 15 occasions (abdominal 8 times, vaginal 7 times), in all with a successful result for the mother and, where ascertained, for the child. Besides these there have been added 12 cases in which, owing to the impossibility of elevating the tumour, Cæsarean section preceded the ovariectomy. The results were almost equally satisfactory.¹ This success compels a change of view, and makes it necessary to revise my previous recommendations and bring them into accord with recent experience and opinion.

This I shall do in the form of a series of propositions which I trust may not only be convenient for purposes of reference, but may be a practical guide in the often difficult problem of deciding which of the recognised methods is best suited to the circumstances of the individual case.

(1) Ovariectomy is the best treatment, and should be preferred when the patient can *without delay* be placed under the charge of an experienced operator. The abdominal is, in general, to be preferred to the vaginal route.

(2) Where time or place do not admit of ovariectomy, reposition should be attempted, but the effort to push up the tumour should neither be too forcible nor greatly prolonged.

(3) In the majority of cases it will be possible to deal successfully with the complication by one or other of these methods. When both are found impracticable, *no time must*

¹ See table vii., p. 222.

be lost in carrying out the measures which circumstances dictate. The greatest danger lies in delay.

(4) The tumour should then be either aspirated or, preferably, incised: when incised it should be stitched to the vaginal wall if time permit, or, which is better, it may be evacuated and plugged with iodoform gauze. Both these measures are temporary and should be followed by ovariotomy as soon as possible after labour.

(5) When the tumour is solid, or semi-solid, and only partially reducible by incision, an attempt must be made, no matter what the circumstances, to remove it by the vagina or by the abdomen, and if this fail Cæsarean section must be performed. In the hands of even an inexperienced operator this will involve less danger than an attempt to drag the child past the obstruction with the forceps.

(6) Version is in all circumstances contra-indicated. Forceps or craniotomy must never be employed unless the obstruction has been completely removed.

(7) In the abdominal operation for the removal of the tumour Cæsarean section should rarely be necessary. In almost all cases it will be possible to deal with the tumour by first drawing the uterine fundus through the abdominal wound, or by getting an assistant to push the tumour up from the vagina, while the uterus is simultaneously pushed by the operator to one or other side of the pelvic brim.

(8) Tumours which have been reposed or incised during labour must be removed as soon as possible in the puerperium.



ADDITIONAL CASES OF LABOUR OBSTRUCTED
BY OVARIAN TUMOUR.¹

¹ Supplementary to Tables in volume xxxix. of *Transactions of the Obstetrical Society*.

TABLE I.—LEFT TO NATURAL POWERS.

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Budin: <i>Thèse par Jalaber</i> , 1898 Porak: <i>ibid.</i>	I.	Cyst	Not attempted	18-20 hours	R.	A.	After labour tumour occupied the right iliac fossa.
2				Not attempted		R.	A.	Fluctuating cyst in pelvis during 1st stage: after rupture of membranes could not be felt: thought to have been spontaneously elevated, but more probably ruptured as not to be felt in abdomen: puerperium normal.
3	Porak: <i>ibid.</i>	I.	Cyst			R.	A.	Cyst occupied pelvis till os completely dilated: afterwards not to be felt, thought to have been spontaneously elevated. On 6th day large flaccid cyst found in right flank.
4	Ashton: <i>Münch. Med. Wochens.</i> , 1888		Cyst			R.	A.	Tumour not in pelvis during passage of child: descended during 3rd stage and interfered with the removal of placenta.
5	Pryor: <i>Amer. Journ. of Obstet.</i> , 1900		Dermoid		Protracted	R.		Tumour expelled per rectum during labour: pedicle tied and tumour snipped off: good recovery.

TABLE II.—REPOSITION.

No.	Reference.	Para.	Character of Tumour.	Auxiliary Treatment.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Fuchs: <i>Dissert.</i> , Würzburg, 1896	IV.	Ovarian tumour, size of apple	Forceps	10 hours	R.	A.	No symptoms during pregnancy: tumour pushed up under narcosis with whole hand in vagina: puerperium normal.
2	Fuchs: <i>ibid.</i>	IV.	Ovarian tumour, size of child's head Ovarian tumour		18-20 hours	R.	A.	As above.
3	Schroeder: <i>Zeitsch. f. Geb. u. Gynäk.</i> , 1886		Ovarian tumour		Normal	R.	A.	Tumour recognised during pregnancy: caused pain and constipation: operation refused: puerperium normal.
4	Bossi: <i>Ann. di Ost. e gin.</i> , 1900		Ovarian tumour, size of foetal head	Forceps		R.	A.	
5	Bossi: <i>ibid.</i>		Ditto	Forceps		R.	A.	Ovariectomy in the puerperium.
6	Staudé: <i>Geb. Gesells. zu Hamburg</i> , 1900		Ovarian tumour			R.	A.	
7	Prochownik: <i>Deutsch. Med. Wochens.</i> , 1883	I.	Cyst, size of foetal head		Normal	R.	A.	Tumour pushed up under deep narcosis: rapid growth of cyst in puerperium, with peritonitic disturbance: 8 weeks after ovariectomy.
8	Loison et Duscheneau: <i>Archiv. de toc.</i> , 1892	I.	Cyst		Normal	R.	D.	Spontaneous labour at 7th month: cyst ruptured in attempt at reposition: peritonitis, laparotomy.

REPOSITION (continued).

No.	Reference.	Para.	Character of Tumour.	Auxiliary Treatment.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
9	Häusler: <i>Dissert.</i> , Erlangen, 1890	II.	Cyst	Version	28 hours	R.	A.	In first labour craniotomy: version on account of shoulder presentation. Labour somewhat before term.
10	Rosner: <i>Gynécologie</i> , 1895		Cyst		Normal	R.	?	
11	Budin: <i>Thèse par Jalaber</i> , 1898	II.	Cyst		5 hours	R.	A.	Tumour thought to be spontaneously elevated, but probably pushed up during examination.
12	Tate: <i>Obstet. Trans.</i> , 1900, p. 164	IV.	Cyst	Forceps		R.	A.	Good recovery, but ever since dull aching pain in lower abdomen: slow suppuration of cyst, which removed 18 months after.
13	Cecil: <i>Amer. Practit. and News</i> , 1887	I.	Dermoid		Protracted	R.	A.	Good recovery: tumour, size of an orange, found afterwards in right hypochondrium.
14	Berry Hart: <i>Scot. Med. Journ.</i> , 1902, i., 47	I.	Dermoid	Forceps	Over 48 hours	R.	A.	No symptoms during pregnancy save slight occasional pain in left side: tumour replaced in genu-pectoral position: good recovery: ovariectomy 10 weeks after.

15	Löhlein: <i>Gynäk. Tagesf.</i> , Heft iv., 1895		Dermoid	Forceps, 10 hours after reposition	25 hours	R.	A.	Good recovery: first attempt to dislodge unsuccessful even under narcosis in knee-elbow position: under deeper narcosis succeeded in left lateral position, with simultaneous pushing of uterus to right by assistant.
16	Spencer: <i>Obstet. Trs.</i> , 1898	III.	Dermoid	Forceps, both before and after reposition	About 20 hours	R.	A.	Tumour recognised at time of first labour, which very protracted: ovariectomy 7 months after 3rd labour: pedicle twisted twice.
17	Benckiser: <i>Münch. Med. Wochens.</i> , 1899	I.	Dermoid	Forceps		R.	A.	Puerperium normal: ovariectomy 15 months after.
18	Munro Kerr: <i>Obstet. Trans.</i> , 1901	IV.	Dermoid	Forceps		R.	A.	Tumour could not be replaced till head disengaged from brim: no symptoms during pregnancy: recovery good: ovariectomy in 5th week.
19	Bland-Sutton: <i>Lancet</i> , 1901	III.	Semi-solid adenoma	Forceps		D.	?	V. p. 205.
20	Ballantyne: unpublished		Dermoid		Normal	R.	A.	Tumour pushed up under anaesthesia in genu-pectoral position: two or three sharp spicules could be felt in tumour.
21	Matthaei: <i>Centralbl. f. Gynäk.</i> , 1901, No. 3		Dermoid			D.		Reposition effected in knee-elbow position: cyst ruptured, and death occurred on 3rd day from septic peritonitis.

TABLE III.—PUNCTURE OR INCISION.

No.	Reference.	Para.	Character of Tumour.	Auxiliary Treatment.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Nolting: <i>Dissert.</i> , Berlin, 1884	Multi	Cyst	Forceps, before and after puncture	—	D.	D.	Death occurred on the 4th day.
2	Cragil: <i>Med. Rec.</i> , N. Y., 1899		Cyst		Normal	R.	—	Good recovery.
3	Nash: <i>Lancet</i> , 1898, ii., 1268		Cyst	Forceps	Normal	R.	—	Prolapse of cord during labour: uneventful recovery.
4	Heywood Smith: <i>Obstet. Trans.</i> , 1898	I.	Cyst			R.	A.	Same patient as Table I., Case XI. (p. 129): tumour detected before pregnancy, during which several times pushed out of pelvis.
5	Horrocks: <i>Obstet. Trans.</i> , 1898		Multilocular cyst		Normal	R.	—	Pus found in cyst on aspiration.
6	Porak: <i>Thèse par Jalaber</i> , 1898		Cyst, size of cocoanut		8-12 hours	R.	D.	Puerperium normal: 2 weeks after labour cyst felt in posterior cul-de-sac of about size of an orange.
7	Duschesneau: <i>Archiv. de tocol.</i> , 1891		Dermoid		Under 24 hours	R.	D.	After aspiration tumour pushed up: convalescence fairly satisfactory.
8	Abegg: <i>Jubil. d. Deutsch. Gesellsch. f. Gynäk.</i> , 1894	I.	Dermoid	Craniotomy	Protracted	R.	D.	No symptoms during pregnancy: cervix pressed up and forward behind symphysis: fever and peritonitis for 2 weeks after labour.

9	Fieux: <i>Archiv. Clin. de Bordeaux</i> , 1897	III.	Dermoid	Forceps		R.	A.	Tumour first punctured, but incision necessary before head could be got through: wound stitched, rectum and vagina plugged after labour: -ovariotomy later, 2 dermoids being removed.
10	Phillips: <i>Obstet. Trans.</i> , 1898		Dermoid		Normal	R.	—	Tumour incised and sutured to vaginal wall: good recovery, but slow suppuration of cyst.
11	Mignard: <i>Soc. de Méd. de Lyon</i> , 1898		Dermoid		Normal	R.	A.	Though tumour only size of an orange the cervix was pushed forward to behind symphysis: perium normal.
12	Puech: <i>Gaz. des Hôpit.</i> , 1901	I.	Dermoid		Lingering	R.	D.	Footling presentation: ovariectomy 3 months after labour.
13	Schatz: <i>Münch. Med. Wochens.</i> , 1901	I.	Dermoid	Forceps	Over 24 hours	R.	D.	Forceps applied before admission to Klinik: in circumstances Cæsarean section thought inadvisable: after puncture extraction effected with difficulty: convalescence fairly satisfactory.

