THE MANAGEMENT OF SOLID TUMORS OF THE OVARIES COMPLICATING PREGNANCY, WITH REPORT OF A SUCCESSFUL CASE.

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A careful examination of the literature shows that although solid tumors of the ovaries are not uncommon, their occurrence as a complication of pregnancy is sufficiently rare to justify a detailed report of every additional instance. Inasmuch, also, as the proper treatment of this condition is of the utmost importance, the following case offers certain points of interest.

A. R., single, white, domestic servant, aged 22, born in the United States, was admitted to the gynæcological wards of the Johns Hopkins Hospital, June 13, 1893. In the February previous (five months before) she had noticed an increase in size of the abdomen, which had gradually increased. Except for this enlargement of the abdomen, and amenorrhœa since January 1st, she had had no cause for complaint.

Family History. Paternal grandmother died of a new growth in lower abdomen. Maternal grandfather had a cancerous growth on arm; family history otherwise negative.

Personal History. Does not remember having had any serious sickness before. Menstruation began at fifteen; was irregular up to the 17th year, since then regular till 5½ months ago, of the 28-day type and of 5 to 6 days' duration; flow free; slight dysmenorrhœa.

Present Illness. Has always been healthy up to January, 1893. Early in February she first noticed a slight increase in the size of the abdomen, and absence of the menses, which have not returned since. The enlargement progressed in a symmetrical manner, and at the present time (June 3) the abdomen presents the appearances belonging to a five months pregnancy. The patient has had no morning sickness and has not noticed anything which could be interpreted as fœtal movements. There has been no increase in the size of, or pain in the breasts; no swelling of the feet or ankles. Sleeps well; appetite good; bowels constipated; slight giddiness; some dyspnœa on exertion; otherwise no inconvenience. No pain anywhere.

Physical Examination. General condition good. The patient is a well nourished, healthy-looking young woman; eyes clear, tongue slightly coated, mucosæ of a good color. Heart and lungs negative.

Abdomen symmetrically distended. Line of pigmentation from umbilicus to pubes marked. On light palpation a rather yielding, slightly resistant mass is felt extending from two inches above the umbilicus to the symphysis pubis, and from 3 to 4 inches to either side of the median line. On palpating deeply and quickly ballottement is obtained over this area, showing the presence of a layer of fluid. The abdomen over the same area is dull on percussion; on auscultation a placental bruit is heard in the right lower quadrant of the abdomen; no fœtal heart sounds are heard; no actual movements made out, but indefinite "lumps" are felt through abdominal wall which "retreat" from the examining hand.

The measurements of the abdomen were as follows: Girth at umbilicus, 30 inches; girth midway between umbilicus and symphysis, 31 inches; from the ensiform cartilage to umbilicus, 7¾ inches; from the umbilicus to the symphysis, 7¼ inches; from anterior spine of ilium on either side to umbilicus, 6½ inches.

Vaginal Examination. Vaginal mucosa dusky violet in color; outlet considerably relaxed; cervix high up, soft, shortened, patulous. Behind the cervix and occupying a large part of the pelvis is a hard, nodular, fixed mass, about 5x7 cm. in diameter, adherent to sacrum posteriorly. The breasts contained colostrum.

Diagnosis. Pregnancy, associated with solid tumor of the left ovary.

Abdominal section by Dr. Kelly, June 21, 1893.

Incision 18 cm. long through stretched and thinned abdominal walls. The uterus, which was of the size belonging to a five months pregnancy, was forced out by compression made on the sides of the abdomen by the hands of an assistant, the operator meanwhile making direct traction on it and throwing it forward so that the body rested on the pubes. By these means there was brought into view a tumor of the left ovary, lying behind the uterus in the pelvis but not attached to it. It presented a whitish appearance, was hard, irregularly oval, and about the size of two clenched fists placed closely together. Pressure upon it had caused some flattening of the surface adjacent to the sacrum. The tumor, which was attached to the left broad ligament by a narrow pedicle, was raised and tied off together with the left tube by means of four intermediate silk ligatures, a few extra silk ligatures being inserted to stop some slight oozing from the severed pedicle. The uterus, which had all this time been protected by means of a large piece of gauze kept constantly saturated with warm salt solution, was now returned to the abdomen. The peritoneum was united by means of a fine silk suture; the remaining layers of the abdominal coverings with silk-

worm gut and silk; gauze dressing, edges rendered adherent with collodion; iodoform and boric acid powder dusted over same; cotton; Scultetus' bandage.

