OVARIAN CYST WITH TWISTED PEDICLE COMPLICATING PREGNANCY — OPERATION[1]

Report of One Case and Review of the Literature

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THE twisting of the pedicle of an ovarian cyst is an accident which, at any time, places the patient in considerable danger.

The serious nature of this complication and the relative infrequency of its occurrence in pregnancy, are the occasion for the report of the following case and the review of the literature.

Mrs. E. C.; Hosp. No. 55,446; Gyn. No. 13,054; age 32; white. Admitted to the Johns Hopkins Hospital July 1, 1906. Complained of cramps in left side of abdomen, low down.

F. H. Negative or unimportant.

P. H. General health always good; otherwise negative or unimportant. No symptoms like present illness before.

Mens. H. Began at 12 years. Regular every four weeks — not painful. Last period about three months ago. Patient thinks she is pregnant.

Mar. H. Ten years; 5 children, oldest 9 years; youngest 11 months. No miscarriages. Labors, uneventful. Puerperia, uneventful.

P. I. On the day before admission she had cramp-like pain low down in left side. It started at 7 P. M. and lasted until 11 P. M., when some relief by morphia given by physician. The next day examined under chloroform by physician, who made a diagnosis of pregnancy with ovarian tumor, and advised operation. There had been no bleeding, no leucorrhœa, no dysuria. Bowels constipated for forty-eight hours.

Exam. Patient in considerable pain. Temp. 99°. Pulse 90. Patient in good general condition, well nourished; not anæmic. Heart and lungs normal. Abdomen, lineæ atrophicæ present. Abdomen distended by a mass which rises above symphysis halfway to the umbilicus. It is indistinct in outline; slightly tender and rises slightly higher on the left than on the right side.

Vag. exam. Moderate relaxation of introitus. Marked softening of vaginal walls and bluing of mucosa. Cervix small, forward. Fundus, median line in anteposition, indistinctly made out rising half-way to umbilicus; pregnant? Posterior to the cervix a mass about 2½ inches in diameter, very tender, bulging into posterior fornix.

Exam. of urine. Faint trace of albumen. No casts.

Operation. July 3, '06. Anæsthetic: Scopolamin gr. 1-100, morphia gr. ¼, chloroform.

Median abdominal incision, uterus normal, enlarged to size of about four months' pregnancy. Intestines distended; rather dark in color, suggestive of obstruction below, but good circulation. Hand gently introduced into pelvis back of uterus, giving rise to a gush of bright red fluid, thinner than blood; and an irregular mass was felt. It was freed (some slight adhesions) and lifted up, and found to consist of an ovarian cyst from the left side, of a dark purple color, almost black. Pedicle twisted 1½ times. The tissue was very soft and friable. Removal begun at infundibulo-pelvic ligament and all the "purple tissue" removed, including a small part of the uterus. Wall of uterus bled freely. During the operation several uterine contractions were noted, but they were not marked. The oozing was checked with catgut sutures; the omentum drawn down and the incision closed in layers with catgut. There was marked thinning of the abdominal wall below the umbilicus, but no definite hernia.

Post-operative. Morphia given freely. No pain suggestive of threatening abortion. No bleeding. Out of bed on the 14th day after operation and went home on the 22d day.

Exam. on discharge. Abdominal wound healed except small granulating area at upper end (due to faulty approximation of skin edges).

Uterus. Anteposition rising to within three finger-breadths of the umbilicus.

Vag. exam. No tenderness nor thickening on left side in broad ligament.

Temp. 102.8 evening of day of operation. 101.5 on the 2d day to normal on 3d day, and following.

Through the patient's physician, Dr. A. W. McDonald, by whom she had been sent to the hospital, the following notes were obtained: "Following the operation, no pain or inconvenience. Pregnancy continued to term. Labor lasted five hours. Normal spontaneous delivery. The mother says, 'The healthiest baby of a family of six.'"

Pathological report. Path. No. 10,049. The specimen consists of an irregularly shaped cystic and blackened tumor, apparently an ovarian cyst, with Fallopian tube, which has become strangulated.

The *tube* is convoluted, thickened, and indurated, and winds over the top of the tumor. It is 12 cm. in length, varying in width from 5 mm. at the isthmus to 4 cm. at the fimbriated extremity, which is patent. It

[1] Read by invitation before the Obstetrical Society of Boston, April 27, 1909.

is apparently strangulated, but its outer surface is smooth.

The *tumor* is irregular in shape, 6 cm. x 7 cm. x 12 cm. The surface is dark, in places almost necrotic. The outer fourth of the tumor is hard and densely infiltrated, in contrast with the rest of the tumor, which is cystic.

On opening the cyst it is found to contain sebaceous material, and a quantity of dark hair. This hair arises from the wall of the cyst over an area about 2½ cm. in diameter. Elsewhere the wall of the cyst is smooth and about 3 mm. in thickness. The diameter of the cyst cavity is 6 cm. The outer pole of the tumor, the indurated area mentioned above, shows an infarct. In the tissue beneath the origin of the hair, there are masses of bone and cartilage, not definitely resembling any structure in the body. There is made out no normal ovarian tissue. The vessels in the outer part of the tumor are filled with thrombi.

Micros. exam. Tube. The tube shows a dilated lumen. The structure of the tube is masked to a considerable extent by the infiltration with blood. The vessels show thrombi. There is little round-celled infiltration, and a few polymorpho-nuclear leucocytes are to be seen.

Cyst. Fairly normal cyst wall except for infiltration with blood. No sections taken from the area of bone or cartilage.

Diag. Strangulated dermoid cyst of the ovary. Partial strangulation of the Fallopian tube. Infarcts of tube and ovary.

In a somewhat careful but not exhaustive search through the literature, reports of 113 similar cases have been found. These are presented in tabulated form. Some notes are so brief that they are of little value for comparison. The results of a study of this series of cases are given in summary.

Historical. The earliest case to which reference has been found is that of Thornton (1), who operated Oct. 27, 1875. It illustrates several interesting features in the history of the treatment, as well as the progress of the disease; so it is abstracted in some detail.