TABLE IV.—TURNING.

No.	Reference.	Para.	Character of Tumour.	Duration of Labour.	Result.		Remarks.
					Mother.	Child.	
1	Schroeder: Winter, <i>Dissert.</i> , Berlin, 1896	I.		—	R.	D.	In attempt to turn lower uterine segment ruptured: craniotomy: very protracted convalescence.
2	Hine: ref., Bland-Sutton, <i>Lancet</i> , 1901	I.	Dermoid	Very tedious	R.	D.	Ovariectomy after puerperium.
3	Schwarz: <i>Gyogyaztat</i> , 1897		Dermoid		D.	D.	Premature labour at 6th month: during version cyst ruptured, and patient died on 3rd day.
4	Spencer: <i>Obstet. Trans.</i> , 1898, p. 331	II.	Dermoid	About 10-12 hours	D.	D.	First attempted to deliver with forceps, but could not apply: during version tumour ruptured: death on 3rd day.
5	Lewers: <i>Obstet. Trans.</i> , 1900, p. 95		Dermoid		D.	—	Uterus ruptured probably during version: patient died 57 hours after.

TABLE V.—FORCEPS.

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Walls: <i>Brit. Med. Journ.</i> , 1900	Multi		Not attempted	Protracted	R.	—	During traction tumour extruded per rectum.
2	Coccard: <i>Thèse de Paris</i> , 1896		Cyst			R.	D.	
3	Jardine: <i>Glasgow Med. Journ.</i> , 1900	I.	Cyst		About 20 hours	R.	A.	During traction cyst ruptured, when delivery was easily completed: good recovery.
4	Mallam: <i>Archiv. de Gynec. et d'Obstét.</i> , 1888	III.	Dermoid	Not attempted	Normal	R.	—	During traction tumour passed per rectum.
5	Guichard: <i>Ann. de Gynecol.</i> , 1886		Dermoid	Not attempted	—	R.	—	Labour followed by inflammation of cyst and peritonitis: in bad health till ovariectomy 2 years later.
6	Bartlett: <i>Obstet. Gaz.</i> , Cincinnati, 1886		Dermoid			R.	—	Delivery effected with difficulty: ex-traction followed by expulsion per vaginam of a dermoid the size of a fist.
7	Cullingworth: <i>St. Thomas's Hosp. Reports</i> , 1887		Dermoid			R.	—	Labour followed by pyrexia, with much vomiting: 2 weeks after, discharge of pus per vaginam: laparotomy 19 weeks after: right dermoid in abdomen, left suppurating in pelvis.

FORCEPS (*continued*).

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
8	Dewar: <i>Lancet</i> , 1894	VI.	Dermoid	Not attempted	14-16 hours	R.	—	For some months previously complained of dragging pain in abdomen: forceps succeeded only with great difficulty, but just before, tumour protruded per rectum, was ligatured and cut off.
9	Sevitsky: <i>Ann. de Gyn. et d'Obstét.</i> , 1896		Dermoid	Not attempted		D.	D.	During traction tumour burst rectal wall and was extruded per anus: dead foetus then easily extracted: cyst drawn down and amputated: died 32 hours after of peritonitis.
10	Treub: <i>Bull. Soc. Obst. et Gynécol. de Paris</i> , 1898	I.	Dermoid	Not attempted	At least 36 hours	R.	D.	Tumour recognised before pregnancy, but operation refused: during traction tumour suddenly slipped through rent in posterior vaginal wall, and fell to floor: good recovery.
11	Haultain: <i>Journ. of Obstet. and Gynec. of Brit. Empire</i> , 1902	III.	Dermoid		26 hours	R.	A.	During traction tumour protruded through vulva: on being grasped with hand and pulled down it became detached: delivery completed with forceps: rent in vaginal wall plugged with iodoform gauze: uninterrupted recovery.

TABLE VI.—CRANIOTOMY.

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Benckiser: <i>Münch. Med. Wochens.</i> , 1899	Multi	Cyst	Attempted	Normal	R.	D.	Rupture of cyst during delivery: puerperium normal.
2	Charleoni: <i>Thèse par Cocard</i>		Dermoid		—	R.	D.	
3	Münchmeyer: <i>Centralb. f. Gynäk.</i> , 1890	III.	Spindle celled sarcoma	Not attempted		R.	D.	No symptoms pointing to malignancy of tumour: slow convalescence: ovariectomy 4 weeks after labour.

TABLE VII.—CÆSAREAN SECTION.

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Cocard: <i>Thèse de Paris</i> , 1896			Attempted		R.	A.	Seen some time before labour when thought to be hydramnios with tumour in pelvis: uterus and tumour removed.
2	Debaissieux: <i>Congrès de Gyn. et d'Obst. de Brux.</i> , 1892	Multi	Cyst			R.	—	Tumour thought to be a fibroid, and Porro's operation performed.
3	Rosner: <i>Gynécologie</i> , 1895		Cyst	Not attempted		D.	A.	Tumour thought to be a retrocervical fibroma: death due to septic peritonitis.
4	Pinard: <i>Thèse par Cocard</i>		Cyst	Not attempted		R.	A.	
5	Staupe: <i>Monats. f. Geb. u. Gynäk.</i> , Bd. ii., Heft 4	I.	Cyst of left, small cyst of right ovary	Attempted	About 36 hours	R.	A.	Membranes unruptured till time of operation.
6	Bland-Sutton: <i>Lancet</i> , Feb., 1901	I.	Dermoid	Not attempted	20 hours	R.	A.	See Case XXII., p. 205.
7	Favell: <i>Brit. Med. Journ.</i> , 1901, i., p. 581		Dermoid	Attempted		R.	—	Cæsarean section performed, as owing to the muscularity and firmness of the abdominal wall it was impossible to get tumour out of pelvis.

8	Stratz: <i>Weekbl. van zet. nederl. Tijds. voor Geneesk.</i> , 1901, No. 6	I.	Dermoid	Not attempted	Protracted	R.	A.	At time of operation, temperature 37.7°, pulse 120; adhesive perito- nitis and rupture of the uterus im- minent: tumour removed, whole operation lasting 25 minutes.
9	Furneaux, Jordan: <i>Trans. Brit. Gynæ- col. Soc.</i> , 1902		Dermoid		? Protrac- ted	R.	D.	
10	Boxall: <i>Obstet. Trs.</i> , 1898, p. 25	I.	Large semi- solid tu- mour	Attempted	12 hours	R.	A.	Tumour felt like oedematous fibroid: during pregnancy some pain in left ovarian region—opposite side from tumour.
11	Japp, Sinclair: <i>Lan- cet</i> , Jan., 1901		Large fleshy tumour	Not attempted	24 hours	R.	A.	Labour pains weak, but other ab- dominal pain was present almost continuously: os displaced up and forwards, and at time of opera- tion just admitted 2 fingers.
12	Schatz: <i>loc. cit.</i>	I.	Parovarian cyst	Not attempted	Over 60 hours	R.	D.	Tumour not detected till labour: Porro's operation performed be- fore removal of tumour as thought impracticable to preserve uterus, owing to risk of infection.

TABLE VIII.—ABDOMINAL OVARIOTOMY.

No.	Reference.	Para.	Character of Tumour.	Duration of Labour.	Result.		Remarks.
					Mother.	Child.	
1	Walcher: <i>Med. Correspond. Blatt</i> , 1897	I.	Dermoid	23 hours	R.	A.	Occasional attacks of pain during pregnancy: spicules of bone felt in tumour on vaginal examination. Before tumour could be elevated uterine fundus had to be withdrawn from the abdomen: labour terminated by forceps 3 hours after operation.
2	Spencer: <i>Obstet. Trs.</i> , 1898, p. 14	II.	Dermoid	About 20 hours	R.	A.	No unusual symptoms during pregnancy save occasional attacks of pain in right side of abdomen for first 3 months: on full dilatation forceps applied with difficulty but delivery could not be effected: during operation uterus withdrawn from abdomen: delivery at once completed with forceps.
3	Duncan: unpublished	I.	Dermoid	About 10-12 hours	R.	A.	Tumour found accidentally on examining for narrow pelvis: labour induced, and when os size of florin laparotomy: tumour could not be elevated till uterus withdrawn: delivery completed on full dilatation of os 7 hours after.
4	Semon: <i>Monats. f. Geb.u. Gynäk.</i> , 1901		Sarcoma	14-18 hours	R.	A.	Before tumour could be removed uterus had to be tilted out of the abdomen: half an hour after operation labour concluded spontaneously: 1½ years after patient in good health: subsequent pregnancy.
5	Sandberg: <i>Med. Revue</i> , 1899	VII.	Multilocular cyst	Over 48 hours	R.	A.	Peritonitis 7 and 4 years before. Tumour not diagnosed till 2nd day of labour: after operation as pains weak, version performed.
6	Reynolds: <i>Boston Med. Journ.</i> , 1897				R.		

TABLE IX.—VAGINAL OVARIOTOMY.

No.	Reference.	Para.	Character of Tumour.	Reposition.	Duration of Labour.	Result.		Remarks.
						Mother.	Child.	
1	Niebergall: <i>Centralb. f. Gynäk.</i> , 1901, p. 583	IV.	Cyst	Attempted	12-16 hours	R.	A.	Considerable hæmorrhage on vaginal incision, checked by forceps: head at once descended and delivery completed by forceps: cyst partly in abdomen: several adhesions, puerperium complicated by rise of temperature for a few days.
2	Taylor: <i>Brit. Med. Journ.</i> , 1901, ii., 1559		Cyst	Not attempted	8 hours	R.	A.	Immediately after operation delivery was completed by forceps while patient still unconscious.
3	Griffith: communicated: <i>v. Obstet. Trans.</i> , 1901	Multi	Dermoid	Attempted		R.	A.	Immediately after extracting tumour, before pedicle could be tied, child expelled and pedicle torn through: impossible to secure it: incision sutured after swabbing vagina with biniodide solution: no gauze used: good recovery: no hæmorrhage occurred.
4	Hesselbach: <i>Deutsche Med. Wochens.</i> , 1900					R.	A.	



SECTION III.

THE PUERPERIUM WITH OVARIAN TUMOUR.

SUMMARY.