Time of operation 46 minutes.

The convalescence was rapid and uneventful; the highest temperature reached was on the second day, when it rose to 101° F., after which it soon became normal; the bowels moved on the fourth day. On July 2, 1893 (12th day), note reads: "For the first few days after operation a slight bloody vaginal discharge was observed; patient complained of sharp pains through the abdomen. This symptom soon subsided under a moderate use of morphine. Abdominal dressings removed; wound united throughout *per primam;* general condition excellent."

July 10, 1893 (20th day), "Patient sat up in bed; did not feel weak nor tired afterwards."

July 22, 1893 (4 weeks after operation), "Patient discharged; has had no setbacks; wound nicely healed; patient feels well; abdomen increased in size."

Pathological Report. Mass consists of a large tumor developed from left ovary, with about 4 cm. of normal tube, with clear mesosalpinx; tube patulous. Tumor 12x7 cm., density of cartilage, with clear smooth fibrous capsule, which strips off moderately easily. On outer surface is an umbilication about 3 cm. deep, containing a small mass of similar consistence, with broad flat pedicle. Vessels on surface small but injected. Section of mass reveals a dense fibrous structure, yellowish and translucent, with numerous deeper pinkish areas corresponding to umbilication on surface; tissue much softened, and upon pressure exudes a clear fluid.

Frozen sections reveal fibrous tissue with fine points of fatty degeneration.

Sections hardened in alcohol. The specimen consists of dense fibrous tissue with spindle-shaped nuclei. The tumor is richer in cells in the larger portion. The capsule is much thickened. Vascular supply scanty, especially around the umbilication. Diagnosis: Fibroma of ovary.

From the after-history it would seem clear that premature labor was artificially induced after the patient returned home. When she left our care she was certainly well, and had nature been left to herself there was nothing in the patient's condition to prevent the continuance of the pregnancy to term, and there was no indication that in this case delivery would have been accompanied with any more danger than that belonging to a normal labor.

Considerable confusion seems to exist in the minds of authors regarding the classification of tumors of the ovaries associated with pregnancy. In many reports of cases of ovariotomy during pregnancy, only incidental reference or none at all is made to the nature of the growth removed. Thus, J. Dsirne[1] (Liveland) collected from the literature 135 cases of pregnancy associated with ovarian tumors in which ovariotomy was performed, the diagnosis in 42 of these being tumor ovarii, and in the remainder cystoma. None are distinctly specified as being solid tumors.

Most tumors of the ovary, including those complicating pregnancy, are cystomata, and of these dermoids form a considerable number, as is shown by the following table:

Name of operator.	Total number of cases operated on.	Cysts, including dermoids.	Number of solid tumors.	Fibromata.	Sarcomata.	Carcinomata.
1. Billroth	86	78	8	..	3	5
2. Schroeder	102	97	5	..	5	..
3. Thornton.....	338	328	10	3	..	7
4. Hildebrandt..	37	27	10	..	..	..
5. Weber.....	123	72	51	..	..	..
6. Krassowoski..	128	128	..	..	..	..
7. K. Von Brann.	81	71	10	1	2	5
8. Thos. Keith ..	200	183	17	..	..	..
9. Olshausen	193	267	26	6	9	5
Totals	1388	1251	137	10	19	22

The figures in the above table give, as we see, 9.9 per cent. solid tumors. But Olshausen[2] holds that this is too large a proportion. Weber, whose statistics tend materially to raise this percentage of solid neoplasms, has probably counted as solid tumors many which other authorities would class among the cystic variety. With Weber's cases omitted we should have only 6.8 per cent. of solid tumors, which is probably more correct.