S. E., 28. Married and the mother of one child aged 15 months, was placed under the care of Mr. Spencer Wells on Oct. 12, 1875. Healthy looking woman, pregnant about four and one-half months. Abdomen occupied by a good sized cyst on the right side; and rather behind and to the left, the enlarged uterus was found. The cyst was freely movable and from the character of the fluctuation seemed to consist of one large cavity. Dr. Playfair had diagnosed ovarian tumor at King's College 14 months before, i. e., just after her confinement. Six months before the birth of her child she had an attack of severe pain, and so forth, which was probably due to the tumor. I tapped the patient by Mr. Wells' request on Oct. 19th, and removed ten pints of fluid, but evidently some small masses behind. On the 20th, headache and quick pulse, temperature 100°, very free perspiration. On the 21st temperature to 101.2° in evening, but then the patient seemed to improve, though subject to headache and heavy sweating. Temperature and pulse not much above normal. I suggested to Mr. Wells the propriety of performing ovariotomy, but he thought it would be best to keep her quiet in bed and watch her. Oct. 26th, after turning rather quickly in bed the patient complained of extreme pain in the abdomen; pulse rapid and feeble, temperature falling; face dusky. Kept quiet with tincture opii, and poultices over the abdomen. On the next day temperature 98°; pulse 140°; face dusky; cold perspiration and suppression of urine.

Operation. The operation had the expected fatal outcome, but the comment of Thornton is noteworthy: "The case raises an interesting point as to the propriety of tapping or performing ovariotomy during pregnancy, as it is plain a similar accident might readily happen again. The facts that the child was certainly alive a few hours before the operation, and that through the whole case, ending in a severe operation and death, no sign of abortion occurred, seem to me strongly to support the advisability of performing ovariotomy at once, if any operation is necessary, a course also encouraged by Mr. Wells' successful cases."

There are reports of two cases operated on in 1878; one by Spiegelberg (2), the mother recovering, the pregnancy terminating in abortion three days after operation; the other by Schroeder (3) May 25, 1878, successful for the mother and child.

In the next year two cases underwent operation successfully at the hands of Wilson (4) and Lawson Tait (5). In the latter case a parovarian cyst was removed, the first of this kind noted. Since that time more than one hundred cases have been reported, by almost as many operators.

AGE OF PATIENT. 81 CASES

In 81 cases the age of the patient was noted, the youngest 19 (109), the oldest 43 (147). Dividing the child bearing period from 20 to 45 into five pentads, the table below gives the number of cases and the percentages.

Pfannenstiel says the most frequent new growths of the ovary, the cystadenomata are observed chiefly in the third to the fifth decade,

with a maximum between the twenty-fifth and thirty-fifth years. The maximum for dermoids is about the thirtieth year. This decade (twenty-five to thirty-five) represents also the height of the child bearing period.

AGE OF PATIENTS

Age of patient	Under 20	20–24	25–29	30–34	35–39	40–44
No. of cases	1	16	25	21	14	4
Percentage	1.23	19.75	30.89	25.92	17.28	4.93

PREVIOUS PREGNANCIES. 76 CASES

Direct relationship between ovarian tumors and pregnancy has not been shown, but certain general facts are fairly well established. Though ovarian growths may first give symptoms at almost any age, the percentage of married to unmarried women having ovarian tumors is about ten to six (Olshausen). The percentage of married to unmarried women at the time ovarian tumors chiefly appear is about seven to one (A. Martin).

The relaxation of the abdominal wall as affected by previous pregnancies may be considered as a factor in determining mobility, and therefore a tendency to twisting of the pedicle. The relatively greater number of families of not over four childen, than of families of more than four, probably fully explains the larger percentage in the smaller families in the table.

PREVIOUS PREGNANCIES

No. of preg.	0	1	2	3	4	5	6	7	8	13	Multi.
No. of cases	10	16	16	10	8	5	4	2	2	1	2
Pct.	13.15	21.05	21.05	13.15	10.52	6.57	5.27	2.63	2.63	1.31	2.63

MONTH OF PREGNANCY. 96 CASES

The third and fourth months are the most dangerous, as about 58 per cent of the cases noted occur at this time. Probably this is due to the increasing mobility of the tumor as the fundus reaches and lies near the brim of the pelvis. As the enlarging uterus encroaches on the abdominal cavity, diminishing the space for the other organs, and tending to fix the tumor, the danger rapidly decreases to the last months, when this complication is comparatively rare.

MONTH OF PREGNANCY

Mo. of preg.	1	2	3	4	5	6	7	8	9	10
No. of cases	..	9	29	27	12	8	6	3	1	1
Percentage	..	9.67	30.20	28.12	12.90	8.63	6.45	3.22	1.07	1.07

Anamnesis. In thirty-five cases there are notes of some suggestion of pelvic trouble before the present illness. In ten of these pain was noted, in three not severe; in seven severe and similar to present attack. In sixteen others a definite tumor was known to exist, and in nine there had been an unusual enlargement of the abdomen with no especial pain, and no definite tumor. In one case (28), an abdominal tumor had been discovered six years before, as an obstruction in the second pregnancy. Operation had not been necessary. This tumor doubtless persisted, but had not disturbed in any way four following pregnancies.

The history with considerable uniformity is of sudden and severe pain, not infrequently fainting, weakness, or collapse; some increase in the pulse rate, but little rise of temperature. In a few cases the temperature was at first subnormal. A study of the symptoms as recorded reveals little to be added to the now well known clinical picture. The condition with which it was most frequently confused is ruptured ectopic pregnancy; occasionally inflammatory adnexal disease, or appendicitis.

Side of origin, 70 cases. In 35 cases the tumor arose from the right side, in the same number, from the left.