INFLUENCE OF OVARIAN TUMOUR ON THE PUERPERIUM, 229.

INFLUENCE OF PUERPERIUM ON OVARIAN TUMOUR, 230.

Torsion, 231.

Suppuration, 232.

Rupture, 232.

Peritonitis, 233.

SYMPTOMS, 234.

DIAGNOSIS, 238.

PROGNOSIS, 239.

TREATMENT, 242.

1. Where the Puerperium is Undisturbed, 243.

2. Where Acute Symptoms Arise, 247.

POST-PARTUM OVARIOTOMY, 249.

Statistics of Operation, 250.

Tabulation of Cases Operated on within the First Two Weeks of the
Puerperium, 252.

Time of Operation, 254.

GENERAL SUMMARY OF TREATMENT, 257.



OVARIAN TUMOUR IN CHILDBED.

THE dangers which beset the pregnant woman who is the subject of an ovarian tumour do not terminate with the completion of labour. Indeed, serious symptoms are more likely to occur during the puerperium than at any other time ; nor is this difficult to understand when we call to mind the nature of the complications to which these tumours are liable. The conditions existing after labour will be seen to be peculiarly favourable to their development.

Influence of Ovarian Tumour on the Puerperium.—

In many of the cases no abnormal influence on the course of the puerperium has been noted. Indeed, it often happened that the tumour was overlooked, while in other cases, beyond the fact that the abdomen remained larger than after previous confinements, nothing unusual was observed.

In the following case, which I had the opportunity of seeing, a tumour of considerable size was not detected until the second week of the puerperium.

Case XXIII.—Mrs. W., a secundipara, was spontaneously delivered of a living child after an easy and seemingly normal labour. She noticed that the abdomen did not diminish as after her previous confinement. Her recovery was uninterrupted, and she was allowed up early in the second week. The persistence of the abdominal enlargement led to an examination, when a tumour of the size of a football was discovered. Six months after, ovariectomy was success-

fully performed. The tumour, which was about the size of a seventh month pregnant uterus, proved to be a multilocular, partially solid cyst of the left ovary.

That a recovery of this favourable character, however, is the exception, not the rule, is proved by a study of the puerperal history of the cases. In less than one-half do I find the puerperium entirely undisturbed. The cause of the disturbance is to be found in the ovarian tumour; indeed, it may be stated, as a general rule, that the behaviour of the tumour determines the character of the convalescence. When the former undergoes no untoward change the puerperium is little affected, and in most cases runs a normal course. Involution is in no way retarded, and the pulse, temperature, and general condition are those of a natural confinement. The position or mechanical relations of the tumour may cause retroversion of the uterus, or even axial rotation of it. Both these results have been met with, and, when present, no doubt tend to delay involution, but do not seem otherwise to affect convalescence.

Influence of the Puerperium on Ovarian Tumour.—

In endeavouring to estimate the effect of the puerperal condition on ovarian tumours we are met with the difficulty, already alluded to, that complications, which have their origin in pregnancy or in labour, may not reveal themselves clinically till the puerperium. Of this the following case reported by Cullingworth¹ is an illustration:—

Case XXIV.—A woman, aet. thirty-four, was confined of her seventh child after a very short labour, which consisted of little more than one long violent pain. For some hours previously there had been a fixed pain in the left side with no dilating effect on the cervix. Acute symptoms continued after labour. For four days no action of the bowels or passage of

¹ Cullingworth, *Practitioner*, April, 1900.

flatus, so that, no tumour being felt, the case was regarded as one of intestinal obstruction. When seen by Cullingworth the abdomen was large and tender, with free fluid in the lower part. Laparotomy on the fourth day, when a large purple cyst came into view, containing twelve pints of fluid mixed with blood, and having its pedicle twisted no less than three complete turns. There were no adhesions or evidences of mechanical obstruction or peritonitis. Death occurred half an hour after the operation.

It will be seen from the above case, where the symptoms commenced with the onset of labour, how difficult it may sometimes be to separate the effects due solely to the puerperal condition. We must be content to ascribe to its influence all those symptoms and complications which arise during it, and cannot be traced to an earlier origin.

Comparatively few cases are available for analysis. Excluding Jetter's cases, in which the various complications are insufficiently differentiated, I find that 330 only passed through pregnancy and labour without disturbance or without requiring surgical interference. An examination of the puerperal history of these proves that the conditions obtaining after labour are peculiarly favourable to the occurrence of changes in an ovarian tumour which are fraught with danger to the woman. No fewer than 137 suffered from acute complications, while of many others it is stated that there were febrile symptoms or attacks of pain, of longer or shorter duration, which did not, however, seriously interfere with convalescence. In more than half of the cases then, it may be computed, some disturbance of the puerperium was experienced.

The most common complication is undoubtedly torsion of the pedicle of the tumour. This is favoured by the lax condition of the abdominal wall and the sinking down of the emptied uterus, to which the tumour may be attached by adhesions. In 11 cases of post-partum ovariectomy published

by Mangiagalli¹ torsion was found in 4, while it existed in all save 1 of Aust Lawrence's 10 cases.² In our 330 cases it occurred 75 times, or in 22·7 per cent., while in pregnancy, it may be remembered, it was met with in only 12 per cent. of the cases. Its post-partum frequency is probably even greater than the above analysis indicates, as many of the attacks of fever or pain ascribed to peritonitis were almost certainly due to minor degrees of torsion. In several cases, again, torsion was found on operation, but as it gave rise to no symptoms these have not been included.

Where the ovarian cyst is fixed by adhesions above, effects similar to those of torsion may be produced by the traction on the pedicle, which is caused by the descent of the uterus after labour. Condamin³ has recently reported a case in which the abdomen remained large after the birth of the child, with the persistence of intense abdominal pain; meteoric vomiting and pyrexia occurred. A fortnight after, laparotomy was performed, when the cyst, which was congested, was found firmly adherent to the liver, transverse colon and mesentery. The adhesions to the liver were so firm that portions of the cyst wall were left. The pedicle was not twisted.

The other complications of ovarian tumour are likewise more frequent in the puerperal period, and the explanation of this is to be found partly in the conditions mentioned above, partly in the liability to infective processes which attends every labour. It is to this latter cause that must be attributed the frequency with which suppuration has been met in the puerperium. In 150 ovariectomies Mangiagalli⁴ found only 16 suppurating cysts, but of these no fewer than 7 were in his post-partum operations. In our series of 330 cases I find that suppuration took place in 30, or 9 per cent. The cases in which

¹ *Berliner Klinik. Wochenschr.*, 1894.

² *British Medical Journal*, 1893, vol. ii.

³ Condamin, *Lyon Méd.*, June, 1902.

⁴ Mangiagalli, *loc. cit.*

it was combined with torsion are not included. In commenting on the frequency of suppuration in the puerperium, Spencer¹ observes that the cause is not always easy to ascertain—"whether infection from tears in the genital tract, or from the intestine when the vitality had been lowered by injury or twisting of the pedicle". Chronic and subacute torsion are no doubt important factors, while the relatively greater frequency of suppuration in pelvic tumours points to the influence of injuries sustained during labour.

Rupture of an ovarian cyst in the puerperium is not so common as might be expected. Jetter records 13 instances, while in the series of 330 cases under consideration it occurred only 13 times, or in 4 per cent. Apart from torsion and suppuration, the most common cause is the dragging on adhesions between the cyst wall and neighbouring organs. The sudden alteration in position to which the descent of the uterus exposes the tumour favours this occurrence. On 15 occasions rupture took place into the peritoneal cavity, into the vagina or rectum 5 times, into the bladder 3 times, while on 3 occasions the cyst opened through the abdominal wall.

The danger is greatest when the cyst-contents are discharged into the peritoneal cavity, though even without operation this does not necessarily prove fatal. Butler Smythe² reports a case in which a cystic tumour of the size of a cocoanut and freely movable was detected early in pregnancy. After consultation it was decided not to remove it, as it would not interfere with pregnancy. No trouble was experienced during gestation. The tumour was carefully watched during the puerperium. At the end of a week it began to enlarge, and on the nineteenth day the woman felt something give way and experienced a sharp burning pain in the abdomen, but

¹ Spencer, *Obstet. Trans.*, 1900, vol. xlii., p. 143.

² Butler Smythe, *Lancet*, 1896, vol. ii., p. 809.

thought it unnecessary to draw attention to it. On the following day an examination was made, and no tumour was to be found. There was no rise of temperature or increase in the pulse rate, and no symptoms were observed either by the nurse or by the patient, who left hospital apparently quite well a few days later.

Inflammation of the tumour with resulting peritonitis is a common but, on the whole, less dangerous complication. The extent and severity of the inflammation vary greatly. There may be merely a slight localised peritonitis, or there may be acute general inflammation of the peritoneum. Inflammatory symptoms, independent of torsion or suppuration, were met with in about 7 per cent. of the cases.

SYMPTOMS.

From what has just been said in regard to the reciprocal effects of the two conditions it will be gathered that the symptoms of this puerperal complication present a wide variation. In many cases it is expressly stated that there was nothing to suggest either to the patient or to the medical man the existence of any unusual condition. Even tumours of large size may occasion no subjective symptoms whatever, and there may be nothing to attract attention in the pulse, temperature, or general character of the convalescence. On the other hand, inflammatory symptoms may supervene. These may be acute or may be so slight and transient as not materially to affect the recovery. Frequently the symptoms were of so mild and indefinite a character that they were disregarded at the time, or attributed to some other less important cause. For example, in some cases I find that there was merely a continuous ache or sense of weight in the region of the affected ovary. At other times occasional attacks of pain were complained of. The attacks may last only a few minutes, or a few hours, as happened in the first

case that came under my own observation (p. 171). These transient attacks, which may or may not be accompanied by a rise of temperature, are generally due to slight rotation of the tumour with temporary disturbance of the circulation through its pedicle, or to tearing of adhesions or to pulling on them. When of longer duration they may depend on the same causes, or be due to a localised peritonitis. As an illustration of the latter I may cite the following case recorded by Aronson.¹

Case XXV.—A primipara, twenty-four years of age, was seized with pain in the abdomen three days after a normal labour. The pain increased in severity, and fourteen days after labour she observed that the abdomen was enlarging; there was no fever. When seen seven weeks after the onset of symptoms the woman was found to be somewhat wasted and anæmic with small, feeble pulse, but normal temperature. The abdomen was distended, especially in the hypochondriac regions, the right more than the left; tenderness over the upper part of the abdomen; no distinct tumour could be recognised; fluctuation over the abdomen; dulness varied with change of position, save in the right hypochondriac region where there was an area of fixed dulness; vaginal fornices free; little subjective trouble. A diagnosis of chronic peritonitis with ascites was made. A month later the condition was unchanged, save that it was thought a tumour could now be felt in the right hypochondriac and the hypogastric region. Two years afterwards, the abdominal symptoms never having disappeared, a colloid cyst of the right ovary, extensively adherent, was removed. Recovery was slow and attended with the formation of abdominal and pelvic abscesses.

