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HYDROSALPINX.

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HYDROSALPINX, ITS SURGICAL AND PATHOLOGICAL ASPECTS, WITH A REPORT OF TWENTY-SEVEN CASES.

BY T. S. CULLEN, M. B.

Although hydrosalpinx has been mentioned by various writers since the 17th century, it is not until a much later date that satisfactory descriptions of it are met with in the literature. The first accurate descriptions are those given by Baillie in 1794 and Voigtel in 1805, and it is not until Froriep's case in 1834 that we meet with another concise account of the affection. Since then many isolated cases have been reported and exhaustive articles written by Bandl, Beigel, Hennig, and Landau.

During the past four years a considerable number of cases of hydrosalpinx has been operated upon in the clinic of Prof. H. A. Kelly, to whom I am greatly indebted for the privilege of thus reporting a part of his clinical material and for his kind assistance at all times. In eleven of the cases I had the opportunity of studying the pathological changes, the results of which are, I think, of sufficient interest to warrant their publication; indeed, as will appear later on, I have been convinced of the insufficiency of the classification of the several varieties heretofore given and have therefore suggested a new variety.

The study of the histological changes was carried on in the Pathological Laboratory of the Johns Hopkins University and Hospital, under the direction of Prof. Welch, to whom as well as to Dr. S. Flexner I am indebted for advice and criticism.

For the sake of convenience the subject will be divided into a consideration of the pathogenesis and pathological histology of the disease, a description of its symptomatology, and also the treatment now carried out in the Johns Hopkins Hospital.

PATHOLOGY.

*General appearances.* On opening the abdomen the omentum is in some cases found adherent to the pelvic structures and must be



liberated before they can be seen. The tube at its uterine extremity is usually small, and after following a tortuous course outward for 1 to 3 cm., rapidly or gradually dilates, the dilated portion presenting three or four constrictions with corresponding bulgings. (Figs. 1 and 2, Plate XVII.)

The contour of the tube has by Hegar and Kaltenbach been likened to a coil of intestines. Rokitansky calls it "Hydrops tubæ saccatus," from its sacculated appearance. We have seen some cases that resembled a pipe, the outer occluded fimbriated extremity corresponding to the bowl. The tube after passing outwards usually curves backward and then downward and inward, dropping into Douglas' cul-de-sac. (Plate XVI.)

*Size.* The dilated tube is generally about the size of a small orange and rarely is larger than a child's head. Tumors of immense size, supposed to have been dilated tubes, were reported by Munnike, Muralt, Harder, Cyprianus, Tulp and Mey. These, however, appear to have been ovarian in origin. Peaslee reports the case of a lady, aged 41, who was supposed to have an ovarian tumor. She was tapped on several occasions, fluid being drawn off. At the autopsy the uterus was found to be of normal size. On the right side was an ovarian cyst, while on the left, to use his own words, was a "*bona fide* tumor of the Fallopian tube." The tube commenced to dilate near the uterus and contained eighteen pounds of fluid. The sac was densely adherent to the neighboring structures. Bonet reported a case in which the tubal sac contained thirteen pounds of fluid.

The tube is usually pinkish in color and is bound down to the ovary and surrounding structures by adhesions. If the case be recent these are vascular, if old, dense and poor in blood supply. The uterine end of the tube is frequently free from adhesions, while the outer end is fixed. In rare instances the fimbriated end may be only partially occluded, as is shown by our Case 24, where the fluid tended to escape into the abdomen. In this case part of the fimbriæ was still visible, the remaining portion having become inverted and projecting into the lumen of the tube, the fimbriated end being occluded but not adherent to the surrounding structures. In a second case (Plate XVII, Fig. 4), the fimbriated end was closed, but the tube was absolutely free from adhesions. Chambers reports a similar case

occurring in the practice of Thomas, the fimbriated end being occluded but not adherent to the pelvic structures.

At the outer extremity of the tube, where it becomes adherent to the ovary, subperitoneal cysts frequently develop. (Fig. 2, Plate XVII.) These vary from 1 to 2 cm. in diameter, are thin-walled and filled with clear, straw-colored, transparent fluid. Such cysts were present in six out of eleven of our cases.

Förster says hydrosalpinx is usually double; Kiwisch, that in advanced cases both tubes are greatly dilated. From the literature we were able to gather only twenty-four cases which were described with sufficient accuracy to permit of a classification. Of these, seven were unilateral and seventeen bilateral. Of our twenty-seven cases ten were bilateral and seventeen unilateral, showing a reverse ratio. Thus from the grouping of the cases it will be seen that in about one half only one tube is involved, while in the other half the hydrosalpinx is double. However, it must not be forgotten that the number of cases collected with the view of establishing this fact is too few to be conclusive.

The walls of the tube are usually thin, the inner surface is smooth and glistening, and where the tube is moderately distended resembles a serous membrane. The folds of the mucosa run parallel to the axis of the tube and are usually 1 to 2 mm. in breadth, being separated from each other by varying intervals. Corresponding to the constrictions seen on the outer surface are projections into the lumen of the tube.

Rokitansky states that in rare instances the inner walls of the tube may be converted into bony plates. Klob believes that he confirms this by reporting one case where small, yellow "bony" plates were scattered throughout the wall of the tube.

That the tube may contain a calculus in its lumen is fully demonstrated by our Case No. 21, where a well-developed S-shaped calculus was found free in the tube. (Figs. 5 and 6, Plate XVII.) This condition seems to be exceedingly rare, as we have been unable to find a similar case in literature.

In concluding the general description, emphasis may be laid on the fact that if the tube be ruptured during operation, or if the fluid has escaped, the tube may contract to its normal size and deceive one as to the condition that was previously present. Landau mentions this fact and we have seen similar cases.

*Fluid—its physical characters.* The fluid is usually pale straw-colored, and may be almost identical with water in appearance. At times it is slightly smoky and may be tinged with blood. The specific gravity varies from 1008 to 1009 (Oerum).

*Chemical composition.* Concerning this very little is known, and we are almost entirely dependent on Oerum for our information. He examined two cases and found the fluid to be alkaline. It contained serum globulin and serum albumen, but neither mucin nor pseudo-mucin. According to Landau the fluid is sometimes rich and at other times poor in albumen.

Prof. J. J. Abel examined the fluid from Case No. 27 and found it to contain slight amounts of serum albumen, serum globulin, and, contrary to Oerum's experience, also mucin. There were traces of the salts of hydrochloric and phosphoric acids and also of sodium, calcium and magnesium.

*Microscopically,* I have found the fluid to contain a moderate amount of desquamated tubal epithelium and granular material. According to Winkel and Klob, it also frequently contains cholesterol crystals. The epithelium may show fatty or hyaline degenerations. (Orth, Beigel.)

VARIETIES OF HYDROSALPINX. Heretofore two or at most three divisions have been made. Froriep in 1834 described two varieties as follows:

- (1) Hydrops tubæ Fallopii oclusæ.
- (2) Hydrops tubæ Fallopii apertæ.

Albers in 1840 subdivided the latter, making in all three:

- (1) Hydrops tubæ Fallopii oclusæ.
- (2) Hydrops tubæ profluens.
- (3) Hydrops ovarii profluens.

Since then several other terms have been introduced by different writers to describe these varieties, those in more common use being:

- (1) Hydrosalpinx simplex.
- (2) Hydrops tubæ profluens.
- (3) Tubo-ovarian cyst.

To these it is now proposed to add a fourth, namely, Hydrosalpinx follicularis.

This variety would appear to be rather common; in 11 of our cases it was present 4 times. The term "follicularis" was adopted

because it was already current, having been used by Martin, who described "endosalpingitis follicularis," and, moreover, as will be seen later, endosalpingitis must have existed in the majority of the cases before the follicular hydrosalpinx developed.

Our classification is then as follows :

- (1) HYDROSALPINX SIMPLEX.
- (2) HYDROPS TUBÆ PROFLUENS.
- (3) HYDROSALPINX FOLLICULARIS.
- (4) TUBO-OVARIAN CYST.

#### HYDROSALPINX SIMPLEX.

*The gross appearance* agrees very closely with the general description given. The uterine end of the tube is usually normal in size; as it passes outward it becomes slightly convoluted and gradually or suddenly dilates, increasing in size until the occluded fimbriated end is reached. The tube usually presents a convoluted appearance and passes outward, backward, and then inward, terminating in Douglas' cul-de-sac. (See Plate XVI.) The tumor is rarely larger than a child's head, but, as seen by Peaslee's case, may contain as much as eighteen pounds of fluid. The external surface is in most cases surrounded by numerous adhesions, found principally near its outer extremity. Where the tube walls are thin, as is usually the case, the folds of the mucosa can be seen running along the inner surface parallel to its long axis. The inner surface is smooth and glistening, usually pinkish in color. The fluid is as described under the general characters.

*Histological character. Peritoneal coat.* The outer surface of the tube, especially towards the fimbriated extremity, is covered by adhesions; these are made up of connective tissue having more or less irregularly triangular nuclei scattered throughout. Sometimes these are dense and poor in vessels, at other times more vascular.

*Muscular coat.* At times the muscular coat appears perfectly normal, in other cases it is very scanty or has almost entirely disappeared. Frequently there is connective tissue cell proliferation between the muscle bundles. These new-formed cells occur in rows or clumps, and in some places surround the blood-vessels. Occasionally the muscle fibres appear as hyaline, wavy bands which have lost their nuclei. Now and then lymph nodules are found in this

coat; again the intermuscular connective tissue is loose and cedematous in appearance. In no case did we find any hypertrophy of the muscular coat.

The *mucous membrane* of the tube presents a much altered appearance; the folds have to a large extent disappeared. Cross sections show the lumen of the tube to be lined by one layer of epithelium, which rests either directly on the muscular layer or on the slight amount of intervening stroma. Projecting here and there into the lumen are delicate folds (Fig. 1, Plate XVIII) which may be single finger-like projections constricted at their bases, or occur as folds presenting numerous branches.