Tumor. In the 114 cases there is no definite note of a solid new growth, but several are described simply as "ovarian tumor" and the character not stated. In one multilocular cyst the microscopical diagnosis was "endothelioma," the only suggestion of malignant character of any of the tumors. A more careful microscopical examination might have showed a larger proportion of malignant growths, but in many of the cases the strangulation made further examination of little value. But the concomitant pregnancy suggests another possible explanation of this relatively low percentage of malignancy. Malignant tumors of the ovary occur at a later period in life (maximum from the 45th to the 55th years), than do the non-malignant tumors. Also the fact that so frequently the malignant tumors are bilateral may militate against the simultaneous development of pregnancy. The percentage of malignant new growths in pregnancy, or the puerperium, is stated from 1.4

to 6.6 per cent (119). In this series twenty-three dermoid cysts were noted, a percentage of 20.35. In general the percentage of dermoids to all other ovarian tumors is 10. It has already been pointed out that dermoids seem somewhat more subject to twisting of the pedicle than do the other forms of ovarian new growth. In 2 cases there was found a dermoid of the other ovary, also a percentage of about 10, which agrees with the estimate in Pfannenstiel (119). There were 9 parovarian or broad ligament cysts, a percentage of 7.89. The origin and development of these cysts would lead us to expect a relatively small number of twisted pedicles, as many have no pedicle at all. But this figure (7.89 per cent), is not far from the percentages of occurrences quoted by Pfannenstiel; Lippert, 6.7; Schauta, 9.1; Olshausen, 11.3; Fritsch, 11.8; Martin, 14.4.

If the cyst is large, twisting of the pedicle is less likely to occur — the largest noted contained twenty liters (12); the smallest was the "size of a mandarin" (53).

Condition of the other ovary. In 22 cases the condition of the other ovary was noted — 15 normal, 4 dermoids, 1 cystic degeneration, 1 cyst, 1 multilocular cyst removed at previous operation. In cases of normal ovary the removed ovary was a "cyst" in 11; a dermoid in 4.

Number of twists of the pedicle. 68 cases. Many ovarian tumors show a twist of the pedicle of 90°, but the term is generally restricted to those in which symptoms arise from interference with circulation, rare under 180°. The greatest number of turns was three and one-half. There has been reported a case not complicating pregnancy, in which the pedicle sixty centimeters long was twisted 25 times (119).

NUMBER OF TWISTS. 68 CASES

No. of twists ...	½	¾	1	1½	2	2½	3	3½	Slight
No. of cases ...	5	1	15	14	18	4	9	2	1
Percentage. ...	7.35	1.47	22.05	20.58	26.47	5.88	13.23	2.94	1.47

Direction of twist. 22 cases. Küstner called attention to the fact that right sided ovarian tumors have a left spiral, left sided, a right spiral twist. The determination of the kind of spiral in any given case is as follows: the direction (side of the operator), toward which the tumor must be turned to untwist the pedicle gives the direction of the spiral. This law has been confirmed by most investigators. Lippert found 80.95 per cent of pedicles twisted typically; Bürger, 78 per cent; Wedekind, 85.7 per cent; but Frangenheim only 58½ per cent. In this series 40.90 per cent were typical, 59.10 per cent atypical. The number of cases is, however, rather small.

Several explanations have been offered.

1. "Bilaterally symmetrical organisms possess on the right side of the body a left spiral direction of growth." (Fischer.)

2. The direction is due to gross anatomical conditions — as the shape of the cavity bounded by the pelvis and abdominal walls, which are more or less fixed. The tendency from these fixed conditions, this shape of the cavity, is always an outward twist and varies thus according to whether the tumor receives its impulse while on the side of the pelvis from which it grows or after slipping to the other side. (Thorn.) The direction once being given, numerous factors of varying importance may accelerate or retard the motion — as changes in bladder, intestines, fœtal movements, movements of the whole body in changes of position.

DIRECTION OF TWIST

Dir. of twist	Right to Left	Left to Right	Total	Per cent.
No. of cases	4 rt. sided. 1 lft. sided	8 rt. sided. 9 lft. sided		
Typical	1	8	9	40.90
Atypical	4	9	13	59.10

Strangulation. Twisting of the pedicle may cause incomplete or complete stoppage of the circulation. In the latter case the arteries as well as the veins become occluded by pressure. If the stoppage is partial there may be only congestion, or from more marked obstruction to the venous flow, hæmorrhages. In many cases it has not been possible to determine, from the reports, with any degree of accuracy, which condition was present. Of 62 cases noted, half seemed to have merely hæmorrhages into the cyst; in the other half the occlusion was apparently complete, giving "gangrene" or "necrosis" or "purple" or "blackish" tumor. Frangenheim reports that out of 80 cases with twisted pedicle, 54 showed at operation no recognizable result of twisting of the pedicle. In this connection he notes that

Freund has called attention to the possibility of a spontaneous untwisting of the pedicle.

Results. Maternal deaths. In 106 cases in which the result is recorded there were six maternal deaths as follows:

(1) Death 16 hours after operation, which was performed on the day after symptoms of strangulation appeared. The tumor was gangrenous, and there was peritonitis, orginating probably at the time of tapping the cyst several days before ovariotomy.

(15) Death on the 16th day after operation. The date of operation (after the onset of acute symptoms) is not stated. There was hæmorrhage into the cyst. The cause of death was apparently sepsis.

(16) Death on the 3d day after operation. The date of operation not stated. Tumor gangrenous. Cause of death not stated.

(34) Death on the 2d day after operation, the date of which was the 4th day after the onset of acute symptoms. "Tense blood tumor." Cause of death not stated.

(61) Death on the 9th day after operation, the date of which is not stated. "Hæmorrhage into a dermoid." Cause of death "cardiac weakness."

(70) Death on the 8th day after operation, which was several days after onset of acute symptoms. "The tumor showed fresh hæmorrhagic areas." Cause of death "pleurisy and pneumonia."

This gives a mortality percentage of 5.62.

The percentages given by others (for ovariotomy in pregnancy including some cases of twisting of the pedicle) are:

	Per cent
Flatau, 284 cases, 7 deaths	2.46
Orgler	2.7
Dsirne	4.5
Patton	8.0
Aronson	16.9

Frangenheim reported 87 cases of ovariotomy for twisting of the pedicle with three deaths — 3.5 per cent.

Results. Interruption of pregnancy. In 105 cases in which the course of pregnancy was noted there were 25 interruptions. Of these four could not be traced to the operation.

(56) Abortion 10 weeks after operation.

(60) Abortion 2½ months after operation.

(64) Premature birth 6 months after operation.

(71) Abortion 3 weeks after operation and two days after going home.

In the 21 cases due to operation, the tumor was strangulated in fourteen; in seven, not strangulated or not noted.

In the early months the danger of disturbance is less (3d month 7.14 per cent). There is a marked increase in the 4th month to 19.23 per cent, after which the percentage is continuously high. In the single case in the 10th month (99) labor came on in 32 hours, and the patient gave birth to a normal child which lived. The percentage of interruptions is 20. The percentage mortality is reckoned after deducting (99) but including (58) and (101) in which the premature child lived but a few hours. This gives 20 cases of a total of 105, percentage 19.04.