The obscurity of the signs in the above case was probably due to the fact that the tumour was small and adherent to the

¹ Aronson, *loc. cit.*

liver, and that its presence was masked by the existence of ascites. It shows that even small tumours, situated in the abdomen, may give rise to peritonitis in the puerperium.

Symptoms of greater severity, which we saw occurred in over 40 per cent. of the cases, are usually the result of one or other of the complications of ovarian tumour. Their clinical features are so identical with those which have been already detailed under pregnancy that a separate description of them is unnecessary. The following cases present a typical picture of the complications of ovarian tumour in the puerperium. The first two are selected from Aust Lawrence's series of post-partum ovariectomies.¹

Case XXVI.—Multipara: during last six months of pregnancy suffered a great deal of abdominal pain and was larger than in previous pregnancies; during labour far more than the usual suffering. After labour she had several severe attacks of abdominal pain accompanied by sickness and high temperature. Five weeks after, Lawrence found a semi-solid tumour rising from the pelvis to the umbilicus, equal in size to a six months' pregnant uterus. Laparotomy; cyst everywhere adherent; after freeing adhesions, cyst found to be absolutely free. What had happened was that the cyst had become rotated to such an extent that the vessels of the pedicle were absolutely blocked, and it would have become gangrenous had it not contracted adhesions. The woman made a good recovery.

Case XXVII.—Multipara: during pregnancy observed that she was much larger than usual, but otherwise did not complain; no unusual symptoms during labour; on the third day after, seized with acute abdominal pain, which persisted with high temperature and swollen abdomen till she was seen by Lawrence three weeks after. He found the woman very ill, with an enormous amount of free peritoneal fluid and also

¹ Aust Lawrence, *loc. cit.*

an abdominal cyst. Laparotomy, when an ovarian cyst with twisted pedicle and everywhere adherent was removed. The woman made a rapid recovery.

Case XXVIII.—A primipara, twenty-six years of age, was seized six days after labour, which was spontaneously terminated, with sudden severe pain in the abdomen, high fever, and well-marked signs of peritonitis. Three days after she was seen by Professor Landau. She was in an extremely weak condition, with dyspnœa, fever and a rapid, thready pulse. The abdomen was so much distended that the puerperal uterus could not be felt at all. On percussion there was a clear tympanitic note over the symphysis, but dulness in the left loin, where a distinct bulging was observed. On palpation a moderately defined, hard swelling was made out. The position of the swelling suggested a renal tumour, but the normal character of the urine along with the peritonitic symptoms did not support this diagnosis. Aspiration yielded a blood-coloured fluid. Landau gave as a probable diagnosis an ovarian cyst with twisted pedicle. Operation was recommended, but was not performed for several days. In the interval free fluid was found in the peritoneal cavity with resonance over the situation of the tumour. Rupture of the cyst was then diagnosed. At the operation more than a litre of dark blood mixed with fluid was found in the peritoneal cavity, with a ruptured ovarian cyst the pedicle of which was twisted one half turn. The woman made a good recovery. (From Professor Landau's *Klinik*; L. Pick, *Dissertation*, Königsberg.)

In childbed the true significance of the febrile symptoms is apt to be overlooked from the resemblance which they present to the symptoms of an acute puerperal infection. Many observers have been misled by this resemblance. Mistakes can be prevented only by keeping in view the possibility of an ovarian cause in all febrile attacks following labour, and excluding that possibility by the most careful examination.

DIAGNOSIS.

The early recognition of an ovarian tumour complicating the puerperium is of the utmost importance. A knowledge of its existence will at once explain the acute symptoms which are so apt to supervene, and will prevent errors of diagnosis and delay in carrying out the necessary treatment.

It is seldom that we meet with the difficulty in diagnosis that is so often experienced in pregnancy. The physical conditions present make the detection of the tumour easy. No doubt in many cases the tumour has escaped observation, but that is usually because it has not been looked for. In a case reported by Heinricius¹ an ovarian cyst was mistaken for the puerperal uterus, notwithstanding that it rapidly increased in size. The case was regarded as one of puerperal infection, and it was not till the eleventh day that it was discovered that what had been regarded as the uterus was an independent tumour. On laparotomy it proved to be a suppurating ovarian cyst.

The most important point in the diagnosis is an early examination, before the abdominal signs are masked by peritonitis. A daily, or at least occasional, examination of the abdomen of puerperal women should be routinely made. Many errors in diagnosis would thus be avoided.

Recognition of the tumour must rest on the physical signs. As a rule, no difficulty will be experienced save in those cases in which no examination is made till several days after the onset of some complication. Peritonitis may then obscure the physical signs of ovarian disease.² In these circumstances men of even wide experience in abdominal examination have been unable to satisfy themselves of the existence of a definite tumour, notwithstanding that its presence was suspected.

Uncertainty as to the exact nature of the tumour will exist

¹ Heinricius, *Ann. de Gynécol.*, vol. xlvii., p. 255.

² See a case recorded by Bland-Sutton, p. 205 (Case XXIII.).

chiefly when it occupies the pelvis. An elastic fluctuating tumour detected in the posterior or lateral fornices after labour will usually be ovarian. The conditions which most closely simulate it are a simple localised peritonitis or parametritis, a pedunculated fibroid, a displaced cystic kidney, or an old extra-uterine gestation sac. The two last are so rare that they may practically be disregarded. The differential diagnosis of the other conditions has already been discussed under pregnancy.

An examination under chloroform will often be of service, but will not always reveal the true state of matters. In not a few of our cases a decisive diagnosis was impossible till the abdomen was opened. This should always be done where doubt exists as to the cause of dangerous puerperal peritonitis.

PROGNOSIS.

The existence of an ovarian tumour in the puerperium must always be a source of anxiety. The danger is greater at this time than during pregnancy owing partly to the increased liability to complications of the tumour, and partly to the fact that complications traceable to pregnancy or labour often do not present themselves in dangerous form till the puerperium. There is a good deal of truth in the statement which Bland-Sutton¹ makes in passing from the consideration of ovarian tumours in the pelvis to deal with those that occupy the abdomen during labour: "We have now to deal with a much more insidious, and far more fatal, complication, namely, when an ovarian tumour complicates labour, and delivery is completed without, in some cases, its presence being even recognised". The danger lies not in the situation of the tumour, but in the fact that abdominal tumours are more likely to escape recognition till some dangerous complication supervenes.

In estimating the influence of the puerperium on ovarian

¹ Bland-Sutton, *Lancet*, 1901, vol. i.

tumour it was noted that acute complications arose in over 40 per cent. of the cases, while in many others minor disturbances of the puerperium resulted. Even these figures do not give the full measure of the danger, as we then excluded all puerperal complications whose origin could be traced either to pregnancy or labour. If we add these we find that some acute complication of the puerperium occurs in about 1 out of every 2 cases.

Note has already been taken of the fact that few of the deaths attributable to the complication of pregnancy with ovarian tumour take place before the completion of labour. The most acute complications arising during gestation seldom prove fatal till after the uterus has been emptied. Notwithstanding this fact and the frequency of purely puerperal complications, a fatal issue ensued in only 18 per cent. of the cases. In many, however, it was only averted by timely operation. The post-partum mortality, without operation, may be set down somewhat roughly at about 28 per cent.

In individual cases there are various factors which influence the behaviour of the tumour, and consequently the woman's recovery. The character of the labour has less influence than might be expected. Rapid and easy labours seem quite as liable as the more protracted and difficult to be followed by complications. It is a curious and noteworthy fact, to which Sir John Williams has called attention, "that the mortality in the easier labours was as large as in the more difficult ones, in cases which required little or no help as in those demanding the greatest skill".¹

The character of the tumour will affect the prognosis. Those of a malignant character are the most serious; but they do not necessarily prove fatal. At least two cases have been successfully operated on post-partum, in which the tumour was found to be sarcomatous. Dermoid tumours

¹ Williams, *Cavendish Lecture*, 1897.

are, on the whole, more dangerous than simple or multilocular cysts.

The situation of the tumour during labour has an important influence on the prognosis. If it lies in the pelvis, and the condition is not recognised till too late to permit of its being returned to the abdomen, or if previous to reposition the tumour has been subjected to prolonged pressure, the prognosis is more serious.

Small tumours are as much to be feared as the larger, while their inherent danger is increased by their greater liability to escape detection. Grave symptoms in the puerperium have been found to depend on tumours no larger than a hen's egg, as, for instance, in the following fatal case, for the notes of which I am indebted to Sir John Williams.

Case XXIX.—A primipara, on the third day after an easy labour, in which she was not seen till the head was on the perineum, had a sudden rise of temperature to 102. Examination disclosed a tumour about the size of a hen's egg in the right posterior quarter of the pelvis, which was believed to be an ovarian dermoid. Peritonitis set in with high temperature. There was no tenderness or distension till a day or two before death, which took place on the thirteenth day after labour.

An important factor in the prognosis is the treatment adopted. Even where complications of the most serious kind arise, the danger may usually be removed by immediate operation, but the success of laparotomy will depend on early recognition, which, indeed, must be regarded as a most important element in the prognosis.

TREATMENT.

IN approaching the treatment of ovarian tumour in the puerperium we are met by a somewhat simpler problem than was presented during pregnancy, as we have here to consider only one life, that of the mother. Notwithstanding this simplification of the issue, there prevails much uncertainty as to the best method of dealing with this complication. This may be traced to the old belief, which is only slowly disappearing, that operations are especially hazardous in the puerperal period. I hope to be able to show that the risks are to a large extent accidental, and not inherent in the post-partum condition.

The puerperal management of ovarian tumour has been strangely neglected in text-books on midwifery. Though the more recent discuss at some length the treatment during pregnancy, scarcely one refers to the management in the puerperium. None lay down definite rules for the guidance of the practitioner. This is all the more remarkable when one considers that the puerperium is the period of most danger, and that, in a large proportion of these cases, the tumour is first recognised either towards the end of, or after labour. Of Aust Lawrence's 10 cases not one was detected during pregnancy.