Klob and Bandl say the epithelium of the mucosa becomes flattened. Orth finds that in some cases the epithelium may lose its cilia, and that in others it becomes flattened. He has, however, found ciliated epithelium in a tumor the size of a goose egg. In our eleven cases in which a microscopic examination was made we found the epithelium always intact, in two it was cuboidal, and in the remaining cases cylindrical. (Fig. 2, Plate XVIII.) In some cases it was possible to make out the cilia in the hardened specimens. It may, however, be mentioned that in none of our cases was the tube markedly enlarged. The stroma of the mucosa usually presents little change, but occasionally where there has been slight hemorrhage into the lumen some of the stroma cells become swollen and filled with brown granular pigment. The lumen is empty or may be partly filled with a granular material containing a few desquamated epithelial cells. This granular substance is the albumen of the serous fluid which becomes coagulated during the process of hardening.

#### CASES.

*Case 1.* L. F., age 44. Admitted in the service of Dr. Kelly, 6, 5, 1890. She complained of pain in inguinal region which extended down the thighs. Married 15 years. Has had 9 children, but no miscarriage. The labors were all normal; menses are regular, lasting 4 or 5 days. Examination reveals a tear of the perineum, marked prolapse of the anterior and posterior vaginal walls. The cervix is hard and stellately lacerated. On both sides of the uterus hard irregular masses can be felt.

6, 10, 1890. Operation by Dr. Kelly, double salpingo-oöphorectomy. The omentum, which was densely adherent to the pelvic structures, was liberated and its bleeding vessels controlled.

Left side. The tube and ovary were densely adherent, the former being dilated and filled with serous fluid.

Right side. The appendages were also very adherent to surrounding structures, and during removal the ovary was torn from its hilum. The pelvic cavity was flushed out with distilled water 112° F., a glass drain placed in lower angle of wound and the abdomen closed. Duration of operation 45 minutes. The tube was removed on the following day. The highest temperature reached was 103°, the average 99.5°.

7, 22, 1890. Patient discharged feeling well.

*Case 2.* J. M., aged 32. Admitted in the service of Dr. Kelly, 7, 7, 1890. For the last two months she has had painful menstruation. The pain is very sharp in character and is referred to the ovarian regions. She has been married 17 years, has had no children, but five miscarriages. All the miscarriages have occurred before the third month. Menstruation commenced at 13 years, then stopped for a year, and after that was regular, lasting two or three days. Patient has slight leucorrhea. Two years ago she had articular rheumatism.

*Vaginal examination.* Cervix low down in pelvis; uterus enlarged, slightly movable and sensitive; appendages ill-defined.

7, 9, 1890. Operation by Dr. Kelly, right salpingo-oöphorectomy. The omentum was densely adherent to the pelvic structures.

Right side. The tube after passing outward 1 cm. became dilated and convoluted, resembling a coil of intestines. Its outer extremity was occluded and measured 2 cm. in diameter. The tube contents were clear and transparent. The left tube and ovary were small and adherent. After flushing out the abdominal cavity with distilled water 112° F. the abdomen was closed. Highest temperature reached was 101°, the average 99°.

10, 2, 1890. Patient discharged well.

*Case 3.* Z. F., age 31. Admitted in the service of Dr. Kelly, 10, 1, 1890. Patient complains of pain in left ovarian region. This commenced several years ago and has continued ever since. Has frequent attacks of vomiting. Menses at 18, regular, lasting four

days. Flow moderate and not painful. For the last six years the menses have been irregular, occurring at intervals of two to seven weeks, flow lasting one week, very profuse. The menstrual epoch has been accompanied by pain, chiefly referable to the left ovarian region.

10, 11, 1890. Operation, removal of both tubes and ovaries for double hydrosalpinx. Uterus anteфлекed, moderately enlarged. On each side posterior to the broad ligament are two cyst-like masses about 8 cm. long and 5 cm. broad; these start at the cornua uteri, pass outward and downward and backward, ending in Douglas' cul-de-sac. They are the dilated Fallopian tubes, which are filled with clear fluid. The left tube is intimately adherent to the ovary.

Patient made a good recovery and was discharged 11, 8, 1890.

Case 4. M. H., age 46. Admitted in the service of Dr. Kelly, 10, 10, 1890. She complained of leucorrhœa, which has persisted ten years, of pain in the left side and also of headache. Married seventeen years; no children, no miscarriages. Menses commenced at seventeen years, occurred every two or three weeks, lasting seven to eleven days. The flow was profuse and painful. Last menstruation 11, 9, 1889.

*Vaginal examination.* Outlet intact, cervix in axis of vagina and covered by several hard nodules. It resembled commencing carcinoma of the cervix, but microscopical examination proved negative. The uterus reclining in the pelvis, adherent posteriorly and sensitive. The cavity of uterus 6.5 cm. in length. Indistinct resistance was felt in both broad ligaments.

10, 18, 1890. Operation. The left tube and ovary were so densely adherent to the broad ligament that their removal was impossible.

Right side. The ovary was densely adherent to surrounding structures. The Fallopian tube was converted into an irregular convoluted mass the size of an orange. This was filled with clear fluid. The right ovary and tube were then removed and the pelvic cavity drained. The drainage tube was removed on the third day. Duration of the operation 35 minutes. 10, 25, 1890, pus can be squeezed from the lower angle of the wound. The highest temperature reached was 101.4°; this was on the eighth day.

11, 12, 1890. Patient discharged. Still some slight oozing from lower angle of wound.

*Case 5.* E. R., age 35. Admitted in the service of Dr. Kelly, 10, 9, 1890. Patient complains of dull, aching pain in the lower part of the back and in both ovarian regions. The pain sometimes extends to the legs. It has greatly increased in the last few years. She is scarcely able to work and has more or less constant headache. Married 16 years. Has had four children; the labors have been normal. Five years ago she had a miscarriage in the third month; this was followed by fever, lasting three weeks. Menses commenced at fourteen, were regular, lasting two or three days, moderate in amount and accompanied by pain. One year ago there was a suspicion of her having had contracted gonorrhœa, and since then she has had a profuse yellowish discharge.

*Vaginal examination.* Outlet relaxed, cervix torn on the left side, uterus enlarged, retroflexed, adherent, and so sensitive that it is impossible to outline the appendages.

11, 2, 1890. Operation by Dr. Kelly, double salpingo-oöphorectomy. The uterus was first liberated from its adhesions posteriorly to facilitate the removal of the appendages.

*Right side.* The tube is dilated and filled with serous fluid. Both the tube and ovary are densely adherent to the broad ligament and pelvic wall.

*Left side.* The tube is also dilated and filled with serous fluid. The tubal and ovarian adhesions are not so dense as on the right side. A glass drain was placed in the lower angle of the wound and was removed the fifth day. 11, 22, 90. Patient discharged perfectly well.

*Case 7.* Mrs. P., aged 35. Admitted in the service of Dr. Kelly, 12, 6, 1890. For the last few years she has complained of pain in the back and lower part of the abdomen; this was accompanied by headache. Menses at 17, for a time irregular, occurring every two or three months; since then regular, lasting two or three days, accompanied by pain in back and lower abdomen.

12, 29, 1890. Operation. Both tubes and ovaries densely adherent. Left tube and ovary adherent to the outer pelvic wall and also to the intestines. The right tube was dilated, presented a convoluted appearance and contained 12 cc. of clear fluid. Duration of operation 20 minutes. Normal recovery.

*Case 7.* J. B., age 21. Admitted in the service of Dr. Kelly, 1, 24, 1891. For the last year the patient has complained of pain in the

right ovarian region. Sometimes this pain reaches to the knee, and is increased on exertion. She has been married one and a half years, has had no children, but one miscarriage at two and one-half months, and dates her trouble from this period. Menstruation is regular, lasting 7 days, flow moderate. The pain is so severe that for two days she has to remain in bed, and now has frequent painful micturition and profuse leucorrhœa.

*Vaginal examination.* The cervix is low down near outlet, points upward towards the symphysis pubis. Uterus large, retroflexed, adherent and sensitive. On the left side a distinct, sensitive adherent mass can be detected. On the right side near the uterine cornua is some thickening, accompanied by a sense of resistance.

2, 2, 1891. Operation. Double salpingo-oöphorectomy for double hydrosalpinx.

Left side. The tube and ovary were intimately adherent to each other and measured 6 cm. in diameter. The tube was filled with serous fluid. The uterus was pushed to the right. The right tube and ovary were also adherent, and the tube was dilated and filled with serous fluid. After removing both appendages a large glass drainage tube was placed in the lower angle of wound. Duration of operation 20 minutes. Tube removed on the fourth day. The highest temperature  $101.3^{\circ}$ , this was on the second day. The average temperature was  $99.5^{\circ}$ . Patient made a good recovery.

*Case 8.* E. M., age 19. Admitted in the service of Dr. Kelly, 2, 18, 1891. She has complained of pain in the lower part of the abdomen for the last year. Menstruation commenced at 14, was regular, lasting two days, not painful.

*Examination under  $\text{CHCl}_3$ .* The vaginal outlet intact, vagina bathed with pus. Uterus forward. A large resisting mass could be detected on either side of the uterus.

Operation by Dr. Kelly. The right tube and ovary were so densely adherent to the colon and rectum that their removal was impossible. The left tube commenced to dilate 5 mm. from uterine extremity, became markedly convoluted, resembling a coil of intestine, and its fimbriated end was occluded. The tube was 4.5 cm. in its greatest diameter. The left side was enucleated after some difficulty. The uterus was firmly adherent anteriorly and laterally. A small drain was placed in the lower angle of the incision and the

wound closed. Duration of the operation 30 minutes. The highest temperature was 100°. The patient made a good recovery.

*Case 9.* L. L., age 33. Admitted in the service of Dr. Kelly, 1, 16, 1894. She complained of great nervousness; at times, of a sharp continuous pain in the region of the left ovary, this was very severe at menstrual periods. She has been married 17 years. 0 para, no miscarriages. Menses commenced at 14. They have always been scanty and painful, usually lasting about three days. Last menstruation was 18 days before admission. Her only serious illness was an acute attack of measles one year ago; since childhood she has been troubled with indigestion, and for the last five years has been very nervous.