The fœtal mortality after ovariotomy in pregnancy (including tumors with twisted pedicle) is variously stated.

Retzlaff, 11 per cent; Graefe, 16 per cent; Patton, 19 per cent; Bumm, about 20 per cent; Fehling, 23 per cent; Flatau, 25 per cent; Dsirne, 27.17 per cent; Waehmer, 27.8 per cent.

In only one case of abortion was it noted that the patient had previously had an interruption of pregnancy. This was (60) abortion 2½ months after operation, macerated fœtus.

INTERRUPTIONS TO PREGNANCY. 21 CASES

Mo. of preg.	1	2	3	4	5	6	7	8	9	10	Not stated
No. of interrupt.	1	2	5	4	2	2	1	..	1	?	
Cases noted in month	9	28	26	12	7	6	3	1	1	.	
Percentage	11.11	7.14	19.23	33.33	28.50	33.33	33.33	..	100	..	

With this may be compared Dsirne's table (ovariotomy in pregnancy up to 1892),

Mo. of preg	1	2	3	4	5	6	7	8	9	10
No. of interrupt.	5	4	2	4	4	3	2	1	..	
Cases noted in month.	11	28	21	10	11	5	5	1	..	
Percentage.	45.45	14.28	9.52	40	36.36	60	40	100	..	

and the table compiled from the series reported by Flatau.

Mo. of preg.	1	2	3	4	5	6	7	8	9	..
No. of interrupt.	0	4	8	8	10	3	3	0	0	..
Cases noted in month.	1	32	43	44	30	19	13	5	2	..
Percentage.	12.50	18.60	18.36	33.33	15.78	23.07	..	..	..	

From various sources the following figures have been compiled. Percentage of pregnancies in which ovarian tumor occurs:

Weiss (V. Braun)	.015
Fehling	.11
Löhlein	.15
Pfannenstiel	.57
Martin	1.5

Percentage of ovarian tumors complicating pregnancy:

Segalowitz	3.
Wedekind	3.4
Lippert	3.45

Percentage of ovarian tumors having twisted pedicle:

Spencer Wells	2.4
Orgler	4.
Olshausen	5.5
Williams	6.
Dsirne	6.
Frangenheim	8.2
Flatau	10.
Waehmer	11.5
Aronson	12.5
Pfannenstiel, average of	20.
Horwitz	23.
Thorn	35.
Küstner	38.8

The time for the discussion of the advisability of operation in these cases has long gone by. A comparison of the maternal mortality in the present series, of less than six per cent, with the mortality of 80 per cent if no operation is performed (Aronson) should remove any doubt which may remain. The question of the time of operation, whether immediate or a few hours later under more favorable conditions, is one which has to be decided by the individual surgeon who sees the case. "More favorable conditions" must include the condition of the patient as well as better mechanical facilities for operating.

Apart from the conclusions which have already been noted, a consideration of the tables of interrupted pregnancies suggests that the time of election for the removal of an ovarian tumor discovered during pregnancy is the early months. It should be removed, in general, as soon after discovery as possible. The conditions are most favorable for the tumor, the fœtus, and the mother. As pregnancy advances after the fourth month the danger of twisting of the pedicle decreases but other complications may arise; particularly in the puerperium is some complication probable, should labor be undisturbed, and at that time the patient is in a less favorable condition for an abdominal operation.

I desire to express my thanks to Dr. H. A. Kelly of Baltimore, to whose clinic the patient was admitted, and through whose courtesy I was enabled to operate. For the pathological report I am indebted to Dr. D. B. Casler of the Johns Hopkins Hospital.

In reviewing the literature, the references to cases in which the original article is stated in the table, it has been possible to confirm. In addition to the references in the table, the following articles have been consulted:

115. Aronson. Inaug. Diss. Zurich, 1883.
116. Dsirne. Arch. f. Gyn., 1892. Bd. xlii, hft. 3.
117. Orgler. Arch. f. Gyn. Bd. lxv, p. 126–160.
118. Patton. Surg. Gyn. Obst., September, 1906.
119. Pfannenstiel-Veit's Handbuch der Gynækologie. Bd. iv, abt. 1
120. Remy. These, Paris, 1886.
121. Williams, J. Lancet, 1897, vol. ii, p. 129.

REPORTS OF CASES

1. THORNTON. Trans. Path. Soc., Lond., 1876, p. 212. Age 28. 1 previous preg. 4½ mos. Cyst tapped several days before. Sudden pain with collapse on turning in bed. Operation on following day. Right multilocular cyst. 3½ turns. Gangrenous M. D. 16 h. p. o.
2. SPIEGELBERG. Berl. Klin. Wch., 1879. Nr. 18, S. 253. Age 23. 3 mos. Left. Cyst. 1 turn. Fresh hæmorrhage into cyst. M. R. Abortion, 3 d. p. o.
3. SCHROEDER. Ztschr. f. Geb. u. Gyn., 1880. Bd. v. 383. Age 24. 1 p. 3 mos. Abdomen increasing very rapidly. Cyst. 1 turn. M. R. Term.
4. WILSON. Trans. Amer. Gyn. Soc., 1880, vol. v, p. 100. Age 40. viii p. Twins once; o abort. Tumor in rt. groin w. last child 5 yr. a. Severe pain 8 m. a. Op. 15 d. after onset of ac. symps. Right. Multilocular; some adhesions. "Acute symptoms," three gals. of bloody fluid. M. R. Term.
5. TAIT. The Med. Times & Gaz., 1880, vol. i, 357. Age 36. Multip. 4 mos. Sudden severe pain and "sickness." Right parovarian. 3 turns "from within outward and to the right." Pearly black tumor. M. R. Preg. not disturbed.
6. CHIARA. Ann. di Ostet. (Milano) 1885, vii, 453. Age 34. i p. 7 mos. Tumor on right side with some symptoms of peritonitis for several weeks. Puncture of tumor and uterus. Operation 12 d. later for sudden and urgent symps. Right. Cyst. (uterus punct. again at op.). 3 turns. "Sudden urgent symptoms," "dark fluid." M. R. Abortion 1 d. p. o.
7. SKENE KEITH. Edin. Med. Jour., 1886. Mar. p. 837. Age 38. viii p. Indic. for op. Slightly increasing lump for 1½yr. Cyst. "Slight" twist of pedicle. "Inside of tumor gangrenous." M. R. Term. Pt. delivered of child some months after operation, but pregnancy not recognized at operation.