The frequency with which pregnancy runs its course without the tumour being recognised, and the great danger to the woman throughout the puerperal period, make it imperative that all uncertainty as to the best method of dealing with these cases should, if possible, be removed. Hitherto, with no records of past experience to guide him, each man

has been a law unto himself. The result has been a wide difference in the attitude adopted, as might be expected in a condition which presents symptoms and dangers of such varying degrees. This applies chiefly to those cases where no complication arises. Where acute symptoms supervene it is generally agreed that immediate laparotomy should be performed. It will be well, then, in discussing the treatment, to consider the two kinds of cases separately: (1) where the tumour causes no disturbance of the puerperium; (2) where acute symptoms manifest themselves.

1. **Where the Puerperium is Undisturbed.**—Before proceeding to consider the treatment which should be here adopted, I shall briefly review the methods which have in the past been employed, and the opinions which have been expressed by the few writers who deal with the post-partum management of cases of this kind.

Heiberg,¹ who is the first to discuss the puerperal management, dismisses the whole question in a few words. He expresses the opinion that the puerperal period contra-indicates ovariectomy, and agrees with Heywood Smith² and Schroeder³ that operation should be postponed for at least six or eight weeks after labour. Thoman⁴ is still more strongly opposed to ovariectomy in the puerperium. As only unfavourable results are to be expected, he maintains that operation is absolutely contra-indicated. Winter,⁵ on the other hand, while agreeing that ovariectomy should be deferred in the absence of symptoms, urges the necessity for immediate operation on the first

¹ Heiberg, *loc. cit.*, p. 160.

² Heywood Smith, *Obstet. Trans.*, vol. xix., p. 195.

³ Schroeder, Veit: *Berlin. Klinik. Wochenschr.*, 1876, p. 393; and *Zeitsch. f. Geburts. u. Gynäk*, 1880, Bd. v.

⁴ Thoman, "*Schwangerschaft und Trauma*," Wien, 1889.

⁵ Winter, *Inaug. Dissertation*, Berlin, 1891.

signs of torsion of the pedicle, which he points out is the danger most to be feared in a puerperal woman with an ovarian tumour. He gives two instances of ovariectomy, in one of which operation was postponed till after the puerperium, though symptoms of torsion appeared a few hours after delivery; in the other ovariectomy was performed two days after labour. From a consideration of these two cases he concluded that to postpone operation was only to increase the difficulties by allowing the formation of adhesions.

In their papers already referred to, Aust Lawrence and Mangiagalli, though both emphasise the dangers of an ovarian tumour in the puerperium, do not seem to recommend earlier operation. They cite their cases rather as an argument in favour of ovariectomy during pregnancy, but in most of the cases, indeed in all of Aust Lawrence's, this would have been impossible, as the tumour was not detected before the onset of labour. Still later Löhlein¹ discusses the subject in an important paper entitled "*Ovarialtumoren und Ovariectomie in Schwangerschaft, Geburt und Wochenbett*". He deals, however, with only a few special cases of pelvic tumour, making no reference to the management in childbed of the larger class where the tumour occupied the abdomen during labour.

Among the most recent writers we find no suggestion of operative removal in the absence of threatened or urgent symptoms. Even Bland-Sutton, whose advanced views cannot be denied, advises ovariectomy in those cases only in which disturbances arise. "It cannot be too strongly urged," he concludes, "*that when a puerperal woman known to possess an ovarian tumour exhibits unfavourable symptoms, ovariectomy should be resorted to without delay.*"²

From what has just been said it will be gathered that, up

¹ Löhlein, *Gynäkologische Tagesfragen*, Heft iv.

² Bland-Sutton, *Lancet*, 1901, vol. i.

to the present time, there has been a general, though tacit, agreement that ovarian tumours which do not disturb the puerperium should not be interfered with, but treated in an expectant way. The only exception to this is to be found in regard to certain cases where the tumour occupied the pelvis during the whole or part of labour, and has been exposed to such pressure or injury as would almost certainly lead to trouble in the puerperium. Instances of this were given in dealing with pelvic tumours during labour. Where the injury to the tumour has been considerable, or where the cyst contents are known to be of an infective character, Hohl¹ inclines to removal immediately after labour. Flaischlen,² again, recommends laparotomy, at the latest on the following day, in those cases where the tumour has been punctured, while Rubeska,³ in remarking on his own case, states that he would extirpate an ovarian tumour, which before reposition was exposed to some hours' pressure, at the end of the first week of the puerperium, even if there were no other indications—suppuration, torsion of the pedicle, etc. He postpones operation till the end of a week to insure that there is no puerperal infection of the uterus.

In dealing with the after-treatment in my paper⁴ on pelvic tumours in labour, I stated that, while the whole subject was still *sub judice* owing to want of sufficient practical experience, the conclusions to which a careful consideration of the facts had led me were : (1) Where the delivery had been effected by Cæsarean section the tumour should if possible be coincidently removed. (2) Where the cyst contents are proved, or strongly suspected of being, infective, or where the tumour has been subjected to long-continued pressure, abdominal ovariectomy

¹ Hohl, *Archiv f. Gynäk.*, 1896.

² Flaischlen, *Zeitschr. f. Geburt. u. Gynäk.*, Bd. 29.

³ Rubeska, *Monatsschr. f. Geburt. u. Gynäk.*, 1895.

⁴ *Obstet. Trans.*, 1897, vol. xxxix.

should be performed immediately, or within a few hours, after delivery. (3) Where the tumour has been subjected to considerable pressure before reposition, and is believed to be a dermoid, its removal should be effected at the end of the first week of the puerperium. (4) Where reposition has been successful early in labour, or where puncture reveals the tumour to be a simple cyst, expectant treatment should be adopted, but the supervention of severe inflammatory symptoms should at once be followed by laparotomy.

These recommendations were made from a study of pelvic cases only. A more extended survey, which includes the puerperal history of a very large number of cases, convinces me that the rule which in ordinary circumstances applies to ovarian tumours, namely, to remove them as soon as possible, should apply with equal, if not with even greater, force to those which complicate the puerperium. The following considerations will, I think, confirm this view: (1) Under an expectant treatment acute symptoms are to be anticipated in 1 out of every 2 cases. (2) Where operation has to be undertaken in the presence of some complication of the tumour its dangers are admittedly much increased. (3) There is no proof that operations in the puerperium are attended with any additional risk, provided the confinement has been conducted with strict aseptic precautions; but, even granting a somewhat increased risk, the danger is less than that which delay, with the possibility of complications, would involve.

The whole evidence at our disposal points to the truth of these propositions, and, if they are admitted, it is the duty of teachers to lay down as a definite rule that, when an ovarian tumour is discovered towards the end of labour or during the puerperium, it should be removed without unnecessary delay. Extirpation is the best safeguard against possible complications.

In connection with those cases in which the tumour is first detected during labour the question naturally arises as to what,

if any, interval should be allowed to elapse between its completion and the operation. This will be considered when we come to deal with post-partum ovariectomy.

2. **Where Acute Symptoms Supervene.**—There is little difference of opinion as to the treatment which should be followed when acute symptoms manifest themselves in a puerperium complicated with an ovarian tumour. It is generally agreed that ovariectomy should be at once performed. Condamin,¹ however, takes a somewhat different view. Where the cyst escapes notice till the onset of an acute complication, he advises the postponement of operative interference until the cessation of the peritoneal reaction, unless the patient's condition becomes too serious. With this view the writer does not agree. Delay serves only to increase the risks by exhausting the woman's strength and by allowing the formation of adhesions, which add to the difficulties and dangers of removal. An illustration of this is to be found in a case reported by Alban Doran,² in which torsion with infection of an ovarian cyst occurred during the puerperium. Operation was deferred for two months. The tumour was found universally adherent with foetid contents. Symptoms of infection from bacilli coli supervened, and the woman died six days after. Doran notes that this form of infection is a "frequent complication after the separation of intestinal adhesions in ovariectomy when malignant or strongly adherent dermoid tumours are removed".

The more critical the condition of the woman, the more urgent the necessity for operation. No matter how grave and serious the symptoms are, there should be no hesitation in opening the abdomen if there is evidence of the existence of a definite tumour. Indeed, one may go a step further and assert

¹ Condamin, *Lyon Méd.*, June, 1902.

² Alban Doran, *Lancet*, 1902, vol. i.

that in all cases of dangerous puerperal peritonitis, of doubtful origin, an exploratory laparotomy should be performed. In several instances this has led to the discovery of an unsuspected ovarian tumour, the removal of which has prevented what would otherwise have been a fatal issue. There can, indeed, be little doubt of the truth of Aust Lawrence's surmise that many women have died of so-called puerperal peritonitis when a timely operation would have saved them.¹

¹ Aust Lawrence, *loc. cit.*

POST-PARTUM OVARIOTOMY.

A FEW words may with advantage be added to what has already been said in regard to post-partum ovariectomy. Notwithstanding its importance, it has, so far, received but scant attention from writers on obstetrics.

That immediate removal will come to be recognised as the treatment which should be followed in all cases of ovarian tumour in the puerperium, complicated and uncomplicated alike, I do not for a moment doubt. My reasons for this have already been stated. The expectant treatment, which at the present time is generally advocated, is based on the belief that the puerperal period is peculiarly prejudicial to surgical operations. Certainly, it is not the time one would select for an operation which could be safely postponed, but in the case of ovarian tumours delay involves many dangers. The risk of operation in the puerperium lies not in the post-partum condition itself but in the possibility of puerperal infection. For proof of this we must rely largely on the results of post-partum ovariectomies. Surgical literature furnishes but little evidence on the point.

Until recently instances of post-partum ovariectomy were few and the results far from satisfactory. In 1881 Heiberg found only 15 cases in which ovariectomy was performed within eight weeks after labour. Of these no fewer than 10 proved fatal. Since then, and more particularly within the last few years, the number of recorded cases has been largely augmented.

I have been able to collect 92 further instances, and an analysis of them yields much interesting and valuable information. With few exceptions the operations were undertaken after the onset of some grave complication, or in some unfavourable condition of the patient. Acute or subacute torsion of the pedicle was present in 28, suppuration in 16, rupture in 8, and acute peritonitis in 12, while in 2 the tumour was malignant, and in 2 the cyst was gangrenous from injuries sustained during labour. In comparatively few of the cases was ovariectomy performed immediately, or even within a few days, after the onset of the complication.

Of the 92 operations no fewer than 79 were successful. If we examine the circumstances at the time of operation in the fatal cases, it will be seen that the condition of the woman was so serious as almost to preclude a successful issue. Of the 13 fatal cases 8 will be found in the table of post-partum ovariectomies. Of the remaining 5 there was torsion with general peritonitis in 2, suppuration in 1, rupture in 1, while in Orthmann's case the tumour was malignant with metastatic deposits on the peritoneum. Excluding the last, and the two first of the tabulated cases, we get a series of 89 ovariectomies performed during the puerperal period with 10 deaths, or a mortality of 11·2 per cent. It is doubtful if ovariectomy, apart from the puerperium, would give better results in a series of cases in which complications had existed for days or weeks before operation.