*Present trouble.* Four years ago the pain which she had occasionally felt in the left ovarian region became continuous, being most severe at the menstrual periods. She occasionally noticed a distinct swelling in the region of the left ovary. This was very sensitive on pressure, appeared at the menstrual period and disappeared afterward. Sexual intercourse was at times painful. Defecation was often accompanied by considerable pain.

*General condition.* Patient was well nourished and weighed about 125 pounds. Her complexion was clear and ruddy, mucous membranes being normal; tongue slightly coated and bowels constipated. Examination of chest negative.

1, 22, 94. Operation by Dr. Kelly, double salpingo-oöphorectomy for adherent appendage on the right side and hydrosalpinx on the left. The patient was placed in the Trendelenberg position. The right tube was released from its adhesions to the posterior surface of the uterus, and both tubes and ovaries were enucleated from pelvic adhesions. Adhesions between the uterus and bladder were also broken up. The patient made a good recovery and was discharged 2, 29, 1894. Her abdominal pain and also the frequent micturition were completely relieved, but her nervousness still continued.

*Pathological report.* Right side. The tube as such is not recognized, but is represented by a mass 4x3x1.5 cm.; this is intimately adherent to the ovary and totally obliterates the mesosalpinx.

Right ovary 5x3x1 cm., is pale, very convoluted, free from adhesions.

Left side. The tube can be followed for 3 cm., then dilates, forming a sac 3.5 cm. in diameter. This contains a clear transparent

fluid. The mesosalpinx is not visible. The left ovary is 4x3.5x2 cm. and is free from adhesions.

*Microscopically.* The outer end of the left tube is much dilated. Its peritoneal coat is thin, but its blood-vessels are injected. The muscular coat has almost disappeared, and the inner surface of the tube is lined by cylindrical epithelium. Springing here and there from the basement membrane are a few tubal folds; these are much shorter than usual. The lumen of the tube is filled with granular material which contains a few oval cells. Both ovaries are normal.

*Diagnosis.* Hydrosalpinx of the left tube.

*Case 10.* M. G., age 39. Admitted in the service of Dr. Kelly, 3, 13, 1892. For the last 12 years the patient has had pain in both ovarian regions. This pain sometimes radiates to the back and lower extremities and is increased by exertion. She has been married 13 years, never had any children nor any miscarriages. Menses commenced at 14 years, were always regular and lasted from three to four days, and usually accompanied by slight pain. Last period 3, 6, 1892. Her bowels are constipated, and occasionally defecation is accompanied by cramp-like pains in the lower abdomen. Ten years ago the patient had "pelvic cellulitis." She was confined to bed for two months, since then she has had three attacks, the last one of which occurred a few weeks previous to admission.

*Vaginal examination.* Outlet relaxed, cervix oedematous, the pelvis is filled by a mass apparently continuous with the cervix.

Operation, double salpingo-oophorectomy for adherent tubo-ovarian masses. The incision, 20 cm. long, was through very thick abdominal walls. The uterus was adherent to the masses on either side.

Right side. The ovary was converted into a cyst the size of a lemon, and the tube was densely adherent to it.

Left side. The tube after passing outward 1 cm. rapidly dilated into a sac 3.5 cm. in diameter. This was filled with clear fluid; the tube was intimately adherent to the ovary. For some days after the operation the urine contained a trace of albumen and some hyaline casts, but both soon disappeared. Duration of operation 40 minutes.

Recovery normal.

*Case 11.* Mrs. H., age 31. Admitted in the service of Dr. Kelly, 10, 19, 1892. She complains of pain in lower extremities during

menstruation, also of frequent nausea before periods, and has constant frontal and occipital headache. The patient has been married 15 years, has had 7 children and one miscarriage. Menstruation has been irregular, lasting 6 or 7 days. The flow was profuse until a few months ago. Last menstruation October 17.

*Vaginal examination.* Cervix bilaterally lacerated, uterus retroflexed and adherent, lateral structures could not be made out.

10, 31, 1892. Operation, double salpingo-oöphorectomy and suspensio uteri. All the pelvic structures were found densely adherent to each other.

Right side. The tube was occluded and filled with clear fluid. The uterus was released from its adhesions posteriorly and its posterior surface approximated to the anterior abdominal wall by two silk sutures.

Left side. Tube and ovary bound together. Duration of the operation 24 minutes. No drainage. For the first day after operation there was a considerable vomiting. Highest temperature 102.4°, average temperature 101°. Good recovery.

*Case 12.* M. A., age 29. Admitted in the service of Dr. Kelly, 1, 20, 1893. Patient complained of shooting pain in the lower part of the abdomen during menstrual period, also of uncomfortable feeling in the stomach after eating. She has been married eight years, but never had any children; no miscarriages. Menses commenced at fourteen, were regular for four years, since then they have been scanty and painful. Last menses 1, 6, 1893.

1, 21, 1893. Operation, double salpingo-oöphorectomy. On opening the abdomen about 90 cc. of blood-stained fluid escaped. This coagulated on exposure to the air.

Right side. The tube after passing outward 2 cm. is suddenly converted into a cyst 8 cm. in diameter; this is intimately adherent to the ovary, which is not enlarged. The tube contains 180 cc. of clear fluid.

Left side. The tube and ovary are densely adherent. The abdomen was irrigated with normal salt solution of 112° F. and the wound closed. Duration of operation 22 minutes.

1, 26, 1893. The patient has developed signs of peritonitis. Temperature 106.4° F.

1, 27, 1893, patient died 8.45 a. m.

The autopsy revealed general peritonitis. This case was one of four fatal cases occurring in one week. A full report of these cases is given in the accompanying article.

*Case 13.* E. W., age 31. Admitted in the service of Dr. Kelly, 3, 2, 1893. For the last five years the patient has had constant pain in the right ovarian region; this is compared to a knife-thrust. Four years and a half ago she had an acute attack of this pain and was compelled to remain in bed two months. During this attack the temperature at times rose to 104.5° F. Since April, 1892, defecation has been accompanied by severe pain in the region of the sigmoid flexure. Patient has been married ten years. Has never had any children, but has had nine miscarriages. One occurred at the fifth month, two at four months, and the remaining six between the sixth and eighth week. None of these were induced. After a miscarriage at fourth month in 1883 she had flooding and remained in bed three months, since then she has never felt strong. Menses commenced at 18, were regular, the flow has always been attended by pain on the first day. Last period 2, 22, 1894. Two years ago she jumped from the second story of a burning building and was unconscious for two hours. Since then the abdominal pain has been more severe. Leucorrhœa is profuse and odorless, and has been constant since the first miscarriage.

*Vaginal examination.* The outlet is relaxed, uterus retroflexed, normal in size.

Right side. Ovary flat, softish, somewhat enlarged, apparently adherent to the pelvic wall.

Left side. Ovary slightly enlarged, softish, its mobility is diminished.

3, 18, 1893. Operation, double salpingo-oöphorectomy. All the pelvic structures were bound down by adhesions. The uterus retroflexed and adherent. Both tubes were dilated and filled with serous fluid. Duration of operation 30 minutes. Abdomen irrigated, no drainage. 5, 12, 1893, patient discharged well.

*Case 14.* M. W., age 38. Admitted to the service of Dr. Kelly, 3, 5, 1893. Complained of slight dysmenorrhœa and bleeding hemorrhoids. She has been married 19 years; one child 18 years old. Menstruation regular, lasting 5 days; some pain in the ovarian region. Last menses March 1, 1893.

*Vaginal examination.* Uterus anteflexed, normal position. Posterior to the uterus is a round mass about the size of an orange, this is rather soft to the touch. Right side, nothing to be made out.

*Operation.* Removal of both tubes and ovaries for double hydrosalpinx. Both tubes were dilated and filled with serous fluid, they were intimately adherent to surrounding pelvic structures. Duration of the operation 35 minutes. Highest temperature 100.5°.

Patient made a good recovery.

*Case 15.* M. G., age 30. Admitted in the service of Dr. Kelly, Oct. 16, 1893. The chief complaint was a pain in the lower part of the abdomen and in the pelvis. She has been married eight years and had one child four years ago, the labor being instrumental. She had one miscarriage in 1891. Menstruation began at seventeen; the flow was moderate, lasting 3 to 4 days, and was accompanied by slight pain. Last menses 10, 16, 1893, very painful, especially in the left ovarian region.

*Family history.* Her father, one brother and one sister died of heart disease.

Since her miscarriage two years ago she has had a soreness and tenderness throughout the pelvis. This is most severe in the left ovarian region, extending down the thigh. It is sharp, shooting in character, and is increased by the menstrual period. She has pain in the back and a bearing-down sensation.

10, 6, 1893, examination under ether by Dr. Robb. The outlet is relaxed. The vagina contains a considerable amount of bloody fluid. The cervix is in the axis of the vagina, the uterus is forward and reclining in the pelvis. It is softened and about the size of a two months' pregnancy.

Right side. There is a softish irregular mass which seems to be adherent to the uterus.

10, 26, 1893. Operation by Dr. Kelly, double salpingo-oöphorectomy. The incision was 7 cm. in length. On either side of the uterus were cyst-like masses in the pelvis. The left side was delivered with considerable difficulty, and during removal the cyst was ruptured, about 200 cc. of clear serous fluid escaping. The cyst on the right side was densely adherent to the posterior surface of the uterus and to Douglas' cul-de-sac. The bleeding from these adhesions was so general that it had to be controlled by sulphate of iron.

A small amount of sweet oil was then poured over the raw areas. No drainage. The patient made an uninterrupted recovery and was discharged well, 11, 23, 1893.

*Pathological report.* Specimens consist of several pieces of much torn tissue; the largest of these is the left tube and ovary. The left tube 7.5 x 1 x 1.3 cm. Its surface is covered by numerous broad hemorrhagic adhesions. The inner end of the tube is 5 mm. in diameter. As it passes outward it gradually increases in size, terminating externally as a cyst-like mass 2.5 cm. in diameter. The cyst is bluish in color and covered with deeply injected vessels. There are several small subperitoneal cysts along the course of the tube. The tube is filled with a straw-colored transparent fluid.