8. HEILBRUNN. Münch. Med. Woch., 1887, S. 278. Age 30. v p. Last 2 y. before. 4 mos. In past 10 mos. gradually increasing tumor in abdomen with pain, fever, malaise. Op. for pain and possible obstruction to labor later. Right side. Dermoid and multilocular cyst. 2 turns. "Whole tumor hæmorrhagic." M. R. Term.
9. REUTER. (Op. Küstner.) Inaug. Diss. Jena, 1886. Age 25. 3 mos. Pain in abdomen. Right. Cyst. 180°. "Surface of cyst necrotic." M. R. Term.
10. TERILLON ET VALAT. Arch. d. Tocolog., 1888, xv, 207. Age 30. ii p. Latter 5½ y. a. 2 mos. Tumor in past 5 yrs.; 2 attacks of pain, fever, and vomiting in past 3 yrs. Right. Cyst. Small cyst of other ovary. 3 turns from L. to R. M. R. Abortion 10 d. p. o.
11. MAYO-ROBSON. Brit. Med. Jour., 1889, p. 1034. Age 25. o p. o abortion. Sudden colicky pain in abdomen. Op. 10th day. Left multilocular cyst. L. to R. "Sloughing." M. R. Preg. not disturbed.
12. STIEGLITZ. Inaug. Diss. Erlangen, 1889. Age 29. i p. 3 mos. Increase in size of abdomen in past 9 yrs., esp. in last few. In 1st preg. enormous abdominal distention from. which pt. suffered. Also peritonitis 4 mos. before and crural thrombosis. Since then tumor rather smaller. Left. Cystoma, 20 liters of fluid, blood stained. M. R. Term.
13. HINTZE. (Op. Ahlfeld.) Inaug. Diss. Marburg, 1891. Age 24. 1 p. 3 mos. Left. Parovarian. M. R. Term.
14. IBID. Age 32. iv p. Last 11 mos. before. 3 mos. Right. Cyst. M. R. Term.
15. IBID. Aet. 37. iv p. Last 9 mos. before. Right. Cyst (adherent to intestine and omentum). Hæmorrhage into cyst. M. D. 16d., p. o. Abortion 3d. p. o. Pt. apparently died of sepsis.
16. BAUDRON. (Op. Pozzi.) Soc. Anat., 1891, Mar., p. 270. Aet. 28. ii p. Latter 3 y. before. 4 mos. Occasional sharp pain in left ovarian region in past 3 yrs. Severe pain in left iliac fossa. Eleven days later op. for urgent symptoms. Left. Cyst. 3 turns. L. to R. Gangrenous tumor. M. D. 3d., p. o. Abortion 2d., p. o. Macerated fœtus.
17. RIEDINGER. Prag. Med. Woch., 1891, S. 197. Aet. 27. iii p. Last 2½ y. before. 5 mos. Severe pain in abdomen with vomiting and swelling of abdomen. Left. Unilocular cyst. 1½ turns. L. to R. "Gangrenous looking." M. R. Term. Pregnancy ended almost at term, — living child.
18. IBID. Aet. 38. ii p. Latter 2½ y. before. Op. 14th day, 2d attack. Left. Multilocular cyst. 2 turns. "Brownish red" tumor. M. R. Preg. not disturbed.
19. VON BANDISCH. (Op. Dohrn.) Diss. Königsberg 1892. Aet. 27. iii p. 6 mos. Pain in left side of abdomen after lifting heavy weight 3d. before. Then a tumor was noticed. Op. in 1st week for acute symps. Left. Dermoid. 1 turn. "Blue black tumor." M. R. Preg. not disturbed.
20. WEISS. (Op. V. Braun.) Beitr. Z. Chir., 1892, 235. Aet. 24, o. p. 5 mos. For 4 mos. gradually increasing tumor in lower abdomen. In past week rapid increase in size with severe pain. Left. Cyst. 1½ turns. L. to R. Hæmorrhage into tumor. M. R. Spontaneous birth of living child on going home five weeks later.
21. IBID. Age 30. o p. 7 mos. Pain for several months, severe in past 2 wks. Right. Dermoid. 360°. R. to L. Strangulated. M. R. Preg. not disturbed.
22. KREUTZMANN. Amer. Jour. Obst., 1892, p. 204. Age 28. ii p. Latter 1½ y. a. 2 mos. Op. 1 wk. after first seen. Left multilocular cyst. ½ turn from "outside to inside." "Fresh blood." M. R. Preg. not disturbed.
23. OLSHAUSEN. (From Dsirne.) Age 25. 8 mos. Cyst. M. R. Term.
24. FROMMEL. (From Dsirne.) 3 mos. Cyst. M. R. Term.
25. TERILLON. (From Dsirne.) 3 mos. Cyst. 1½ turns. M. R. Term.
26. SCHROEDER. (From Dsirne.) Age 25. 8 mos. Proliferating ovarian cyst. Adherent omentum. M. R. Term.
27. MEREDITH. Trans. Obst. Soc., Lond., 1892–3, vol. xxxiv, p. 239. Age 31. vi p. Last 1 yr., 10 mos. bef. Some abdominal swelling 12 mos. before. Operation for severe pain on 6th day after acute symps. Left multilocular. Dermoid of other ovary. M. R. Term.
28. TRAVERS. Lancet, 1894, p. 146. Age 29. vi p. Last 11 mos. before. 4 mos. 6 y. before abd. tumor which obstructed 2d confinement. Operation not necessary. No obstruction in subsequent confinements. Op. 10th d. Right. Cyst. 2 turns. L. to R. "Beginning gangrene." M. R. Preg. not disturbed. 4 mos. after operation pregnancy progressing all right.
29. MERKEL. Münch. Med. Woch., 1895. Nr. 37. Age 39. vi p. 4 mos. Gradually increasing melancholia. Marked distention of abdomen. Right. Cyst. Other ovary, cystic degeneration, ½ removed. 1½ turns. "Purple." M. R. Term.
30. SCHWAN. Inaug. Diss. Heidelberg, 1895. Age 24. ii p. o abort. 4 mos. Operation, 6 wks. from onset of pain. Parovarian cyst. 1½ turns. M. R. Term.
31. HIRST. Amer. Jour. Obst., 1895, vol. xxxii, p. 224. 1 p. 1 abortion. 3 mos. Occasional pain in left groin for 1 yr. (since miscarriage). Worse in past 2 wks.; 1 wk. ago very severe and occasionally since. Left dermoid. 1 turn. M. R. Preg. not disturbed.
32. BECKING. (Frommel Jahr. Geb. u. Gyn., 1896.) 7 mos. Ovarian cyst. M. R. Term.
33. MORSE. Trans. Obst. Soc., Lond., 1896. Age 30. Multip. Last 2 y. before. 9 mos. No acute symptoms. Right. Dermoid. 1 turn. L. to R. "Gangrenous." M. R. Term. Forceps at term to take strain from recent abdominal scar.
34. LÖHLEIN. Deut. Med. Woch., 1896. Nr. 29, S. 455. Age 33. ii p. o abortions. 6 mos. Severe pain in left side of abdomen, vomiting, obstipation, distention. Op. 4th day. Left. Multilocular. Corpus luteum in cyst wall. 2 turns L. to R. "Tense blood tumor." M. D. 2 d. p. o.
35. NAUMANN. Hygeia. Bd. xviii, Nr. 9, p. 1967. Age 38. vii p. 4 mos. Similar attack of pain some time before. Op. 6th day of acute symps. Right. Cyst. 1½ turns. "Blood stained fluid." M. R. Abort. 7 d. p. o. Much macerated fœtus.
36. JONES. Med. Rec., N. Y., 1897, i, p. 418. Age 29. 4 mos. Op. 4th day of acute symps. Left. Cyst. "Black." M. R. Abortion 24 d. p. o. On 23 d. p. o., chill, fever to 104° for over 24 hrs, when the abortion occurred. Incision had been suppurating since op.