The same table shows the relative frequency of the different varieties of solid tumors to be as follows:

Fibromata	are	present	in	the	proportion	of	.72 per cent.
Sarcomata	"	"	"	"	"	"	1.36 "
Carcinomata	"	"	"	"	"	"	1.58 "
All others	"	"	"	"	"	"	.057 "

The investigations of Jetter[3] have shown that any form of ovarian tumor may complicate pregnancy. Of his collection of 166 cases, 97 were cystomata, 37 dermoids, 11 carcinomata, and 21 uncertain. In this small number of cases the proportion of undoubted solid tumors to all others is only 6.6 per cent.

Solid tumors of the ovaries may be classified as follows:

- Solid
  - Desmoid
    - Fibromata,
    - Sarcomata,
    - Myxomata,
    - Endotheliomata,
    - Enchondromata.
  - Epithelial
    - Carcinomata,
    - Papillomata.

The lines between these several varieties of tumors are not always distinctly drawn, and almost any two forms may be found associated. The benign forms of epithelial tumors of the ovary are always cystic in nature (Olshausen[2]).

Ovarian neoplasms do not preclude the possibility of conception so long as the ovaries contain healthy ovarian tissue. Indeed, rare instances have shown that the removal of both ovaries is not an absolute safeguard against conception. In such cases there are undoubtedly rudimentary masses of ovarian tissue or supplementary ovaries left behind (Montgomery[4]).

It is difficult, if not wholly impossible, to arrive at any accurate conclusions as to the frequency of conception in women who are the subjects of ovarian neoplasms. S. Remy[5] finds, however, that in 257 women with tumors, 321 pregnancies occurred, with 266 normal deliveries; so that some of the

mothers became pregnant at least twice during the existence and probable growth of the same tumor.

Montgomery, in commenting on the frequency of ovarian tumors complicating pregnancy, says he is able from a very cursory investigation of the literature to present tables of over 150 cases. It is evident that he refers to cysts of the ovary associated with pregnancy.

Several authors, as Kleinwächter, Spencer Wells and Rokitansky, have observed pregnancy in connection with unilateral ovarian fibromata. During labor the tumor may obstruct the birth canal, and thus render Cæsarean section necessary, as happened in Kleinwächter's case; the tumor may be contused and become gangrenous, as has been described by Rokitansky.[7]

After a careful examination of the literature we have been able to find but fourteen cases of undoubted solid growths of the ovary in association with pregnancy. These are here presented in chronological order with brief histories.

Case I. Breit[8]. In this case an ovarian tumor of stony hardness and adherent to the rectum was removed; no details given.

Case II. Spiegelberg[9] (reported by Bourgonin). Patient was aged 37 and had borne two children. Immediately after the birth of the second child a rapid enlargement of the abdomen was noticed, which pursued a slowly progressive course and ended in death. At autopsy a fibroma of the left ovary weighing 60 pounds was found, with considerable ascites. Size of tumor 51x23 cm.

Case III. Spiegelberg[10] (reported in 1867). The woman died nine days after her second labor, aged 36. Tumors of both ovaries were found at autopsy which microscopic examination showed to be myxosarcomata which had undergone cystic degeneration. One tumor measured 20x12x4 cm.; the other 15x10x4 cm. Death was due to rupture of one of the tumors, apoplexy of both, and peritonitis.

Case IV. Kleinwächter[11] reported in 1872 the following case. Age of patient 31 years; month of pregnancy not stated, probably full term; pains began on May 25, and on May 29 were very severe. Patient was brought to the hospital by midwife, who got away before giving any further information. Head presenting. Examination revealed a bony tumor, about the size of a fist, in the pelvis. Cæsarean operation performed on May 31, 1868, and a healthy female child weighing 3010 grammes safely delivered. Twenty-five hours afterwards the mother died of general peritonitis.

Diagnosis. Peritonitis after Caesarean section; ossified fibroma of the right ovary.

Case V. Spencer Wells[12] (reported by Cayla). The patient, aged 29, who had had one child, presented herself in March, 1872, with a tumor in right suprapubic region. She was three months pregnant. One month later laparotomy was performed, and a tumor weighing five kilograms was removed. This tumor had been held in place by the epiploon to which it was adherent. The structure of the tumor was that of an œdematous fibroma. The patient recovered and the child was born at term.