Left ovary 3 x 2.5 x 1 cm. The surface shows numerous flat adhesions, its vessels are much injected, and it contains a corpus luteum 5 mm. in diameter. The various zones of this are well marked.

Right side. Tube 11 cm. long, 8 cm. in diameter. Its surface is covered by a few shaggy adhesions.

The uterine end of the tube is 5 mm. in diameter, patulous. Its fimbriated extremity is not visible, the outer end of the tube being converted into a sac-like mass which is covered by numerous adhesions and in one or two places having subperitoneal cysts on its surface. The inner walls of this sac are smooth and glistening, with here and there patches of ecchymosis. This sac is filled with serous-like fluid. The ovarian tissue cannot be made out in the remaining pieces.

*Microscopically.* Right side. The external coat of the tube is greatly thickened and contains many dilated capillaries. The different layers of the muscular coat show great connective tissue cell infiltration. The mucous membrane lining the tube is normal; its epithelium is intact.

Left side. The outer and middle coats present precisely the same appearance as those of the right tube. The lumen is greatly dilated, its epithelium is intact and the cilia are visible.

Left ovary. Its capsule is greatly thickened, otherwise it is normal.

*Diagnosis.* Double hydrosalpinx, chronic interstitial salpingitis, perisalpingitis and peri-oöphoritis.

*Case 16.* H. I., age 37. Admitted in the service of Dr. Kelly, January 9, 1894. She complained of a constant dull, dragging sensation in the back. She has been married sixteen years, has had two children (twins), the labor was hard and protracted. The placenta was adherent and there was hour-glass contraction of the uterus. She, however, made a good recovery. The menses commenced at 15, were regular, moderate in amount and lasted three days. Since marriage they have been accompanied by cramp-like pain. Last menstruation January 1.

*Family history.* Mother died of pneumonia, several maternal aunts died of phthisis.

*Present trouble.* Five years ago she had an attack of nervous prostration, which necessitated her remaining in bed for two weeks, and she was not able to resume her household duties for four months. Since then she has a tired and languid feeling, accompanied by pain in the back. Two years ago she had paroxysms of cramp-like pain in the umbilical region. These occurred at irregular intervals and would last for several hours. They were not accompanied by chills or fever, but the abdomen would become very tender. Her bowels have been constipated, and defecation has been accompanied by a certain amount of pain. There is a moderate leucorrhœal discharge.

1, 11, 1894. Operation by Dr. Kelly. Double salpingo-oöphorotomy. The tubes and ovaries on both sides were enucleated from dense adhesions to surrounding structures; they were then tied off and excised. The duration of the operation was 43 minutes.

1, 22, 1894. Since yesterday the patient has been complaining of cramp-like pains throughout the abdomen; these are paroxysmal in character. The pain continued for over a week and was relieved as soon as the bowels were moved. For ten days before her leaving the hospital she was free from pain. She was discharged February 14.

*Pathological report.* Right side. The tube is 6x.5x.5 cm. Its surface is covered by long thread-like adhesions. The fimbriated extremity is 1 cm. in diameter and is patent. The ovary is 4x4x1 cm. Its surface is pale and smooth, but on account of mutilation it is impossible to give a more accurate description.

Left side. The tube is 8x.5x.5 cm. At the juncture of its middle and outer third it is sharply bent upon itself. The fimbriated

extremity is occluded, the outer end of the tube being considerably dilated. On its surface are a few delicate adhesions. Left ovary is 4x3x1 cm. The anterior surface is smooth, pale and glistening. Scattered over both surfaces of the ovary are small cysts averaging 5 mm. in diameter. In one place is a ruptured corpus luteum.

*Microscopically.* Right tube. The peritoneal coat is somewhat thickened and contains numerous blood-vessels. Its muscular and mucous coats are perfectly normal. The small portion of the ovary examined presents nothing abnormal.

Left tube. The peritoneal coat is here and there covered by adhesions containing greatly dilated blood-vessels. The folds of the mucosa are flattened, increasing the calibre of the lumen.

The epithelium of the mucosa is everywhere intact and the lumen is empty. The left ovary contains many corpora fibrosa in various stages of development. It also contains several Graafian follicles.

*Diagnosis.* Double perisalpingitis and peri-oöphoritis, left hydro-salpinx.

*Case 17.* E. S., age 26. Admitted in the service of Dr. Kelly, 1, 25, 1894. Patient complained of intermittent pain in both ovarian regions, intensified on standing or on exertion. She has had one child and one miscarriage. Her menstruation commenced at 17. The flow lasted 6 or 7 days, was abundant, and accompanied by no pain. Since marriage the flow has lasted 7 days, being profuse and associated with a great deal of pain. This commences about two days before the period and continues until three or four days after it. Her last menstruation was 1, 14, 1894.

*Family history.* Father died of pneumonia; one sister and a niece of tuberculosis. Up to the present illness she has been perfectly well.

*Present trouble.* Following a miscarriage two years ago there was an excessive menstrual discharge. This was accompanied by a great deal of pain, which has been constant since then. The flow has been profuse and has contained, according to her statement, "shreds of tissue" and also masses of clotted blood. During menstruation she is frequently nauseated and occasionally vomits.

*General condition.* Patient is a thin woman, about 35 years of age. She has lost 23 pounds during the last year. Her appetite is poor; her tongue is coated; mucous membranes are pale. The

bowels are regular, but defecation is frequently accompanied by pain. Micturition is often associated with a burning sensation, and there is a constant desire to urinate. Abdominal examination negative.

Per vaginam, the outlet is somewhat relaxed, the cervix high up, is conical and points towards the hollow of the sacrum. The uterus is forward, situated just above the pubic arch. On the left side the tube and ovary are adherent and apparently slightly enlarged. On the right side the lateral structures are adherent, enlarged and very sensitive.

2, 5, 1894. Operation by Dr. Kelly, double salpingo-oophorectomy and excision of the uterine cornu for double hydrosalpinx and encysted pelvic peritonitis. An abdominal incision 8 cm. long was made. The left tube and ovary were found attached to the surrounding structures by broad velamentous adhesions. After cutting these, the tube and ovary were removed. On the right side the tube and ovary formed a mass about 10 cm. in diameter, intimately adherent to the pelvic floor. It appeared to be made up of cysts containing smoky brown fluid. The uterine cornu was resected and the mass removed. The duration of the operation was 30 minutes. The patient had very little pain after the operation, made a good recovery, and was discharged 3, 5, 1894.

*Pathological report.* Right side. The tube is 12x.5x.4 cm. It is very tortuous, its fimbriated extremity is occluded. The surface is bright red in color and is covered by several delicate adhesions. The lumen of the tube is almost invisible. The mesosalpinx is much thickened and reddish in color. The ovary is 4.5x4x2 cm. Its posterior surface is white and glistening. It contains several thin-walled cysts. The largest of these is 3 cm. in diameter.

Left side. The tube is 6x1x3 cm. The surface is smooth and glistening. Its fimbriated extremity is bound down to the ovary by adhesions and is 1.5 cm. in diameter. The tube contains a transparent yellowish fluid. The mesosalpinx is somewhat thickened. The ovary 4x2.5x2 cm. Its anterior surface is covered by dark-red adhesions. On the posterior surface is a corpus luteum 1.5 cm. in diameter.

*Microscopically.* The right tube has several non-vascular adhesions on its surface. The muscular coat stains poorly and shows connective tissue cell proliferation. The tubal epithelium is normal.

The ovary, beyond being covered by a few delicate adhesions, is normal.

Left side. The tube at its uterine extremity is perfectly normal; at its outer extremity it is considerably dilated, but otherwise presents no change. Left ovary is normal.

*Diagnosis.* Double perisalpingitis and peri-öophoritis, hydrosalpinx of the left tube.

*Case 18.* C. M., age 36. Admitted in the service of Dr. Kelly, March 21, 1894. On entering she complained of constant pain in the lower part of the abdomen. She had been married ten years, has had one child, the labor was difficult and the perineum was torn. This was repaired six years ago. Eleven years ago she had typhoid fever, and since then has had an attack of pneumonia. Her present trouble began one year ago, as an aching pain in the abdomen, following any exertion. The pain was especially severe during menstrual periods. It was radiating in character, extending down into the legs and into the sacral region posteriorly. Menstruation commenced at 14, lasting about three days. The flow was regular, profuse and painful. Last menstruation was ten days before admission to the hospital.

*General condition.* Patient was a fleshy woman of ruddy complexion, mucous membrane normal; defecation at times was painful. Micturition was frequent and painful. Abdominal examination was negative.

*Vaginal examination.* Outlet greatly relaxed, cervix high up, lacerated, lips being indurated and everted. The uterus is freely movable, enlarged and situated anteriorly. Laterally no disease detected.

3, 28, 1894. Operation by Dr. Kelly, double salpingo-öophorectomy for bilateral hydrosalpinx. On opening the abdomen the omentum was found to be adherent to both tubes and also to the uterus. The operation was rendered more difficult than usual by the thick abdominal walls and the tense recti muscles; its duration was 39 minutes. The day after the operation the temperature rose to 103° and fluctuated between that and 100° for 12 days. On the fourth day a small abscess developed in the wound, which increased in size and then disappeared. The patient was discharged feeling well.

*Pathological report.* Right side. The tube is 4.5x1x1 cm. Somewhat convoluted. Its fimbriated extremity is 1.5 cm. in diameter, bluish-red and patent. The tube is covered by numerous dark red adhesions and is intimately adherent to the ovary. The ovary is 5x2.5x2 cm. and is enveloped in adhesions. On its outer surface are two subperitoneal cysts, the largest being 1.5 cm. in diameter. These are filled with clear fluid. The ovary contains a corpus luteum 2 cm. in diameter. The left tube is 9x1.5x1 cm. It passes downward and forward, terminating in a trumpet-like extremity 4x3 cm. At the uterine end the tube is only 6 mm. in diameter, but quickly dilates and becomes convoluted. It is covered by numerous delicate adhesions, and at its juncture with the ovary is a subperitoneal cyst. The tube is filled with fluid which does not appear to be translucent. The left ovary is 4x1.5x2 cm. It is soft and flabby and is covered by numerous delicate adhesions. It contains a corpus luteum 1.5 cm. in diameter.