37. NEUGEBAUER. (Frommel Jahresb. der Geb. u. Gyn.) 1897. 3 mos. Ovarian cyst. Peritonitis. M. R. Abortion day of operation.
38. BOUILLY. (Op. Chaput.) La Gyn., 1898, iii, 481. Age 28. iii p. Last 2 y. before. o abortion. 3 mos. 5 y. bef., puncture of cyst of right side with apparent cure. Severe pain and vomiting for 4 days before operation. Right. Parovarian. 3–4 turns. "Apoplectic" tumor. M. R. Preg. not disturbed.
39. BARON. These, Paris, 1898. Age 23. i p. Tumor since birth of 1st child. Severe pain and vomiting. Op. on 6th day of acute symps. Right. Ovarian cyst. 1½ turns. R. to L. "Blackish." M. R. Term.
40. PRIOR. (Frommel Jahr. der Geb. u. Gyn. 1898.) 5 mos. Acute symps. Parovarian cyst. M. R. Term.
41. WAGENER. Diss. Amsterdam, 1899. 6 mos. Three mos. before, pain in right groin. Lump in right side which has increased considerably in size in past 2 days. Right. Dermoid. Other ovary normal. 1½ turns. "Bluish red" tumor. M. R. Preg. not disturbed.
42. IBID. Age 28. i p. 2 mos. Sudden severe pain. Op. 4th day. Left. Multilocular cyst. ½ turns. Bloody fluid in cyst. M. R. Term.
43. IBID. (Case of Zweifel.) Age 40. iii p. 1 abortion. Tumor discovered before beginning of pregnancy. Sudden onset of pain. Cyst. M. R. Term.
44. TULL. Amer. Gyn. Obst. Jour., 1899, vol. xv, No. 2, p. 137. 6 mos. Cyst. 2 turns. M. R. Term.
45. IBID. (In discussion "Coe reports similar case.") Pregnancy. Cyst. Twisted pedicle.
46. PÜRCKHAUER. Diss. Würzburg, 1900. Age 24. i p. 6 mos. Marked abdominal distention and pain. Of late some fever. Right. Other ovary normal. 1½ turns. Strangulated. M. R. Term.
47. IBID. Age 43. xiii p. Last 3 y. bef. 2 mos. Pain and abdominal distention worse of late. Right. Very adherent cystoma. Other ovary normal. 2½ turns. Bloody fluid in tumor. M. R. Preg. Term.
48. IBID. Age 32. iii p. 5 mos. Increase in size of abdomen with pain for several months. Left. Cystoma. 1 turn. Not strangulated. M. R. Preg. not disturbed.
49. IBID. Age 32. vi p. (1 premature in 7 mos.) 4 mos. Slowly increasing tumor since last pregnancy. Right. Cystoma. Other ovary normal. 1 turn. M. R. Preg. not disturbed.
50. LUND. Bost. Med. & Surg. Jour., 1900, p. 208. Age 27. ii p. Latter 10 mos. before. 4 mos. Sudden severe pain and vomiting. Right. Parovarian cyst. 3 turns. Hæmorrhage into wall of cyst. M. R. Preg. not disturbed.
51. WAEHMER. (Op. Kaltenbach.) Inaug. Diss. Halle, 1900. Age 25. iii p. 2 with forceps. For three months pain in lower abdomen, nausea, and vomiting. Dermoid. M. R. Term.
52. PINARD ET SEGOND. Comp. Rend. d. la Soc. d'Obst., Gyn. et Pæd. de Paris, Tom. ii, p. 75, 1900. Age 26. ii p. Latter 2 y. before. 3 mos. Sudden onset symps. of peritonitis. Cyst adherent. 2 turns. Strangulated. M. R. Preg. not disturbed.
53. IBID. (In discussion Segond notes following case.) Age 20. i p. Gradually increasing symps. of "pregnancy and adnexal disease." Right. Cyst (size of mandarin). 1 turn. M. R. Abortion 8 d. p. o.
54. PIERSIG. Inaug. Diss. München, 1901. Age 32. vii p. 5 mos. Attack of peritonitis 14 mos. before. Severe pain in abdomen 3 wks. before. Right. Multilocular cyst. 2 turns L. to R. Hæmorrhagic fluid from cyst. M. R. Preg. not disturbed.
55. IBID. Age 39. iv p. 3 abortions. 3 mos. Lump in abdomen, not tender. Left. Multilocular cyst. Other ovary normal. ½ turn. M. R. Preg. not disturbed.
56. IBID. Age 21. o p. o abortion. 4 mos. Op. 10–12 day of disease. Left. Unilocular cyst. Normal. 2 turns. Hæmorrhagic infiltration of tumor. M. R. Abortion 10 wks. p. o. due to severe work of pt.
57. IBID. Age 22. i p. 4 mos. Sudden appearance of tumor with severe pain 1 y. before. Repeated 11 d. before. Left. Multilocular cyst. 2½ turns. Hæmorrhage into cyst. M. R. Preg. not disturbed.
58. IBID. Age 39. v p. 8 mos. Pain in left side of abdomen 2 mos. Left. Multilocular cyst; many adhesions. 2 turns. No sign of strangulation. M. R. Premature birth 1 d. p. o. Child lived several hours.
59. FLATAU. Münch. Med. Woch., 1901, p. 1902. 3½ mos. Sudden appearance of symptoms of peritonitis. Dermoid. 3½ turns. Strangulation. M. R. Preg. not disturbed.
60. HELLIER. Lancet, 1901, p. 1727, Dec. 21. Age 42. iii p. 2 abort.; the latter 20 mos. before. Op. for freely movable tumor. Right. Dermoid. M. R. Abortion 2½ mos. p. o. Macerated fœtus. Mother thought fœtus died soon after operation.
61. BLAND-SUTTON. (Op. Berry Hart.) Lancet, 1901, p. 384, Feb. 9. 5 mos. Left. Dermoid. Hæmorrhage. M. D. 9 d. p. o. "Cardiac weakness."
62. LITTLEWOOD. Brit. Med. Jour., 1901, No. 9, p. 1410. 7 mos. "Ovarian tumor."
63. LÖWENBERG. Zent. f. Gyn., 1901, p. 1389. Age 27. i p. 3–4 mos. Op. 3 days after onset of acute symps. Right. Multilocular cyst with dermoid. M. R. Preg. not disturbed.
64. KREUTZMANN. Am. Jour. Obst. 1901, p. 160. o p. 2 mos. Op. 15th day after onset of acute symps. Left. Multilocular cyst. Other ovary normal. "Several" turns. Hæmorrhage into the cyst. M. R. Premature birth 6 mos. later.
65. IBID. 4 mos. Ovarian tumor with pregnancy. Multilocular cyst. Normal other ovary. "Several" turns. Strangulated. M. R. Abortion 4 d. p. o.
66. KROMBACH. Inaug. Diss. Giessen, 1902. Age 34. v p. 1 abortion. 2 mos. Op. 14th day of acute symps. Left. Cyst adherent to intestine and omentum. Normal other ovary. 2½ turns. Hæmorrhage into tumor. M. R. Pregnancy not disturbed.
67. IBID. Age 32. ii p. Both operative deliveries. 4 mos. For 15 mos. "Tumor of rt. ovary." Pain. Right. "Cyst size of fist." Other ovary normal. 3 turns. M. R. Preg. not disturbed.
68. IBID. Age 35. iv p. 6 abortions. 3 mos. Pain in right side for several weeks. Right. Cystoma. Other ovary normal. 2 turns. Preg. not disturbed.
69. IBID. Age 23. o p. o abortions. 3 mos. Rt. ovary removed some time before, a multilocular cyst. Left, multilocular cyst. Endothelioma. Other ovary removed at previous operation. ½ turn. Blood in cyst. M. R. Pregnancy not disturbed.