Case VI. Hempel[13] in 1875 reported the case of a patient aged 42 who died four weeks after her 11th labor. At autopsy both ovaries were found enlarged to more than the size of a child's head. The surfaces of the tumor masses were hard and irregular. The tumors proved to be carcinomata, probably secondary to cancer of the stomach.

Case VII. Schroeder[14] (reported by Cayla). Woman aged 22, six months pregnant; operation May 25, 1876; solid tumor removed from left ovary. Labor at term; cure.

Case VIII. Spencer Wells[15] (reported by Cayla.) Woman aged 41, four months pregnant; operation October, 1876; tumor weighed 7 pounds. Labor at term; cure. Diagnosis: Round cell sarcoma of left ovary.

Case IX. Spencer Wells[16] (Cayla). Woman aged 28, four months pregnant; operation November, 1877. Fibroma of right ovary removed, weighing 10 pounds. Labor at term; cure.

Case X. Casati[17]. Large fibro-sarcoma of left ovary. Pregnancy at fourth month. Ovariotomy; abortion, partial suppurative peritonitis; cure. Patient was 29 years old. Menstruated at 18; married at 25; ten months later had first child. In March, 1881, had second child; labor normal. Two months after this noticed tumor in left groin. Four months after labor menses recommenced; milk stopped at 5th month. On January 4, 1882 (ten months after birth of last child), the patient was examined and the following diagnosis made:

Completely solid tumor (probably sarcoma) of left ovary; partial peritonitis and pleurisy. At operation the woman was found to be four months pregnant. The tumor weighed 1850 grammes, and measured 13x48x36 cm.

Case XI. Dr. J. H. Carstens,[18] of Detroit, Michigan, in 1889 reported a case almost identical with our own. The patient, aged 26, white, four years married, without having had children or miscarriages, had had frequent micturition and pain for the year previous. She had noticed a hard lump in lower abdomen, which had increased rapidly during the last four weeks. The menses, which had formerly been regular, ceased February 24, 1889. General health and family history good. Examination showed the pelvis to be filled with a hard growth which seemed movable. The uterus was found a little to the left of the growth. The os was soft, velvety. Pregnancy suspected. Examination under ether warranted a diagnosis of pregnancy of two months duration and a pelvic tumor, which was thought to be a uterine fibroid with a long pedicle, a sarcoma, or some other hard tumor of the ovary. Operation May 27, 1889. When the peritoneum was opened a very hard nodular tumor came into view. It was movable, slightly adherent to the bladder, intestines and omentum, but not adherent to the uterus. The long narrow pedicle was tied off together with the right Fallopian tube, which was also removed. The left ovary was found to be healthy and was left untouched. Patient made a good recovery. The pregnancy continued and was of seven months duration at the time the case was reported. The tumor was very hard and nodular, 10 cm. long and 12 cm. in diameter; in the middle was a constriction in which the uterus had rested. A microscopical examination by Dr. George Duffield showed only pure fibrous structure. The ovary had entirely disappeared in the growth.

Case XII. Münchmeyer[19] (reported in 1890). Patient aged 30. Third pregnancy. Month of pregnancy not stated, probably full term. Normal but small pelvis. Enormous elastic tumor (spindle-cell sarcoma) occupied the pelvis. Head presenting. Shortly before the delivery of fœtus the colossal swelling of the tumor was noticeable. The absence of any symptoms pointing to malignancy of the tumor was noted. The child being already dead, the skull was crushed and the fœtus delivered. The tumor remained for four weeks after the delivery, but shrunk to about the size of a goose egg(?). Ovariotomy was then performed; the patient made a good recovery, and was discharged three weeks subsequently.

Case XIII. J. Murphy.[20] Abdominal section during pregnancy (reported in 1895).