*Microscopically.* The right tube and ovary are covered by adhesions, but are otherwise perfectly normal.

Left side. The tube wall at the outer extremity is much thinner than usual. The mucous membrane is composed of one layer of cells, lying in places on a scanty submucous stroma, in other places directly on the muscular coat. The epithelium is in part cylindrical, in part cuboidal. At varying intervals small folds project into the lumen. These have only two or three secondary folds and are covered by cylindrical epithelium. The left ovary is covered by numerous adhesions. Its structure is normal.

*Diagnosis.* Perisalpingitis and peri-oöphoritis of right side; hydrosalpinx, perisalpingitis and peri-oöphoritis of left side.

*Case 19.* M. B., age 33. Admitted in the service of Dr. Kelly, 3, 26, 1894. Her chief complaint was constant pain in the left ovarian region, accompanied by some backache. She has had four children, the eldest is seven years old, the youngest five months. The first labor was instrumental. She has had two miscarriages, the first one in 1891, the second one six months before admission. The latter one was followed by considerable hemorrhage. She was curetted and remained in bed two weeks. Menstruation commenced at 15 years, was very free and lasted from three to four days. At times the menses were painful during first day or two. Since mar-

riage the flow has been more profuse and not so painful. The last period 3, 17, 1894.

*Family history* good.

Her only illness has been rheumatism. Present trouble dates from the birth of the oldest child. At that time the pain was not very severe, but the patient was unable to work for two months. The pain has gradually increased in severity, and since the birth of the last child five months ago has been much worse. It is most marked at the menstrual periods. Coitus has been very painful since the last confinement.

*General condition.* A well nourished woman of ruddy complexion. The mucous membrane of good color; her appetite poor; tongue clean, bowels regular, no urinary difficulty.

3, 28, 1894. Operation by Dr. Russell.

Left side. The tube thin-walled and distended with fluid, but not adherent. The broad ligament was tied off and the tube and ovary were removed. In the broad ligament were several dilated veins. One of these, about 1 cm. in diameter, was punctured during the operation. A hematoma formed and it was necessary to control the vessels lower in the pelvis.

Right side. Tube and ovary free, but the fimbriated extremity along its lower border was adherent to the ovary. The adhesions were cut and the structures dropped back into the abdomen. The enlarged retroflexed uterus was brought forward and remained in position without being sutured to the abdominal walls. The abdomen was closed with buried silk sutures. Duration of the operation 53 minutes. The continuous suture was removed 4, 8, 1894. About the middle of the wound was a small superficial abscess. This was not, however, surrounded by any area of induration. 5, 2, 1894, patient discharged well.

*Pathological report.* Left tube 11x.4x.4 cm. It is somewhat convoluted and terminates in a trumpet-like extremity 2 cm. in diameter. The tube is pinkish in color and its posterior surface is covered by numerous adhesions. The fimbriated extremity is intimately adherent to the outer end of the ovary. The tube is filled with a clear transparent fluid. The folds of mucous membrane are distinctly seen through the tube wall and run parallel with the tube axis. Attached to the outer extremity of the tube is a subperitoneal

cyst 1.5x.8 cm. The ovary is 4x3x2 cm. It is soft and flabby, is covered by a few delicate adhesions, and contains a corpus luteum 2.5 cm. in diameter.

*Microscopically.* Sections from the outer dilated portions of the tube show that the wall is very thin, that the muscular coat still exists, and that the mucous membrane is represented by one layer of cylindrical epithelium which rests on the muscular fibres. Springing from this layer are folds; some are single, others present secondary and tertiary branchings. Most of the folds are constricted at their juncture with the tube wall. All are lined by cylindrical epithelium, the cilia of which are in many places visible. The stroma of the folds is loose and is composed of cells having oval nuclei, a few lymphoid cells being scattered throughout the stroma. The ovary contains nothing of note.

*Diagnosis.* Hydrosalpinx of left tube.

*Case 20.* M. P. A., age 47. Admitted in the service of Dr. Kelly, 4, 6, 1894. Complaining of constant dull pain in the left ovarian region. She had been married 20 years. 0 para, no miscarriage. Menses were regular, lasting four or five days. The flow was free, being accompanied by pain during the first two days. Last menstrual period was March 5, 1894.

*Family history.* Father died of phthisis. The patient has always been well up to the present illness. Her trouble commenced two years ago, with suffering from constant pain in the left ovarian region. At the outset the pain was felt throughout the abdomen, but eventually centered in the left side. She has had a profuse bloody discharge from the vagina for the last eight days.

*General condition.* A somewhat thin woman, mucous membranes of good color, appetite poor, tongue brown and coated, bowels constipated. Micturition is accompanied by a burning sensation. Locomotion and standing increase the constant pain of which she complains.

4, 6, 1894. Operation by Dr. Kelly, hysterectomy for myomatous uterus, accompanied by cysts on either side of the same. An incision 15 cm. long was made in the mid-line. On opening the peritoneal cavity some external longitudinal fibres of the colon were cut; the muscular coat, however, was not injured. The intestinal wound was closed by interrupted sutures and the intestines packed away by means of gauze and sponges; this was, however, very difficult on

account of the constant straining of the patient. To the left of the uterus was a large cyst resembling very much a dermoid. The cyst was adherent to the sigmoid flexure over an area of 4x2 cm. It was dissected off by the knife and scissors. The ovarian vessels were then tied and cut. The uterine vessels were now controlled by passing a ligature through the substance of the uterus low down in the pelvis. The right side was similarly treated after releasing the cyst and tube from adhesions to the pelvic floor. The patient was then put in position for vaginal hysterectomy. The vagina was distended by a large mass resembling a submucous myoma. To enucleate this the vaginal orifice was split backward as far as the side of the rectum. The mass was then grasped by the hand and boldly cut away. The large, ragged, friable surfaces bled profusely and it was necessary to again treat it abdominally. The uterus was then dissected loose from the bladder and amputated at the cervix. The cervical stump was closed by three fine silk sutures and the peritoneum was brought over the stump. On looking into the pelvis just before closing the abdomen nothing but a semilunar line of sutures could be seen. There were no raw surfaces and no bleeding points. As the intestines had been out of the abdomen for a considerable time, they as well as the abdominal cavity were irrigated with normal salt solution. The duration of the operation was 38 minutes; no drainage.

5, 9, 1894. The patient has had obstinate nausea and vomiting ever since the operation and has just vomited an *ascaris lumbricoides* 14 cm. long; after this the vomiting immediately ceased. 5, 12, 1894, the patient was discharged well.

*Pathological report.* Operation, hysteromyomectomy. The uterus is 7x9x5.5 cm. It is glistening and presents a rough, somewhat striated appearance. On the right side, about the middle of the fundus, is a small nodule 1.5 cm. in diameter. There is also a nodule 1.5 cm. in diameter at the juncture of the left tube with the uterus. The uterine canal is 4.5 cm. long. The mucous membrane is yellowish-white in color, here and there presenting dark-red patches of ecchymosis. It is 2 mm. thick. The uterine walls are infiltrated by three or four nodules, the largest of which is 2 cm. in diameter. On cross-section they present a pearly-white appearance.

Right side. The Fallopian tube is 21 cm. long, and 8 mm. in diameter at its inner extremity. After passing outward 6 mm. it gradually dilates into a sac 5x6 cm. This somewhat resembles a pipe bowl. The surface of the tube is covered by numerous adhesions. The tube is filled with a clear fluid, and coursing along beneath the surface the folds of the mucosa are distinctly seen. On cutting open the hardened specimen the tube lumen is seen to suddenly dilate into the cavity above described.

The walls of this cavity are very thin, are smooth and glistening and are traversed by delicate folds of mucous membrane. These are separated from one another by a considerable interval. In other portions of the cyst wall are small granular masses arranged in rows. These appear to be remnants of folds of mucous membrane. The right ovary is 4x4x1 cm., cirrhotic and yellowish-white in color. The lower extremity of the ovary is occupied by a small cyst 2.5 cm. in diameter. The inner surface of this is dark blue in color and is traversed by numerous blood-vessels.

The left side for the most part is occupied by a cyst 13x12x11 cm., smooth and glistening, and has numerous small vessels coursing over its surface. Posteriorly it is covered by numerous adhesions. It gives a distinct sensation of fluctuation. The tube is 17 cm. long and 1 cm. broad, and from its uterine extremity it passes out over the surface of the tumor and appears to merge into the tumor itself. Attached to the under surface of the tumor is the ovary. This is 5x3x1 cm. It is somewhat lobulated, it is pinkish in color and is intimately related to the tumor. On cutting open the hardened cyst, the walls are seen to average 1 mm. in thickness. The inner surface presents a coarse trabeculated appearance. The Fallopian tube is not dilated, but communicates with the sac by an opening 5 mm. in diameter. This opening is oval in form. Its margins are smooth and glistening.

*Microscopically.* The mucous membrane of the uterus is in part of normal thickness, but that of the fundus is 5 mm. thick. The glands are normal in character; the epithelium is everywhere intact. The stroma is composed of cells having oval nuclei; in the deeper layers of this are a few lymph nodules. The nodules in the uterine wall are made up of non-stripped muscular fibre.