In not one of the 10 fatal cases was ovariectomy performed within forty-eight hours of the occurrence of acute symptoms. Earlier operation would no doubt tend further to improve these results, while it is reasonable to assume that, if complications could be anticipated, the mortality would be little, if at all, higher than that of ovariectomy in general.

The facts at our disposal, though few, support this conclusion. In all the fatal cases an acute complication existed, with the exception, perhaps, of Mond's case, in which, however,

the cyst was aspirated previous to labour. In 17 cases no complication preceded operation, and all the patients made good recoveries.

In the subjoined table only those cases are included which were operated on within two weeks of labour. In 6 no complication was present. Of the remaining successful cases torsion was present in 2, suppuration in 3, gangrene of the cyst in 1, peritonitis in 3, while in 2 the cyst ruptured during, in 2 after, labour.

The existence of an acute complication does not preclude a successful issue. Many of the women at the time of the operation were extremely ill. In Hirst's case¹ the patient's condition is stated to have been "almost hopeless". Mangiagalli² describes one patient, in whom a cystic tumour ruptured during labour, as practically moribund when admitted to hospital. Ovariectomy was performed, however, as a last resort and the woman recovered. These results should encourage operation even in circumstances that seem hopeless.

It has been shown, then, that no good reason exists for postponing ovariectomy till the end of the puerperium. All the available evidence points to the advisability of early operation as the best prophylactic against those dangerous complications which are so liable to occur post-partum, and which render operation so much more difficult and hazardous that it is of the first importance to anticipate them.

¹ Hirst, *International Clinics*, 1898 (see Table, Case 24).

² Mangiagalli, *loc. cit.* (see Table, Case 19).

POST-PARTUM OVARIOTOMY.

No.	Operator and Reference.	Time of Operation.	Diagnosis.	Result.	Remarks.
1	Nathan Raw: <i>Lancet</i> , 1899	Immediately after	Cyst, with twisted pedicle, ruptured during labour	D.	The labour was complicated from placenta prævia: during version uterus ruptured.
2	Jardine: <i>Glasgow Med. Journ.</i> , 1900	2 hours after	Cyst, suppurating in pregnancy	D.	Brought to hospital in hopeless condition, having been 4 days in labour: dilatation artificially completed and forceps applied: child still-born: death 6 hours after operation.
3	Toth: <i>Centralbl. f. Gynäk.</i> , 1898, No. 3	2nd day	Cyst: ruptured in 6th month of pregnancy.	D.	Premature labour followed rupture of cyst: 20 quarts of colloid fluid in abdominal cavity.
4	Cullingworth: <i>Practitioner</i> , 1900	4th day	Cyst, with twisted pedicle	D.	V. p. 230.
5	Bland-Sutton: <i>Lancet</i> , 1901	? end of first week	Dermoid, with twisted pedicle	D.	V. p. 205.
6	Ruge: <i>Berlin. Klin. Wochens.</i> , 1878	11th day	Dermoid, suppurating after puncture	D.	
7	Mond: <i>Münch. Med. Wochens.</i> , 1900	12th day	Cyst, large	D.	Enormous distension: diagnosis doubtful between hydramnios and ovarian cyst with pregnancy: abdomen punctured and large quantity of fluid withdrawn: membranes then ruptured and dead child delivered: death 4 days after operation.
8	Sutton: <i>Amer. Gynecol. Trans.</i> , vol. v., p. 116	2nd week	Cyst, gangrenous from torsion	D.	Torsion occurred during pregnancy and caused abortion.
9	Gow: unpublished	Immediately after	Parovarian cyst obstructing labour	R.	Cyst pushed up under anaesthesia, and labour completed by forceps: without removing patient from delivery table ovariectomy performed.
10	Hohl: <i>Archiv f. Gynäk.</i> , 1896	2 hours after	Dermoid, obstructing labour	R.	Tumour aspirated during labour: adherent to pelvic peritoneum: evidence of tearing of adhesions during labour.
11	Potherat: <i>France Médicale</i> , 1892	28 hours after	Cyst	R.	Pyrexia and signs of infection following labour.

12	Sippel: <i>Centralbl. f. Gynäk.</i> , 1888	2nd day	Cyst, gangrenous from torsion in pregnancy	R.	Torsion followed by premature labour in 7th month: acute peritonitis.
13	Jeafferson: <i>Trs. Prov. Med. and Surg. Assoc.</i>	4th day	Cyst	R.	Rapid enlargement of cyst after labour.
14	Semon: <i>Monats. f. Geburt. u. Gynäk.</i> , 1901	4th day	Cyst, torsion of pedicle with rupture	R.	Torsion occurred 36 hours after labour on rising to stool.
15	Fehling: Waehmer: <i>Dissert.</i> , Halle, 1900	6th day	Cyst	R.	Great abdominal distension: diagnosed by drammios and cervix artificially dilated: delivery followed by fever and pain in abdomen.
16	Hohl: <i>loc. cit.</i>	7th day	Cyst in pelvis during 3rd stage of labour	R.	Puerperium normal till operation.
17	Modlin: <i>Lancet</i> , 1901	8th day	Cyst, suppurating in puerperium	R.	Tumour detected 3 weeks before term, but decided to wait: rapid enlargement of abdomen, with pyrexia after labour.
18	Heinricius: <i>Ann. de Gynec.</i> , vol. xlvii., p. 255	11th day	Cyst, suppurating in puerperium	R.	V. p. 238.
19	Mangiagalli: <i>Berlin. Klin. Wochens.</i> , 1894	10th day	Cyst, ruptured during labour	R.	Patient almost moribund on admission: peritonitis and bronchial catarrh.
20	Landau: Pick, <i>Disser.</i> , Königsberg, 1895	2nd week	Cyst, ruptured on 6th day	R.	Spontaneous labour at 7th month: pedicle found twisted 1½ times.
21	Davies: <i>Brit. Med. Jr.</i> , 1899, ii., p. 1293	2nd week	Ovarian tumour, with twisted pedicle	R.	Severe pyrexia and signs of peritonitis following labour.
22	Galabin: <i>Brit. Med. Assoc.</i> , 1902	2nd week	Dermoid, in pelvis	R.	Abortion induced, thereafter ovariectomy.
23	Condamin: <i>Lyon Médic.</i> , 1902	2nd week	Cyst, adherent to liver and intestines	R.	Labour followed by pyrexia, abdominal pain and vomiting: peritonitis.
24	Hirst: <i>Intern. Clinics</i> , 1898	2nd week	Semi-solid multilocular cyst obstructing labour	R.	Woman's condition almost hopeless, cyst gangrenous.
25	Loison et Duscheneau: <i>Arch. de Tocol.</i> , 1892	2nd week	Cyst, ruptured during labour	R.	Acute peritonitis followed rupture.
26	Staude: <i>Geb. Gesells. zu Hamburg</i> , 1900	? 2nd week	Ovarian tumour obstructing labour	R.	
27	Barton Cook: <i>Med. News</i> , Philadelphia, 1892	? 2nd week	Cyst, suppurating in pregnancy	R.	Aspiration of cyst <i>per vaginam</i> during premature labour in 9th month: signs of infection followed.

TIME OF OPERATION.

HAVING established the necessity for early ovariectomy in the puerperium, we have now to consider the time at which the operation may most safely be carried out. How soon should a tumour be removed which has been first detected during labour? Should ovariectomy be undertaken at once, or should an interval be allowed to elapse to permit the woman to recover from the necessary fatigue and shock?

In endeavouring to answer this question we get little direct help from experience. I find records of only 11 cases operated on within the first week of the puerperium. In 5 of these there was present an acute complication, and in 2 there were evidences of infection with pyrexia and peritonitis. Notwithstanding, 4 of the 7 recovered. In the 3 fatal cases the circumstances at the time of operation were such as almost to preclude the possibility of a successful result; in 1 the operation was performed on the day following a labour brought on prematurely by rupture of the cyst in the sixth month; 1 was operated on immediately after a labour complicated by placenta prævia, rupture of the uterus, and rupture of the cyst; while in the third the woman was brought to hospital in a hopeless condition, having been four days in labour with a large suppurating cyst in the abdomen. In these 3 cases operation was compulsory, and no useful deductions can be drawn from them as to the safety of removing an uncomplicated ovarian tumour after labour.

Four cases only were operated on in the absence of complications, and all 4 proved successful. In one case the operation was performed on the fourth, in another on the seventh day of

the puerperium. In the following case, for the notes of which I am indebted to Dr. Gow, a parovarian cyst was removed immediately after the completion of labour.

Case XXX.—M. H., thirty-four years of age, in labour with her first child, was admitted to Queen Charlotte's Hospital on 13th March, 1901. Labour pains began at 6 P.M. on the 11th. The head presented, the os was the size of a crown piece, and the membranes were unruptured. In Douglas's pouch a cystic tumour was felt, compressed between the sacrum and the head which could make no progress. The tumour was smooth, tense, and had a pedicle. Under anæsthesia Dr. Gow pushed the tumour up, ruptured the membranes, and completed delivery with the forceps. The child was suffering from shock, but quickly recovered. Preparations were at once made for ovariectomy, and without removing the patient from the table the abdomen was opened, and the tumour, which was of the size of a large orange and proved to be a parovarian cyst, was removed. The layers of the peritoneum were so closely adherent to it that it could not be enucleated. The patient made an uninterrupted recovery, the temperature only once, on the fourth day, reaching 100.

Hohl¹ removed a dermoid tumour, which had obstructed labour and required aspiration, two hours after labour. Not only was the result successful, but it proved the wisdom of early operation, as there was found in the peritoneal cavity dermoid contents, which had escaped from the opening in the cyst wall.

Apart from these two cases I find no instance of the removal of an uncomplicated ovarian tumour immediately or within a few hours after labour. As we have seen, however, ovariectomy has been performed on 15 occasions (7 *per vaginam*) during the actual progress of labour, without one unsuccessful result as

¹ Hohl, *loc. cit.*

far as the mother is concerned ; and it may reasonably be concluded that no greater risk would attach to operation undertaken on the completion of delivery.

The conditions and environment which usually obtain immediately after labour are so unsuitable for serious operations that this time should be chosen only if there were danger, as in Hohl's case, in postponing the operative removal of the tumour till a more favourable period. The dangers that lie in delay have already been insisted on, and the fact that many of the complications arise during the first few days of the puerperium make early operation imperative.