"A lady 32 years old was sent into the Sunderland Nursing Institute, under my care, to have an ovarian tumor removed, she being about six months pregnant. The operation was performed at noon, April 20, 1893. The tumor proved to be a solid round-cell sarcoma, weighing two pounds, with somewhat numerous adhesions. The labor pains commenced 24 hours after the operation and became severe at 10 a. m. The patient soon gave birth to a boy, who lived for 12 hours. The convalescence was uneventful. She left the Institute in three weeks. Her highest temperature was 99.5° F."

Case XIV. P. Ruge.[21] Woman aged 36; six months pregnant. Myxo sarcomata of both ovaries; no details.

From an examination of the results in the above fourteen cases we find that eight of the patients were submitted to operation before labor, with the death of one mother and with loss of but two children from miscarriages and one by craniotomy, four children going to full term and one being delivered by Cæsarean section. Three mothers were not operated on; of these, two died soon after labor as a result of complications due to the tumors, and one lived; in three cases no details are given.

The incompleteness of the above collection of cases is painfully apparent. A glance at the various dates of their publication—1861 to 1895—would suggest at once that many similar cases must have occurred previous to the former and probably also subsequent to the latter date. Their non-appearance either in the Index Catalogue of the Surgeon-General's Library or the Index Medicus, would lead to the conclusion that such instances were either not reported at all, or that the accounts of them did not possess sufficient detail and clearness to enable the cases to be recognized as belonging to this category. So-called solid dermoids and all other tumors not distinctly specified to be solid have been rejected from our list.

INFLUENCE OF PREGNANCY ON THE GROWTH OF OVARIAN TUMORS.

In this connection two main theories may be cited: (1) That the increased blood flow increases the growth of the tumor (Spiegelberg and Olshausen). (2) That a decrease in the size of ovarian tumors during pregnancy occurs, owing to lack of space and inactivity of the ovaries (Koeberle). The former of these two views is generally accepted (Dsirne).[22]

Wernicke suggested that benign tumors are apt to become malignant during pregnancy. There are no observations which tend to support this view (Olshausen).[23]

Löhlein[15] in 1895 published a comprehensive article dealing with ovarian tumors complicating pregnancy. His views may be summarized as follows:

(1) He dissents from Wernicke's view and holds that benign tumors of the ovary do not tend to become malignant during pregnancy. (2) He doubts if tumors enlarge much during pregnancy and cites cases to support this position. He quotes many observations to show that the ovaries are in a state of rest during pregnancy.

The recognition of the co-existence of pregnancy with a solid ovarian tumor or tumors is of the greatest importance, and often presents a difficult problem. The limits of this paper forbid more than a brief discussion of the main characteristics of this condition.

Solid tumors of the ovaries are often bilateral, though there are many exceptions to this rule; they are seldom larger than a man's head; the general form of the ovary is maintained; adhesions are rare, but ascites is usually present (Olshausen).[24]

Although the signs and other evidences of pregnancy, in association with solid tumors of the ovaries, are sufficiently characteristic, it is a noteworthy fact that many experienced and able operators have recognized the pregnancy only after the abdomen has been laid open. It is therefore not out of place to emphasize the importance of keeping in mind the possibility of the existence of such a condition in making our examinations.

In this connection it is interesting to note that Napier,[25] after reporting a case of ovarian cyst in which he successfully performed cystectomy at the third month of an unsuspected pregnancy, quotes from Barnes' "Diseases of Women," as follows: "Ovariotomy during pregnancy has been performed several times, the operator not suspecting the existence of pregnancy before the operation. What should be done when a pregnant uterus is discovered during some stage of ovariotomy? Wells says let it (*i. e.* the uterus) alone. Dr. Atlee performed ovariotomy in the second month of an unsuspected pregnancy. Dr. Marion Sims performed ovariotomy in the third month of pregnancy, not suspecting its existence, with good results to mother and child."

The prognosis in cases of ovarian tumor complicating pregnancy is by no means favorable. The great danger to the mother will be appreciated from the figures in the following statistics.