Right side. The tube at its uterine end is perfectly normal, but where dilated the muscular coat is much thinner. Its nuclei in places do not stain, and the submucous coat is practically absent. The inner wall of the sac is lined by one layer of cylindrical epithelium. Springing here and there from the walls are isolated branching folds. The stroma of these is made up of large oval cells having small round nuclei. The folds are covered by cylindrical epithelium. The lumen of the tube contains desquamated epithelium and red blood corpuscles. The right ovary is normal:

Left side. The tube before entering the sac presents a decidedly altered appearance. The folds at their bases are perfectly normal, but towards the centre of the lumen is a large area filled with cells having small long nuclei, with polynuclear leucocytes and with connective tissue cells. The lumen contains some degenerated epithelium and polynuclear elements. The cyst wall is composed of fibrous tissue. The inner wall is coated with a granular material containing connective tissue cells and polynuclear leucocytes. The ovary is normal and is directly continuous with the cyst wall.

*Diagnosis.* Uterus myomotosa, accompanied by thickening of the mucosa. Hydrosalpinx of the right side, cyst of left side, most probably ovarian in origin.

*Case 21.* Mrs. H., a patient of Dr. Goldsborough, of Cambridge, Md. She had been an invalid for many years and suffered chiefly from some stomach disorder. In addition to this she had acquired the morphia habit subsequent to an attack of rheumatism several years ago. Her pelvic trouble was only noticed ten days before the operation, when she had a chill and developed signs of peritonitis.

6, 24, 1894. Operation by Dr. Kelly. Temperature at time of operation  $105^{\circ}$ , pulse thready. Condition one of extreme collapse. Exploratory laparotomy, removal of right tube and ovary. The patient grew rapidly worse during the brief operation and died seven hours later.

*Pathological report.* The tube is 5 cm. long; 8 mm. in diameter at its uterine extremity. After passing outward  $2\frac{1}{2}$  cm. it suddenly dilates and terminates in an occluded fimbriated extremity. The tube is intimately adherent to the ovary, is bright red in color and its walls are very thin. Its cavity is filled with a serous fluid. Lying free in the tube cavity is an S-shaped concretion  $2\frac{1}{2}$  cm. long

and .5 cm. in diameter. This presents a rough mulberry appearance and is exceedingly hard. The ovary is 2.5x2.5x.15 cm., is whitish in color and covered by numerous adhesions. On pressure it is soft and yielding.

*Microscopically.* The tube near its uterine extremity is covered by numerous non-vascular adhesions. The mucosa is represented by four cyst-like cavities lined by cylindrical epithelium. These contain a small amount of granular material. Sections through the tube at its outer third show that the folds of the mucosa are of normal thickness and that their epithelium is intact. At the fimbriated extremity the lumen of the tube is 1.4 cm. in diameter. Springing from the circumference in a few places are delicate folds. These are covered by cylindrical epithelium. The lumen of the tube is for the most part empty, but here and there contains a small amount of granular material. Scattered throughout the walls of the tube are a few areas of calcification. The ovary is flattened, contains a corpus luteum and several corpora fibrosa.

*Chemical examination of calculus.* Dr. Aldrich found the calculus to be composed almost entirely of calcium phosphate.

*Diagnosis.* Peri-oöphoritis, perisalpingitis, hydrosalpinx, calculus lying free in Fallopian tube.

#### HYDROPS TUBÆ PROFLUENS.

This name has been given to this variety because of the periodic escape of the contents of the tube into the uterus. The condition was mentioned by the older writers, and Froriep, in 1834, in speaking of hydrosalpinx described it as a distinct variety. Anatomically the tube in this variety differs in no way from the tube in simple hydrosalpinx, save that the uterine end is either patent or only slightly occluded. The tube may reach an immense size, as in the case of Frank's, where it contained thirty-one pounds of fluid. According to Landau the muscular walls are hypertrophied in this variety, which he designates as "intermittent hydrosalpinx." Martin reports four cases in five hundred of tubal disease. This variety would seem to be rare, as during the five years since the hospital opened we have but a single case; in this only a symptomatic diagnosis could be made.

## HYDROSALPINX FOLLICULARIS.

In this species the tube is usually of small size, and in our cases did not reach more than 3 cm. in diameter. As will be seen from its form, any great dilatation of the tube is almost out of the question. Externally it differs in no way from hydrosalpinx simplex. *On section, however, it presents a honeycombed appearance, and may or may not show a central lumen.* Scattered throughout the central zone of the tube are oval and round spaces varying from a pin-point to 8 mm. in diameter. (Fig. 1, Plate XIX.) These cavities are filled with fluid and apparently communicate with one another.

Upon histological examination the peritoneal coat is found to be covered with connective tissue adhesions. The muscular coat is usually normal in thickness, but it is more likely to show connective tissue cell proliferation between the muscle bundles than any other form. These cells may occur in clumps or be scattered in rows between the muscle cells. In two out of four of our cases there was connective tissue proliferation in the muscular coat, and in one a moderate amount of œdema. The folds of the mucosa are only seen here and there or may have entirely disappeared. The greater part of the mucosa is occupied by the alveoli; these have secondary bands running across them, subdividing them into small cavities. The large alveoli are lined by cuboidal epithelium, the smaller ones by cylindrical cells. (Fig. 2, Plate XIX.) The lumina contain desquamated epithelium, granular material, and occasionally a few polynuclear leucocytes. The stroma closely resembles that of the normal tube, but is usually not so dense.

Martin has described "endosalpingitis follicularis" which presents a somewhat similar picture, but is not uniformly accompanied by a dilatation of the alveoli. Orth also describes endosalpingitis follicularis and says that these alveoli or gland-like spaces may become cystic. Of our eleven cases examined microscopically, four were of this variety, two of them presented double follicular hydrosalpinx, one follicular hydrosalpinx on the left and simple on the right, the fourth was unilateral, the opposite tube and ovary merely being adherent.

*Case 22.* Mrs. B., æt. 28. Admitted in the service of Dr. Kelly, January, 1894.

1, 22, 94. Operation by Dr. Kelly, double salpingo-oöphorectomy. Duration of operation 35 minutes. The patient made a good recovery.

*Pathological report.* Right side. The tube is 6.5x2x2 cm. It is distended, dark red in color, and is covered by numerous shred-like adhesions. The fimbriated extremity is occluded, its position being occupied by a small subperitoneal cyst. Posteriorly the tube is attached to the ovary by thread and fan-like adhesions. The mesosalpinx is not visible. The right ovary is 3x2.5x2 cm. It is in places covered by shred-like adhesions.

Left side. The tube is 5x2x2 cm. Its fimbriated extremity is 2.5 cm. in diameter and is occluded. The tube generally is smooth and glistening, but is covered by a few delicate adhesions. Along the under margin of the tube are three subperitoneal cysts. The mesosalpinx is much shortened and thickened.

The left ovary is 4x3x1.5 cm. Its surface is smooth, and in one place it presents a corpus luteum, the yellowish walls of which are distinctly visible through the peritoneal covering.

*Microscopically.* The right tube at its uterine extremity shows connective tissue cell proliferation between the muscle bundles. The lumen of the tube is somewhat convoluted and the folds are much thicker than usual. Its lumen is filled by a granular material which contains a few polynuclear leucocytes. A short distance from the tube cavity are a few alveoli lined by epithelium similar to that of the tube. At the junction of the outer and middle thirds of the tube the peritoneal coat is thickened and presents numerous connective tissue adhesions on its surface. These are rich in arterial supply. The muscular coat is much thinner than normal and shows a moderate amount of small round cell infiltration. The lumen of the tube is considerably dilated and contains a granular material holding a few polynuclear leucocytes in its meshes. Arranged around the lumen are small and large alveoli lined by cuboidal epithelium. They contain a similar granular material; the stroma between these alveoli is made up of loose connective tissue containing cells which have round or oval nuclei. Some of these cells are swollen and are filled with brown pigment. At the outermost portion the tube forms a series of small cysts varying from 1 to 3 mm. in breadth. These seem to spring from the upper part of the

lumen of the tube. They are lined by a cuboidal epithelium; in some places the stroma beneath the epithelium is markedly distended by red blood corpuscles. The lumina of some of these alveoli are filled with cells containing brown pigment. The right ovary is normal.

Left side. The tube presents the same general appearance as the right, but at its outer portion contains a large quantity of blood in the lumen. The left ovary is covered by a few adhesions. The alveolar appearance seen in both tubes was most probably caused by previous salpingitis, the folds of the mucosa having become adherent to one another, the epithelium from the one side becoming continuous with that of the opposite fold. The alveoli so formed have been distended by serous fluid.

*Diagnosis.* Double follicular hydrosalpinx, perisalpingitis, and peri-oöphoritis.

*Case 23.* H. J. Admitted in the service of Dr. Kelly, 3, 23, 94. Her chief complaint was a feeling of fullness in the lower abdomen, accompanied by pain in both ovarian regions. She also had sharp pains in the uterus, associated with a heavy dragging sensation. She had one child fifteen years ago and a miscarriage two years later. Menstruation commenced at 15, lasted 3 to 4 days, was free and at times painful.

Family history good.

In October, 1892, she had a severe attack of pain, apparently in the uterus. She was compelled to remain in bed for two months. There was a certain amount of soreness in the right ovarian region.

*General condition.* The patient is a very large woman; mucous membranes normal; tongue is pale and somewhat flabby; bowels are constipated and defecation is sometimes painful. She has a slight leucorrhœal discharge. Micturition is accompanied by a burning sensation.

3, 26, 94. Operation by Dr. Kelly, double salpingo-oöphorectomy. An incision 8 cm. long was made in the median line. The uterus was somewhat enlarged and contained in its walls one myomatous nodule. All the pelvic structures were enveloped in adhesions, and posterior to the uterus were 300 cc. of encysted fluid, dark reddish-brown in color. Both the right and left tubes and ovaries were liberated from dense adhesions and removed. A

portion of the left uterine cornu was removed with the left tube. All the bleeding points were controlled by ligatures.

4, 27, 94. The patient made a speedy recovery and was discharged well.