70. IBID. Age 28. Pain in right side for several days. Left. Dermoid. 1 turn. L. to R. Fresh hæmorrhagic areas in cyst. M. D. 8 d. p. o. "Pleurisy and pneumonia." Abortion 3 d. p. o.
71. RAUSCH. Inaug. Diss. Leipzig, 1902. Age 28. ii p. 2–3 mos. Attack of severe pain in abdomen several months before. Unilocular cyst. 1 turn. Not strangulated. M. R. Abortion 3 wks. p. o. 3 d after going home.
72. WALTER. Jour. Obst. & Gyn. Brit. Emp., 1903, Jan., p. 93. Age 31. 4 mos. Cyst. 1 turn. "No change in cyst from rotation."
73. HARTMANN. Ann. de Gyn., 1903, p. 453. Age 23. Sudden severe pain 11 d. before. Cyst of broad ligament. 1 turn. "Slightly ecchymotic pedicle." M. R. Preg. not disturbed.
74. HAULTAIN. Jour. Obst. & Gyn. Brit. Emp., 1903, p. 399. 4 mos. Cyst.
75. BAR. Zent. f. Gyn., 1903, S. 670. 4 mos. Cyst. M. R. Preg. not disturbed.
76. MACÉ. Ibid. In discussion of Bar's case. "Macé reports similar case."
77. FRANGENHEIM. Inaug. Diss., Berlin, 1903. Age 30. iii p. 1 abortion. 3 mos. Increase in size of abdomen before pregnancy began. Left. Cyst. Dermoid of other ovary. M. R. Pregnancy not disturbed.
78. IBID. 4 mos. Cyst. M. R. Pregnancy not disturbed.
79. IBID. 6 mos. Cyst. M. R. Pregnancy not disturbed.
80. JESSURAN. Monats. für Geb. u. Gyn., 1903, Bd. xvii, S. 661. 4 mos. Symptoms of collapse. Dermoid. M. R. Preg. not disturbed.
81. LAPEYRE. Bull. et Mem. de Soc. de Chir. de Paris, 1904, N. S. 30, p. 771. Age 26. o p. o abortions. 2 mos. Increase in size of abdomen in past year. Attacks of pain. Left. Dermoid. Normal. 1½ turns. "Purple" tumor. M. R. Term.
82. IBID. Age 22. o p. o abortion. 3½ mos. Op. 9th day after onset of acute symptoms. Left. Dermoid. 2 turns. Bloody fluid in cyst. M. R. Abortion 1 d. p. o.
83. FRY. Wash. Med. Annals, 1904–5, iii, p. 448. o p. 3-4 mos. Severe pain for wks. Cyst. 2 turns. Gangrenous.
84. LEPAGE. Rev. Prat. d'Obst. et de Pæd., 1904, xvii, 253–261. Age 24. o p. 4 mos. Small tumor noticed by physician. Op. 3 days after onset of acute symptoms. Left. Dermoid. 3 turns. "Opposite hands of watch." "Strangulated." M. R. Preg. not disturbed.
85. KELLY. Glasgow Med. Jour., 1905, lxiv, 136. Age 27, ii p. 4 mos. One month before severe pain, and a tumor was found in pelvis. Relieved by pushing tumor out of pelvis. Similar attack 11 days before operation. Right. Dermoid. Other ovary normal. "Tumor almost black." M. R. Pregnancy not disturbed.
86. ZACHARIAS. Zent. f. Gyn., 1905, S. 468. Age 30. iv p. 2 mos. Right parovarian. 2 turns. M. R. Preg. not disturbed.
87. HEINSIUS. Ztsch. f. Geb. u. Gyn. Age 35. ii p. 5 mos. Severe symptoms of peritonitis. Operation "in a few days." Right. Dermoid, adherent. Other ovary a dermoid, 180° twist to its pedicle. 2 turns to original tumor. "Küstner's law." Blue-red color. M. R. Preg. not disturbed.
88. PORTER. Fort Wayne Med. Jour. Maga., 1905, xxv, 29. Age 24. ii p. Latter 18 mos. before. 3 mos. Abdomen large since last confinement. 6 days before op. severe pain in right side. Right cyst. 2 turns. R. to L. Blood in wall of cyst. Case reported too soon after operation to give result.
89. IBID.
90. IBID.
91. IBID. In J. A. M. A., 1905, xliv, p. 870. These four cases are again reported and the statement is made "none of the three miscarried."