Litzmann has collected 54 cases with 24 maternal deaths; Jetter, 215 deliveries in 165 mothers with 64 deaths; Playfair, 57 deliveries with 23 deaths; Braxton Hicks, 6 deliveries with no deaths; Rogers, 5 deliveries, no deaths; Spencer Wells, 11 deliveries, one death; Fritsch, 4 deliveries, one death. In all, 355 deliveries are reported with 114 maternal deaths, or a maternal mortality of about 32 per cent. The mortality to the children from either abortion or premature labor is, according to Engstrom, much greater. In 216 cases he finds it to be about 48 per cent. (Fenger).[26½]

Heiberg[26] has collected 271 cases of pregnancy with ovarian tumors and found that over one-fourth of the mothers and two-thirds of the children perished; while Dsirne[27] says that only 60 per cent. of the pregnancies complicated by ovarian tumors terminated without accident to mother or child.

The situation and size of the tumors are of marked significance in determining the prognosis. Most solid tumors, especially during their early growth, remain in the true pelvis. When small they may be overlooked, and the hindrance which they offer to delivery may be unsuspected or attributed to pelvic narrowing (Montgomery).[28] Large tumors rarely hinder the engagement of the fœtal head, unless a part of them occupy the pelvis; whereas small tumors, especially dermoids, often retard the descent of the head, so that operation is necessary (Hohl).[29]

Greigg,[30] from his post-mortem researches upon puerperal septicæmia, shows that it is possible that some cases of this disease arise from injury, during parturition, to unrecognized ovarian tumors. We must consider not only the mechanical difficulties in the way of delivery, but also the cachexia due to the presence of malignant new growths (Müller).[31]

Complications of pregnancy may arise owing to the presence of solid ovarian tumors.

1. The stem of the tumor may become twisted and thus give rise to the presence in the abdominal cavity of a necrotic foreign body. This accident occurs in 9.1 per cent. of all cases (Dsirne).[32]

2. Infection of the peritoneum is more likely to occur.

3. The tumor by direct pressure on the intestines may

cause intestinal obstruction, or indirectly twists of the gut or hemorrhoids (Barsony)."

The mortality in ovarian tumor cases complicating pregnancy, treated by the expectant plan, is frightful. In 75 cases (cysts included) collected from the literature, 31, or 41 per cent., were fatal to the mothers, while but 22 children, or 29 per cent., are reported as having been saved (Montgomery)."

Litzmann" gives the maternal mortality as 43 per cent., and the fœtal as 83 per cent.; while Dsirne, as stated above, reports that but 60 per cent. of these cases when left alone terminate without accident to mother or child.

Such a death rate urgently demands renewed investigation and the adoption of a definite plan of treatment. When we come to the consideration of ovariotomy during pregnancy, we find far better results.

Of cases of ovariotomy during pregnancy, Dsirne finds that abortion followed in 22 per cent., and death in only 5.09 per cent. Breit" (1861) reports results of operation on tumors of the ovary in pregnancy during labor, or the puerperium, as follows: In 215 cases, 140 mothers recovered, 64 died; in 11 the results were unrecorded. Of the children, 81 lived, 53 died, of 61 there was no record; 21 abortions occurred.

So far as the chances of maternal recovery from ovariotomy during pregnancy are concerned, they are fully as good as when no pregnancy exists. As regards the continuance of gestation, if the operation is performed in the early months the prospect is usually also favorable (Mundé)."

In this connection Kreutzmann" states the facts clearly when he says: "The bringing about of abortion would be in order (1) if it is proved that ovariotomy during pregnancy is always followed by abortion; and (2) if the statistics show that the results of ovariotomy in pregnant women are much less favorable than in non-pregnant women. The fact that the percentage of abortions following operation is only about 20 per cent. is an answer to the first proposition. As concerns the second, statistics have demonstrated that with most operators the mortality in ovariotomies performed during gestation is less than those in non-pregnant women."

Since ovariotomy, then, can give such good results, the advisability of operative procedures must be taken into consideration in each individual case. Surgeons of wide experience, as Spencer Wells, Tait, Cauchois, Olshausen, and the late Carl Schroeder, are agreed in commending ovariotomy as the best means of dealing with all cases of ovarian neoplasms associated with pregnancy. Again, in view of the fact that Cohn" has proved every sixth ovarian tumor to be probably malignant, the early removal of the diseased structures is of vital importance.