*Pathological report.* Right tube 8x2x2 cm., grayish-red in color, smooth, and in a few places covered by dense adhesions. At the uterine extremity it is 8 mm. in diameter, but after passing outward 3 cm. it becomes bent on itself and the bent surfaces become adherent to one another. Beyond this point the tube is dilated. The fimbriated extremity is occluded and covered by dense adhesions. Springing from the outer portion of the fimbriated extremity is a subperitoneal cyst 1.5 cm. in diameter. The tube walls are very thin and the lumen is filled with a watery fluid. The parovarium is intact. The right ovary is 3.5x3.5x2 cm., pinkish in color, everywhere covered by adhesions. It contains a corpus luteum 3x2 cm., and Graafian follicles are seen on its surface. On section the dilated tube has a cavity 1 cm. in calibre; the upper wall is 8 mm. thick and presents a honeycombed appearance, being traversed by many cavities. The under part of the tube presents an irregular lumen 8x5 mm.

Left side. The tube is 8x1x1 cm., bright red in color and covered by vascular adhesions. Attached to its inner extremity is 1 cm. of the uterine cornu. The tube becomes convoluted as it passes outward; its fimbriated extremity is occluded and covered by dense adhesions. The tube is adherent to both the anterior and posterior surfaces of the ovary. Left ovary 3.5x3x2 cm. It is everywhere covered by adhesions. The posterior surface is lobulated and whitish in color. The remainder of the ovary is occupied by a cyst 2.5x2.5 cm. This is bluish in color and traversed by numerous small blood-vessels; yellowish material can be seen in its interior.

*Microscopically.* Right side. The uterine end of the tube appears perfectly normal, but on approaching the dilated portion the peritoneal surface is here and there covered by vascular adhesions. The muscular coat appears to be œdematous, and the muscle bundles are separated from each other by a granular material which stains pink with eosin. The mucous membrane is entirely altered. Very few of the folds are seen, and these have only one or two

secondary folds. Scattered throughout the mucosa are gland-like cavities. Some of these are very small, others reach 7 mm. in diameter. They are lined by ciliated epithelium. Some of the larger cavities, however, have a cuboidal lining. The lumen of the tube as well as the cavities above described are empty. In a few places, however, they contain desquamated epithelial cells. Some of these cells are brownish in color. The stroma of the mucosa is not dense, being infiltrated by granular material. Here and there it contains a lymph nodule or shows a group of large cells whose protoplasm is light brown. The nearer one approaches the fimbriated extremity the wider these gland-like cavities appear.

The right ovary contains several corpora fibrosa, one of which shows exquisite pigmentation. The pigment contains no iron. Two corpora lutea are also present.

Left side. The uterine cornu presents a normal lumen; around it are eighteen to twenty gland-like cavities. Some are small, others are elongated and dilated. They are lined by cylindrical epithelium. The changes in this tube are of the same character, but less marked than those of the opposite side. The lumina are filled with blood and the stroma shows many large cells containing brown pigment.

The left ovary contains several corpora fibrosa and a large Graafian follicle.

*Diagnosis.* Follicular hydrosalpinx of the right side, follicular hematosalpinx of the left side, double perisalpingitis.

*Case 24.* P. C. Admitted in the service of Dr. Kelly, April 7, 94. *Æt.* 30. She complained of a bearing-down sensation in the region of the uterus. She has had two children and no miscarriages. Menstruation commenced at 16 and has always been regular; since marriage the flow has been accompanied by considerable pain during the first and second days. Last menses March 19th.

Her family history is good.

Her present trouble began seven years ago at childbirth, and has gradually increased since then.

*General condition.* Patient is a well nourished woman; mucous membranes normal; tongue clean; appetite good; bowels regular; defecation has occasionally been accompanied with some pain. She has a moderate leucorrhœa which has been non-irritating.

Operation by Dr. Kelly, double salpingo-oöphorectomy. Both tubes and ovaries were liberated from adhesions to the pelvic wall,

broad ligament, posterior surface of the uterus and rectum. They were then removed. The posterior surface of the uterus was united to the anterior abdominal wall by two silk sutures. Convalescence was uninterrupted and the patient was discharged feeling perfectly well.

*Pathological report.* The right tube at its uterine extremity is .6x.6 cm. in diameter. It passes downward, forward and outward, terminating in a ballooned extremity which is occluded and adherent to the upper surface of the ovary. At one place, however, the extremity is apparently free from adhesions and the fluid tends to escape. The entire tube resembles a pipe. Its surface is pinkish in color and is covered here and there by delicate adhesions. The tube is filled with transparent fluid, and beneath the peritoneum delicate folds of the mucosa are seen running parallel to the tube axis. The largest of these folds is 2 mm. broad. On cutting open the hardened specimen the mucous membrane near the fimbriated extremity is in places 3 mm. thick. A portion of the fimbriated extremity 1 cm. in diameter has been inverted and projects 1 cm. into the lumen of the tube. The right ovary is 4x3.5x2.5 cm. It is bluish-red in color and covered by numerous delicate red adhesions. Eight Graafian follicles can be seen just beneath the surface.

Left side. The tube is 8x1.5x1 cm. It is slightly convoluted. The uterine extremity is partly occluded. The fimbriated extremity over an area of 1 cm. is still free from adhesions and is bluish-black in color. The tube is covered by numerous very vascular adhesions and is intimately adherent to the ovary both anteriorly and posteriorly. Between the tube and the ovary anteriorly is a subperitoneal cyst 2 cm. in diameter.

Left ovary 4x3.5x2.5 cm. It is bluish-white in color and covered by delicate adhesions. On its surface are six small Graafian follicles. It contains a corpus luteum 1.5 cm. in diameter.

*Microscopically.* Right side. The mucous membrane of the tube at the right cornu is perfectly normal. On passing towards the fimbriated extremity the muscular coat is infiltrated by lymphoid cells. These occur in clumps or are arranged singly. The mucous membrane has more folds than usual, and in places presents an alveolar arrangement. Some of these alveoli are filled with desquamated epithelium. The epithelium is everywhere intact. The right ovary is normal in structure, but is covered by vascular adhesions.

Left side. The tube at its uterine extremity is perfectly normal. Towards the fimbriated extremity a cross-section of the tube shows a central portion composed of connective tissue, and radiating from this are pear-shaped cavities; in other words, the tube presents a honeycombed appearance. The largest of these spaces is 3 mm. in diameter. The tube wall is apparently normal. The folds of the mucous membrane are replaced by gland-like cavities. Some of these are exceedingly small and occur in groups. Others are much larger, as above described. The small ones are lined by cylindrical epithelium, the larger ones by cuboidal. The stroma is composed of cells having oval or spindle-shaped nuclei. The ovary is covered by delicate adhesions. Its structure is normal.

*Diagnosis.* Right side, hydrosalpinx. Left side, follicular hydrosalpinx.

#### TUBO-OVARIAN CYST.

In these cases the dilated Fallopian tube communicates with an ovarian cyst, the fluid contents passing from the one cavity to the other.

One of the first cases described was by Blasius in 1834. Later, Richards cited a case in which the dilated Fallopian tube communicated by a valve-like opening with an ovarian cyst the size of a child's head. One of the most carefully described cases was that of Burnier.

*The Gross Appearance.* The first thing that attracts attention is the cyst, which may vary from a walnut to a child's head in diameter. It may or may not be adherent to the surrounding structures, and coursing along its upper surface is the Fallopian tube, which may be normal in size at its uterine end (Klob). As it passes outward it dilates and terminates in a dome-like extremity which, by its under surface, is intimately adherent to the cyst. (Fig. 1, Plate XX.) The inner surface of the tube is smooth and glistening, and has springing from its walls delicate folds which run parallel to the lumen of the tube. At the outer extremity the tube becomes constricted and communicates with the cyst by an opening of variable size. In Bennett's case the aperture admitted a finger, while in Burnier's it was the size of a twenty-five cent piece. Our case (26) presented an oval opening 2.5 cm. in diameter; the margins of this

were sickle-like, and stretching across the opening was a delicate band of tissue. (See Fig. 2, Plate XX.) The tubal folds may cease at the opening, but in Burnier's case they reached the opposite side of the cyst, and in Hennig's the folds extended over the cyst wall. In our cases the folds ceased at the point of communication with the cyst, not showing the slightest tendency to extend farther.

*Histological examination.* The peritoneal coat shows adhesions which are light or dense according to the duration of the process. The muscular coat may be normal, atrophic, or show proliferation of the connective tissue cells between the muscular bundles. The mucosa is represented by one layer of cylindrical or cuboidal epithelium resting on a basement membrane or directly on the muscle. Springing from the margin of the tube-lumen are delicate folds which, as in simple hydrosalpinx, are either finger-like or branching. The lumen, especially in its recesses, may contain some granular material, with a few desquamated epithelial cells in its meshes.

The ovarian cysts may be unilocular or multilocular and are usually not larger than a child's head. Where they spring from a corpus luteum or Graafian follicle they must naturally be unilocular. Burnier's case presented a unilocular cyst the size of a child's head. In Richards' case it was not mentioned whether the cyst was unilocular or multilocular. Of our cases one (26) (Fig. 2, Plate XX) was bilocular and the two others unilocular. As yet the number of cases reported is too small to enable one to say which variety of cyst predominates.

The cyst is covered externally by one layer of flat epithelium; the walls are composed of connective tissue, the outer zone of which is arranged in layers. This tissue may contain Graafian follicles and other ovarian elements.

The inner surface is covered by flat epithelium, as demonstrated by Case 25, cuboidal, as shown in Case 26, or finally by cylindrical epithelium.

*The Fluid.* For a description of the character of the fluid in tubo-ovarian cysts we are indebted to Hammersten, who says that as a rule it is a watery, serous fluid, and that it does not contain pseudo-mucin. In our cases the fluid was clear and transparent, but the method of hardening precluded a more accurate examination.

Microscopically it contained desquamated epithelium and granular material.

Although tubo-ovarian cysts are supposed to be rare, 3 of the 11 of our cases were of this variety.