There are probably few cases in private practice in which the operation can be proceeded with immediately on the completion of labour. The careful preparation which is necessary for its safe performance will often be impossible. Again, objection may be raised by the woman or her friends, who refuse to believe that danger exists now that the labour is safely over. There will, too, be a natural reluctance on the part of the practitioner to submit the patient, who is comfortable and anxious to rest, to a second ordeal. But, to borrow the words of Dr. Haultain,¹ " it is only anticipating the necessary operation by a few weeks, and removes the immediate risks of a possibly injured tumour. Further, the patient by this means is saved a double period of being laid aside, the necessary period of confinement during the puerperium being occupied by the convalescence after laparotomy."

Though immediate removal is the safest treatment, and is in many cases to be urged, it will not be found generally necessary ; but when circumstances permit ovariectomy should not be postponed for more than twenty-four hours. All the evidence meantime at our disposal points to this as the safest and therefore best procedure.

¹ Haultain, *loc. cit.*

SUMMARY OF TREATMENT OF OVARIAN TUMOUR IN THE PUERPERIUM.

IN the following propositions the treatment of ovarian tumour in the puerperium is shortly summarised :—

1. In all cases, complicated and uncomplicated alike, ovariectomy should be performed as early as possible.

2. If the tumour be first detected during labour, its removal may be safely undertaken immediately or within a few hours after delivery, provided the labour has been conducted with proper antiseptic precautions.

3. It is doubtful whether even the possibility of puerperal infection should be regarded as a sufficient reason for postponing operation, owing to the great danger of coincident infection of the cyst.

4. In all cases of acute complication, arising from the tumour, immediate operation is imperative. Even when the symptoms and condition are so grave as almost to preclude hope, laparotomy is not only justifiable but necessary. Experience shows that even in these circumstances removal of the tumour may lead to a successful result.

5. In cases of dangerous puerperal peritonitis, even when no definite tumour can be made out, an exploratory laparotomy is advisable. An unsuspected ovarian tumour has on several occasions been thus discovered and removed, with disappearance of all the symptoms.



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1871

1. The first of the year was a very cold one, with a heavy snowfall on the 1st and 2nd inst.

2. On the 3rd inst. the weather was very fine, with a light breeze from the west.

3. On the 4th inst. the weather was very fine, with a light breeze from the west.

4. On the 5th inst. the weather was very fine, with a light breeze from the west.

5. On the 6th inst. the weather was very fine, with a light breeze from the west.

6. On the 7th inst. the weather was very fine, with a light breeze from the west.

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27. On the 28th inst. the weather was very fine, with a light breeze from the west.

28. On the 29th inst. the weather was very fine, with a light breeze from the west.

29. On the 30th inst. the weather was very fine, with a light breeze from the west.

30. On the 31st inst. the weather was very fine, with a light breeze from the west.

INDEX.

- ABDOMEN, appearance of, 31, 38.
 — belt for, after ovariectomy, 123.
 — circumference of, before and after labour, 96.
 — groove in, 38.
 — inspection of, 38.
 — palpation of, 38.
 — percussion of, 39.
 — rapid enlargement of, 31, 59, 61.
 — sudden alteration in shape of, 68.
 Abortion after ovariectomy, 111.
 — — — at various months, 114.
 — — — bilateral, 116.
 — — — vaginal, 117.
 — — — operation and injury, 100.
 — — — on pelvic organs, 101.
 — — — removal of intraligamentary tumours, 113.
 — — — of parovarian cysts, 113.
 — — — tapping, 90.
 — frequency of, with ovarian tumour, 17.
 Adhesions a cause of abortion, 18.
 — — — — after ovariectomy, 115.
 — — — — post-partum hæmorrhage, 165.
 — ascites localised by, 58.
 — causing symptoms simulating torsion of the pedicle, 232.
 — during ovariectomy, 112, 113, 117, 124.
 — effect of, on position of uterus, 18.
 — — — — uterine contractions, 164.
 — — — — uterine retraction, 164.
 — formation of, 23, 244, 247.
 — preventing reposition in pelvic tumours, 196.
 — tapping a source of, 89.
 — tearing of, due to growth of uterus, 23.
 — separation of, a source of infection, 247.
 Air in cyst as sign of suppuration, 68.
 Albuminuria in pregnancy with ovarian tumour, 21, 61.
 Anæsthesia, value of, in diagnosis, 42, 43, 44, 189, 239.
 Analytical tables—
 Cases published since 1890, 73.
 — of ovariectomy in pregnancy, 127.
 — — labour obstructed by ovarian tumour, 211.
 — — post-partum ovariectomy, 252.
 Fatal cases of ovariectomy in pregnancy, 108.
 Showing prognosis for mother at various months, 111.
 — — — child at various months, 114.
 Anuria after ovariectomy during pregnancy, 148.
 Appendicitis during pregnancy, 65, 67.
 — — — diagnosis of, from ovarian tumour, 65.
 Ascites, occurrence of, in pregnancy with ovarian tumour, 21.
 — resemblance of, in pregnancy to ovarian tumour, 58.
 — diagnosis of, 59.
 Auscultation, value of, in diagnosis, 40.
 — — — — defining position of uterus, 93.
 BALLOTTEMENT, value of, in diagnosis, 36, 39, 60.
 Bilateral ovariectomy. *See* Ovariectomy.
 Bimanual examination, 40.
 — — Howitz's extension of, 43.
 Bladder, distension of, a cause of mistaken diagnosis, 42.
 — irritability of, 30.

- CÆSAREAN section during labour, 187.
 — — — — results of, 187.
 — — — — indications for, 195.
 — — — — necessity for early performance of, 195.
 — — during pregnancy, 119.
 — — — — after injury to uterus, 102, 122.
 Cases, number of, analysed, 4.
 — source from which obtained, 4.
 Cervix uteri, importance of changes in, 36, 41.
 — — — — direction of, 49.
 — — — — position of, 40, 49.
 Complications of ovarian tumour in pregnancy, 22.
 — — — — acute, frequency of, 28.
 — — — — diagnosis of, 64.
 — — — — in puerperium, 230.
 — — — — frequency of, 231.
 — — — — treatment of, 247.
 Conception, effect of ovarian disease on, 1.
 — after removal of both ovaries, 1.
 Craniotomy with ovarian tumour in pelvis, 186, 221.
 — dangers of, 186.
 — indications for, 193.
 Cyst, ovarian, chemical character of contents of, as an aid to diagnosis, 44.
 Cystic degeneration of ovum in ovarian disease, 19.
- DEATH of child, causes of, 79.
 — — mother during pregnancy, 68, 72.
 — — — during labour, 182.
 Dermoid cysts, dangers of, in pregnancy, 78.
 — — — — labour, 179.
 — — expulsion of, during labour, 182.
 — — frequency of, 6, 179.
 — — management of, in ovariectomy, 119.
 — — rupture of, 78, 164, 184.
 — — site of, 8.
 — — suppuration of, 27, 78.
 Diagnosis, importance of early, 74, 169, 237, 241.
 — — — history in, 59, 65.
 — of ovarian tumour in labour, 167, 187.
- Diagnosis of ovarian tumour in pregnancy, 34.
 — — differential, 45.
 — — — fibromyoma uteri, 46.
 — — — retroverted gravid uterus, 49.
 — — — floating kidney, 51.
 — — — extra-uterine gestation, 53.
 — — — ascites, 58.
 — — — hydramnios, 59.
 — — — pelvic exostosis, 63.
 — in the puerperium, 238.
 Displacement, sudden, of ovarian tumour during pregnancy, 9.
 — — — case of, 31.
- ECLAMPSIA during pregnancy, 21.
 — during labour, 183, 184.
 Exostosis, pelvic, resemblance of, to ovarian tumour, 41, 63.
 — importance of rectal examination in diagnosis of, 43.
 Extra-uterine gestation, resemblance of, to ovarian tumour, 53.
 — — — combined with intra-uterine, 53.
 — — — diagnosis of, 54.
 — — — mistaken for ovarian tumour with intra-uterine pregnancy, 54.
 — — — case of ovarian tumour mistaken for, 56.
- FÆCAL accumulations mistaken for ovarian tumour, 42.
 Fibromyoma uteri, diagnosis of, from pregnancy with ovarian tumour, 46.
 — — case of, in pregnancy mistaken for ovarian tumour, 48.
 Floating kidney, resemblance of, to ovarian tumour, 51.
 — — cases of, in pregnancy, 52.
 — — differential diagnosis of, 51.
 Foetal heart sounds, value of, in diagnosis, 36, 40.
 Foetus, influence of ovarian tumour on development of, 21, 79.
 — perception of movements of, 36, 39.
 Forceps, in labour with ovarian tumour in pelvis, 186, 219.
 — — — after reposition, 184.
 — — — after puncture, 185.
 — — — dangers of, 186, 219.

- Forceps, in labour, indications for, 193.
 — early employment of, in labour after ovariectomy during pregnancy, 123.
 Frequency of ovarian tumour with pregnancy, 2, 4.
- HÆMORRHAGE, accidental, after ovariectomy, 122.
 — from tearing of adhesions, 23, 26, 123, 165.
 — in vaginal ovariectomy, 117, 120.
 — — — during labour, 199.
 — into ovarian cyst during pregnancy, 28.
 — — — — due to blow, 28.
 — — — — due to torsion of pedicle, 26, 66, 231.
 — post-partum, due to adhesions, 164.
 — — — fatal case of, 165.
- Hydramnios, case of pregnancy with ovarian cyst mistaken for, 61.
 — differential diagnosis of, 59.
 — resemblance of, to pregnancy with ovarian tumour, 59.
 — — author's case in illustration, 61.
- Hydro-nephrosis. *See* Kidney.
- INCARCERATION of gravid uterus, 18, 31, 49.
- Incision of pelvic cyst during labour, 193, 201.
 — — — — after treatment in, 202.
- Infection of ovarian cyst, 192, 233.
 — puerperal, resemblance of, to complications of ovarian tumour, 71, 237, 248.
 — from bacilli coli, after ovariectomy, 247.
- Injuries during pregnancy and their effect on uterus, 100.
 — of uterus. *See* Uterus.
- Inspection as an aid to diagnosis, 38.
- Intestinal obstruction in pregnancy with ovarian tumour, 30.
 — — symptoms of, in puerperium, 230.
- Intraligamentary tumours, effect of removal of, on continuation of pregnancy, 113.
- Involution of uterus, effect of ovarian tumour on, 230.
- KIDNEY, cystic, simulating ovarian tumour, 51.
 — — — — — diagnosis of, 51.
 — — — — — cases of, 52.
 — — removed *per vaginam* in belief that ovarian cyst, 51.
- LABOUR, cases of, with ovarian tumour in abdomen, 87, 164, 229, 230, 236.
 — — — — — in pelvis, 164, 171, 174, 211.
 — causes of delay in, with ovarian tumour, 164.
 — duration of, 163, 181.
 — influence of ovarian tumour on, 163.
 — obliquity of uterus in, 164.
 — precipitate, 163.
 — premature, 17, 95.
 — — induction of, 94.
 — — — — after ovariectomy, 123.
 — — — — contra-indications to, 126.
 — — — — mortality after, 96.
 — rupture of ovarian cyst in, 165, 181.
 — torsion of pedicle in, 165.
 — spontaneous completion of, with ovarian tumour in pelvis, 182.
 — — results of, 182.
 — — dangers of, 190.
 — with ovarian tumour. *See* Summary, p. 161.
- Laparotomy, exploratory, 35, 42, 52, 65.
 — — necessity for, in puerperal peritonitis of doubtful origin, 239, 248.
- MEMBRANES, foetal, injury to, 121, 125.
- Menstruation in ovarian disease, 35.
 — normal period of, to be avoided in ovariectomy, 125.
- Mortality in pregnancy with ovarian tumour, 72, 78.
 — in the puerperium with ovarian tumour, 240.
- NON-INTERFERENCE in pregnancy with ovarian tumour, 84.
 — — — — — dangers of, 85.