The most favorable time for operation is at some period during the first half of pregnancy. In the later months the increased hyperæmia and engorgement of the broad ligaments increase the danger of untoward results (Montgomery)."

Kelly has published statistics which go to show that all tumors of the ovary should be extirpated as soon as recognized, no matter how small or inoffensive they may appear. His experience with cysts of the ovary has clearly demonstrated that it is not safe to allow them to remain, inasmuch as many apparently innocent cysts (papillary cystomata) may at any time become highly malignant, and if not removed sufficiently early, may prove rapidly fatal.

According to Olshausen," from 60 to 70 per cent. of all patients with proliferating cystomata (cystoma ovarii proliferans papillare) die within three years from the time of the first symptoms, and a further 10 per cent. die during the fourth year.

This surgical law which insists upon the early extirpation of all ovarian tumors applies with still more force in cases of solid ovarian neoplasms associated with gravidity.

Time for Operation. The elective time for the operation seems clearly defined, as all agree that the lowest mortality to both mother and child is secured by operating between the second and fourth months of gestation. There is one apparent exception to this rule. Dsirne" states that in intra-ligamentary tumors, owing to the danger of hemorrhage, it is often better to produce abortion before extirpating the tumor. It may, however, be asserted that the results in these particular cases will be determined largely by the skill and operative dexterity of the surgeon, and that under favorable conditions these cases can also be successfully operated on without previous interference with gestation.

When the case is not seen before labor, and when the tumor interferes with the engagement of the head in the true pelvis, one or both of the following procedures are indicated:

(a) Attempts may be made to replace the tumor in the abdominal cavity under anæsthesia.

(b) As a last resort, celiotomy.

In the puerperium Hohl" says that we should operate not later than the second week. Others hold that if the labor is normal it is better to wait several weeks longer.

In summarizing the results of a thorough search of the literature dealing with the subject the following deductions would appear to be justifiable:

I. Solid neoplasms of the ovary complicating pregnancy are exceedingly rare.

II. The diagnosis of this rare combination of a physiological and pathological process may be very difficult. In certain cases much help can be obtained from recto-abdominal palpation under narcosis, using Kelly's method to gently produce artificial descensus of the uterus. The physical examination with the signs of pregnancy, and those which belong more particularly to solid ovarian growths, will generally enable us to make at least a probable diagnosis and one sufficient to warrant an exploratory section.

III. The prognosis in cases of solid growths of the ovary complicating pregnancy is much worse, both for mother and child, than in those of cystic neoplasms of these organs. This is to be explained by the fact that the former are usually smaller and remain in the true pelvis and obstruct the parturient canal, while the latter, owing to their bulk and consistence, rise above the pelvis, and the dystocia, if produced at all, is of a less serious nature.

Abdominal section and extirpation of solid tumors during the early months of pregnancy produce equally good results, so far as the life of the fœtus is concerned, as in the case of cysts; the ultimate result in the case of the mother depending,

of course, on the malignant or benignant nature of the new growth.

IV. In the management of these cases we have seen that if the extirpation is undertaken during the elective period of gestation (second to fourth month) the maternal mortality was but 5 per cent., due to hemorrhage, shock, sepsis, and other causes; whereas the fœtal mortality due to abortion is only 20 to 22 per cent. as compared with 40 per cent. for the former and 80 per cent. for the latter when these cases are left to unaided nature.

The general rule, then, should be to operate on all cases between the second and fourth months of gravidity. It would be hard to find a stronger argument in favor of the elective operation for extirpation of these ovarian neoplasms than is furnished by a comparison of the statistics of the best authorities.

V. The compulsory operation (during the latter half of gestation, during labor, or the puerperium) will rarely be required. One then should be guided by the suggestions of Hohl, preference being given to the procedures in the order above mentioned.

In conclusion I desire to express my deep sense of obligation to Professor Kelly for permission to report this unusual case; to Dr. Cullen for much encouragement and assistance in obtaining references; and to Dr. Bardeen for valuable aid in abstracting literature.

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