92. GRAEFE. Ztsch. f. Geb. u. Gyn., 1905, Bd. 56, hft. iii, S. 499. 1 p. o abort. 7 mos. Sudden severe pain beginning one week before. Continuous pain with remissions. Cyst. 2 turns. "Clear fluid in cyst." M. R. Term.
93–97. GUICCARDI. From Graefe. See 92. Five cases of cyst in 3–4 mos. "Acute hæmorrhage with infiltration." M. R. Preg. not disturbed.
98. GERSTENBERG. Zts. f. Geb. u. Gyn. 1906, Bd. 57, hft. iii, S. 494. Age 29. i p. 3 mos. Increase in size of abdomen for 2 yrs. Left. Polycystoma. Other ovary normal. 270°. M. R. Term.
99. AGUILAR. Gac. Med. de Granada, 1906, xxiv, p. 187. Age 37. iv p. 10 mos. In 3d preg. suspected twins. Tumor discovered in puerperium. Patient under observation for a long time. Left. Multilocular cyst. 2½ turns. L. to R. Bloody fluid in cyst. M. R. Normal birth 32 h. p. o. Child weighed 3,369 gms.
100. BERGESIUS. Gior. di Ginec. ed Pediat., 1906, vi, 161. Age 22. i p. 5 mos. R. Multilocular cyst. 1½ turns. L. to R. Bloody fluid in abdomen. M. R. Abortion 1 d. p. o.
101. SIMON. Deut. Med. Woch., 1907, p. 1562. 7 mos. Op. 3d day. Ovarian cyst. M. R. Premature 3 d. p. o. Child died after 2 days.
102. FLATAU. Arch. f. Gyn., 1907, Bd. 82, S. 452. Age 34. v p. 4 mos. Severe pain in abdomen for six weeks. Dermoid. 1½ turns. M. R. Pregnancy not disturbed.
103. IBID. Age 38. 5 mos. Severe pain and symptoms of peritonitis for several days. Dermoid. "Hyperæmia and fresh hæmorrhage." M. R. Pregnancy not disturbed.
104. IBID. Age 27. i p. 5 mos. Pain in right side and swelling. Multilocular cyst. 2 turns. M. R. Abortion 9 d. p. o.
105. GRAEFE. (From Flatau.) 3 mos. Cyst. M. R. Preg. not disturbed.
106. SAPALLI. (From Flatau.) 6 mos. Cyst adherent to intestine and omentum. M. R. Abortion 1 d. p. o.
107. WATKINS. Surg. Gyn. Obst., 1907, v. 604. 5 mos. Symptoms of general peritonitis with large tumor. Right cyst. Strangulated. M. R. Preg. not disturbed.
108. NORDENTOFT. Jahresb. Geb. u. Gyn., 1907, S. 400. Age 33. iv p. Repeated attacks of severe abdominal pain. Right. Dermoid. 1½ turns. L. to R. M. R. Pregnancy not disturbed.
109. ROBB. Clev. Med. Jour., 1907, vi, p. 237. Age 19. ii p. Latter 11 mos before. Pain for about 1 mo. Severe in past two days. Left. Dermoid. Other ovary normal. 2 turns. R. to L. Strangulated. M. R.
110. RETZLAFF. (Op. Bauer.) Monat. f. Geb. u. Gyn., 1907, Bd. 25, p. 650. Age 35. iii p. Last 3 y. before. 1 abortion. 5 mos. After first pregnancy, swelling of rt. side; painful with each pregnancy. Sudden pain 10 d. before operation. Right. Parovarian. M. R. Term.

111. IBID. (Op. Martin.) Age 38. ii p. Latter 8 mos. before. About 3 wks. before op., severe pain and some bleeding. Right. Dermoid. Strangulated. M. R. Preg. not disturbed.

112. MARTIN. (In discussion of Retzlaff 110.) Age 32. iv p. 4 mos. Cyst. "Peritoneum reddened; flakes of fibrim." M. R. Preg. not disturbed.

113. AGNEL ET PAMARD. Bull. et Mem. de la Soc. de Med. de Vaucluse, 1907, iii, 597. Age 30. ii p. 4 mos. Movable lump in abdomen before pregnancy began. Op. 6th day of acute symptoms. Left. Cyst. 3–4 turns. M. R. Term.

114. AUTHOR. Age 32. v p. Last 11 mos. before. 0 abortions. 4 mos. Well up to one day before admission to hosp. Sharp cramplike pain in left side of abdomen low down. Op. 4th day. Left. Dermoid. 1½ turns. Strangulated. M. R. Term.