- OVARIAN tumour a cause of cystic degeneration of ovum, 19.
 — — — — deviation in uterine axis, 20, 164.
 — — — — incarceration of gravid uterus, 18.
 — — — — sterility, 2.
 — — bilateral, 7.
 — — carcinomatous, 7.
 — — complete disappearance of, 13.
 — — cystic, 6.
 — — dermoid. *See* Dermoid cysts.
 — — fibromatous, 7.
 — — frequency of, associated with pregnancy, 2.
 — — influence of, in causing abortion, 17.
 — — — — in producing uterine torsion, 19.
 — — — — on development of fœtus, 21.
 — — — — on pregnancy, 17.
 — — — — pregnancy on growth of, 11.
 — — — — — origin of, 10.
 — — in labour. *See* Labour.
 — — in pregnancy. *See* Pregnancy.
 — — in puerperium, 227.
 — — — reciprocal influences, 229.
 — — — — number of cases analysed, 231.
 — — — — frequency of acute complications in, 231.
 — — — — symptoms of, 234.
 — — — — — cases illustrative of, 235.
 — — — — — resemblance of, to puerperal infection, 71, 237, 248.
 — — — — diagnosis of, 238.
 — — — — — importance of early examination in, 238.
 — — — — — value of chloroform in, 238.
 — — — — — laparotomy in, 239, 248.
 — — — prognosis in, 239.
 — — — — influence of character of labour on, 240.
 — — — — — site and size of tumour on, 241.
- Ovarian tumour in puerperium, treatment of, 242.
 — — — — neglect of, in text-books, 242.
 — — — — previous opinions as to, 243.
 — — — — in absence of symptoms, 243.
 — — — — when acute symptoms arise, 247.
 — — — — — necessity for ovariotomy, 247.
 — — — — — Condamin's view, 247.
 — — — — general summary of, 257.
 — — kinds of, associated with pregnancy, 6.
 — — malignant, 7, 32.
 — — — frequency of, 7.
 — — — occasional absence of symptoms in, 32.
 — — — successful removal of, 32, 77, 240.
 — — separation of, due to torsion, 236.
 — — situation of, 8.
 — — size of, 7.
 — — small, danger of, 76, 241.
 — — sudden change in position of, 9, 31.
 — — torsion of pedicle of, rupture of. *See* Torsion, etc.
 Ovariotomy during labour, 187.
 — — — abdominal, 187, 224.
 — — — results of, 187.
 — — — indications for, 196, 201, 208.
 — — — vaginal, 187, 225.
 — — — — results of, 187.
 — — — — indications for, 198.
 — during pregnancy, 98.
 — — — bilateral, 115.
 — — — — results of, 116.
 — — — early cases of, 99.
 — — — fatal cases of, 108.
 — — — opium after, 122, 126.
 — — — practical observations on, 118.
 — — — previous collected cases of, 102.
 — — — recent cases of, 107.
 — — — tabulated cases of, 127.
 — — — total collected cases of, 106.

- Ovariectomy during pregnancy (analysis of), collected cases of, in respect to prognosis for mother, 106.
- — — — mortality in, from operation at various months, 110.
- — — — effect on pregnancy in, from operation at various months, 114.
- — — vaginal, 116.
- — — — objections to, 117.
- post-partum, 249.
- — opinions of early writers on, 243.
- — early cases of, 249.
- — analysis of collected cases of, 250.
- — mortality of, 250.
- — best prophylactic against complications, 251.
- — cases of, within first two weeks of puerperium, 252.
- — time of operation, 254.
- — — evidence in favour of immediate operation, 254.
- — — objections to operation immediately after labour in private practice, 256.
- Ovary, changes in, due to pregnancy, 12.
- position of, in pregnancy, 8.
- PALPATION in diagnosis, 38.
- Parovarian cysts, effect of removal of, on continuation of pregnancy, 113.
- Percussion, in diagnosis, 39.
- Peritonitis, in pregnancy, 22.
- — — acute, 23.
- — — diagnosis of, 65.
- in puerperium, 234, 248, 257.
- — — as a cause of difficulty in diagnosis, 238.
- Pregnancy, after removal of both ovaries, 1.
- complications of ovarian tumour in, 22.
- — frequency of acute, 28.
- — diagnosis of, 64.
- exaggeration of symptoms of, with ovarian tumour, 21, 37.
- extra-uterine, 44, 53, 55.
- Pregnancy, extra-uterine combined with intra-uterine, 53.
- frequency of association of ovarian tumour with, 2.
- injuries during, 100.
- with ascites, 58.
- with cystic kidney, 51.
- with extra-uterine gestation, 53.
- with fibromyoma uteri, 46.
- with ovarian tumour, 15. *See also* Ovarian tumour.
- — — — albuminuria in, 21.
- — — — eclampsia in, 21.
- — — — development of foetus in, 21.
- — — — diagnosis of, 34.
- — — — foetal heart sounds in, 36, 40, 93.
- — — — — movements in, 36, 39.
- — — — formation of adhesions in, 21, 23.
- — — — induction of premature labour in, 94.
- — — — intermittent contractions of uterus in, 39, 49, 60.
- — — — ovariectomy in. *See* Ovariectomy.
- — — — non-interference in, 84.
- — — — position of cervix in, 40, 49.
- — — — position of uterus in, 20.
- — — — prognosis in, 70.
- — — — symptoms of, 29.
- — — — tapping cyst in, 89.
- — — — treatment of, 80.
- Puerperium, character of convalescence in, determined by behaviour of tumour, 230.
- influence of ovarian tumour on, 229.
- — — on ovarian tumour, 230.
- operations in, 242, 249.
- the period of greatest danger, 242.
- with ovarian tumour, 229. *See also* Ovarian tumour.
- peritonitis, torsion of pedicle, etc., in. *See* Peritonitis, etc.
- Puncture of pelvic cyst during labour, 184, 216.
- — — — — results of, 184.
- — — — — dangers of, 191.
- — — — — indications for, 193.

- RECTAL examination, importance of, in diagnosis, 43, 63, 188.
- Reposition during pregnancy, 188.
- during labour, 183, 213. *See also* Ovarian tumour.
- — — results of, 183.
- — — methods of, 188.
- — — Löhlein's expedient in, 190.
- — — dangers of, 189.
- — — defence of, 203.
- Resection of ovarian tumour during pregnancy, 116.
- — — — — cases of, 116.
- Respiratory embarrassment during pregnancy, 32.
- Retention of urine, 55.
- Retraction of uterus, effect of adhesions on, 164.
- Retroversion of uterus, gravid, resemblance of, to ovarian tumour and pregnancy, 49.
- — — differential diagnosis of, 49.
- — — importance of direction of cervix in, 49.
- — post-partum, 230.
- Rupture of extra-uterine pregnancy, 54.
- of ovarian cyst in pregnancy, 26.
- — — — — causes of, 26.
- — — — — frequency of, 26, 27.
- — — — — prognosis of, 75.
- — — — — symptoms and diagnosis of, 67.
- — — — during labour, 165, 181.
- — — — case of, 164.
- — — — causes of, 165.
- — — — during puerperium, 233, 237, 250.
- — — — case of, without symptoms, 233.
- of uterus, 182.
- SARCOMA of ovary, absence of symptoms of malignancy with, 33.
- — — frequency of, 7.
- — — melanotic, 137.
- — — successful removal of, 33, 131, 137, 141, 143, 145, 157.
- Signs of pregnancy with ovarian tumour, 38.
- Sterility, ovarian disease a cause of, 2.
- Symptoms of pregnancy with ovarian tumour, 29.
- Suppuration of ovarian cyst in pregnancy, 27.
- — — — — frequency of, 27.
- — — — — symptoms and diagnosis of, 68.
- — — — in puerperium, 232.
- — — — frequency of, 232.
- — — — causes of, 233.
- TAPPING as an aid to diagnosis, 44, 59.
- ovarian cyst during pregnancy, 89, 126.
- — — — — Cohnstein's investigations into results of, 90.
- — — — — dangers of, 89, 93.
- — — — — prognosis for mother and child after, 90.
- — — — — conclusions as to value of, 92.
- Torsion of pedicle in pregnancy, 23.
- — — — — frequency of, 24.
- — — — — influence of situation and character of tumour on, 25.
- — — — — symptoms and diagnosis of, 65.
- — — during labour, 165.
- — — in the puerperium, 231.
- — — — — frequency of, 232.
- of uterus. *See* Uterus.
- Treatment, summarised, of pregnancy with ovarian tumour, 124.
- — of labour with ovarian tumour in the pelvis, 208.
- — of ovarian tumour in the puerperium, 257.
- UTERUS, contractions of, in diagnosis of pregnancy, 39, 49, 60.
- — — in labour as an aid to diagnosis, 167.
- — — — — effect of adhesions on, 164.
- — — — — effect of, on tumour, 165.
- danger of injury to, in tapping, 93.

- | | |
|--|--|
| Uterus, deviations in axis of, due to
ovarian tumour, 20, 57, 164.
— injuries of, during operation, 102,
120.
— — — — — results of, 121.
— — — — — management of, 121,
125.
— rupture of, 182.
— torsion of, 19, 30, 230.
— sacculatation of, 19. | VAGINAL examination in diagnosis,
40.
— — combined with rectal, 44, 188.
Version, employment of, with ovar-
ian tumour in pelvis, 185,
218.
— — — dangers of, 185. |
|--|--|



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