*Case 25.* K. B., age 29. Admitted to the service of Dr. Kelly, 12, 12, 1892. The patient has complained for the last 6 months of intermittent aching pain in the left ovarian region and has also had a good deal of headache. She has been married 12 years, has had one child and two miscarriages, both of the latter being during the second month. The labor was normal and the miscarriages were not followed by any untoward symptoms. Menstruation began at 16, was regular and lasted from two to three days; the flow was scanty. Last menses December, 1892, were accompanied by pain. The abdomen is tympanitic, and just above the left of the pubes is a rather hard mass, this is 7 cm. in transverse diameter and extends upward 1.5 cm.

*Per vaginam.* The outlet is moderately relaxed, the cervix stellately lacerated and points backward. The uterus is anteflexed, movable, and normal in size.

Right side. A mass the size of a lemon can be felt near the pelvic brim in front. It is elastic and suggests fluctuation.

12, 14, 1892. Operation by Dr. Kelly, double salpingo-oöphorectomy.

Right side. The tube a few cm. from its uterine extremity dilates into a sac which communicates with a cyst occupying the right ovary. The tube and cyst together contain 90 cc. of clear fluid.

Left side. The ovary is converted into a cyst containing about 600 cc. of dark brown fluid. A Miculiez drain was inserted in the wound and the abdominal incision closed. 1, 15, 1893, gauze removed. 1, 21, 1893, patient discharged feeling well, but not very strong.

*Diagnosis.* Tubo-ovarian cyst.

*Case 26.* M. L., age 38. Admitted to the service of Dr. Kelly, 3, 7, 94. She complained of almost constant pain and soreness in the left ovarian region. No children, no miscarriages. Menstruation began at 16, lasting 3 to 4 days; was at times free, at other times scanty, being accompanied by a slight amount of pain. Since marriage the menstrual pain has increased, being chiefly confined to

the left ovarian region. For the last month she has had occasionally throbbing pain in the left side. This has been accompanied by backache.

*General condition.* Mucous membranes are pale, appetite poor, tongue coated and flabby. No urinary difficulty.

3, 8, 94. Operation by Dr. Kelly, double salpingo-oöphorectomy for bilateral hydrosalpinx and universal pelvic peritonitis. On opening the abdomen the omentum was found to be adherent to the pelvic brim. It was liberated and 10 cm. of its lower portion was tied off and removed. On the left side the tumor was very prominent, it was tapped and smoky watery fluid drawn off. It was released from its adhesions to the rectum and pelvic floor. It was necessary to remove the cyst piecemeal. The rectum was denuded of its peritoneum over an area 3x2 cm; the right side, which was densely adherent to the pelvic wall and broad ligament, was removed without rupture. The uterine cornu was amputated and removed together with the tube. About 50 silk ligatures were used in the pelvic cavity. The patient made an uninterrupted recovery and was discharged 4, 5, 94.

*Pathological report.* Right side. The ovary (Fig. 1, Plate XX) is transformed into a cyst 10.5x8x8 cm. This is irregularly lobulated, has a bluish tinge and is distinctly fluctuant. The upper surface is covered by a bright red glistening tissue 1 mm. in thickness. Coursing over the upper surface of the tumor is the tube, attached to the median end of which is 1.5 cm. of the uterine cornu. The tube passes outward .5 cm., then directly downward for 1 cm. It immediately passes upward and outward. This portion of the tube is intimately adherent to the uterine cornu and the tube appears to be occluded by the bend so produced. From this point the tube courses directly outward for 9 cm., being .9 cm. in diameter. It then curves upward, outward and backward, terminating in a bulbous extremity 4x3 cm. The whole tube reminds one of a pipe. The posterior surface of the tube is rough and uneven, being everywhere covered by coarse adhesions. The tube is filled with a transparent fluid.

On cutting open the cyst on the right side the ovary is seen to be converted into two cysts, the large one being 8x7 cm., the smaller one 4x2 cm. Both of these are thin-walled, smooth and glistening.

From the inner surface of the large cyst the tube can be seen coursing along the outer surface. The middle portion of the tube on section presents a trabeculated appearance. The dilated and occluded fimbriated extremity communicates with the larger cyst of the ovary by an irregularly oval aperture. Stretching from one side of the opening to the other is a delicate band. The margins of the opening are smooth and rounded. (Fig. 2, Plate XX.)

Left side. The tube is so mutilated that it is impossible to describe it. The site of the left ovary is occupied by a cyst approximately 10 cm. in diameter. It is grayish-white in color and in places smooth and glistening. Here and there, however, are vascular adhesions. Internally the cyst is white. In places there are ecchymoses beneath the surface. Numerous vessels traverse the inner wall.

The fluid from the left cyst is coffee-colored, alkaline, has a specific gravity of 1010 and contains a large amount of albumen.

Microscopically it contains large cells filled with fat globules, also other cells filled with yellow pigment, and lastly red blood corpuscles.

*Microscopically.* Right side. The tube wall is much thinner than usual. The peritoneal coat is here and there covered by delicate vascular adhesions. The muscular layer is apparently normal. The mucous membrane is greatly altered. The lumen of the tube is approximately cylindrical and has projecting into it in a few places teat-like folds; these, however, are much shorter than normal. Along one side of the lumen the folds appear to have become adherent to one another, and when distended have formed bands from one wall to the other. The spaces so produced are again subdivided by secondary bands. The lumen, the teat-like masses projecting into it, and the bands of tissue are all covered by cuboidal epithelium. This appears to be everywhere intact. The lumen of the tube is empty. The wall of the cyst on the right side is made up of connective tissue, poor in nuclei. The epithelium on its inner surface is cuboidal in form, but where slight projections are seen it is cylindrical. The cyst on the left side presents the same appearance as that on the right. Its inner surface, however, is lined by cylindrical epithelium and its walls show some hyaline degeneration.

*Diagnosis.* Right tubo-ovarian cyst, double ovarian tumor.

*Case 27.* B. G. Admitted to the service of Dr. Kelly, 4, 19, 94, æt. 51. Complaint, a painful tumor in the left ovarian region. She had one child twenty-five years ago; in the eighth month of pregnancy she had a fall and has never felt well since then; has had no miscarriages. Menstruation commenced at 16, has always been regular, lasting 3 to 4 days, not accompanied by pain; last menses in Feb. 1894.

*Family history,* negative.

Present trouble began with the fall 25 years ago. The labor was very severe and both cervix and perineum were torn. In 1889 Dr. Kelly repaired the cervix and perineum, and for two years the patient felt much better. Three years ago she commenced to have pain in the left ovarian region. Every winter since then the abdomen has been distended and painful, the pain being more marked on the left side. During last winter she noticed a tumor in the left ovarian region which has grown rapidly during the past five weeks.

*General condition.* Patient is a well nourished woman, mucous membrane normal, appetite poor, bowels regular. The outlet is normal, cervix in axis of vagina, uterus not outlined, but it seems to be continuous with a mass extending out toward the left pelvic wall. This mass is rounded, irregular, moderately firm and adherent. Right tube and ovary are slightly adherent.

4, 25, 94. Operation by Dr. Kelly, double salpingo-oöphorectomy. Patient was placed in Trendelenberg posture and a median incision 12 cm. long was made. The right tube and ovary were enucleated from dense adhesions to the posterior surface of the broad ligament and pelvic floor.

On the left side the structures were free from adhesions to the rectum and were tied off without difficulty. During convalescence the patient was greatly troubled with flatulency and there was slight breaking down of the abdominal wound. She was discharged in good health, May 29, 1894.

*Pathological report.* The right tube is 9 cm. long. Its median extremity is 1 cm. in diameter. After passing outward 1 cm. it presents a sharp kink, and after proceeding a short distance further gradually dilates into a sac 2.5 cm. in diameter. There is no sign of a fimbriated extremity and the tube on its under surface is intimately adherent to a cyst. Its outer extremity is covered by long

vascular adhesions. The tube is filled with a transparent fluid. The cyst above mentioned is 5 cm. in diameter. It apparently springs from the ovary, which is 3x2 cm. The lower portion of the cyst is bluish in color and is covered by dark red adhesions.

Left side. The tube is 6x1x1 cm. It is bright red in color and is covered by numerous vascular adhesions. Its fimbriated extremity is occluded, is 1.5 cm. in diameter, and is apparently filled with fluid. The parovarium is not visible. The left ovary is represented by a lobulated cyst 6x5x5 cm. The walls of this are bluish in color and are glistening. On cutting open the hardened specimen the left ovary is found to be occupied by a cyst partially subdivided by a septum. The tube communicates with the cyst by an opening 5 mm. in diameter. The margins of this are rounded.

*Microscopically.* The uterine end of the right tube is perfectly normal. Scattered around the lumen, however, are many gland-like inclusions. These are lined by normal epithelium. Sections from the dilated outer end of the tube show some non-vascular adhesions on the surface. The muscular coat contains hyaline wavy bands. These resemble muscular cells which have lost their nuclei. The submucosa is not as dense as usual. The mucous membrane presents only a slight wavy appearance, and is in part lined by cuboidal, in part by cylindrical epithelium. The cilia are here and there distinctly visible. The lumen of the tube is empty. The cyst occupying the ovary shows a wall composed of typical ovarian stroma, corpora fibrosa being scattered throughout. The inner surface is covered by one layer of flat epithelium. This cyst is probably a dilated Graafian follicle.

*Dr. Abel's examination of the fluid from the right tube.* Amount of fluid 13 cc., specific gravity 1009; reaction slightly alkaline. It contains a small amount of serum albumen, serum globulin and mucin, and traces of the salts of HCl, H<sub>3</sub>PO<sub>4</sub>, Na, Ca, and Mg. The fluid is characterized by the extremely small proteid content, and from the reaction there is evidently much less proteid matter present than inorganic salts.

Left side. The tube walls are normal. The mucous membrane presents a gland-like appearance, consisting of several alveoli lined by cylindrical or cuboidal epithelium. The lumina are empty. The stroma of the mucosa is rather dense and is composed of cells having

oval nuclei. At the outer end of the tube the gland-like cavities are dilated and some contain desquamated epithelium. The wall of the cyst on the left side is composed of connective tissue and is lined internally by flat epithelium. It is most probably a dilated Graafian follicle.

*Diagnosis.* Double perisalpingitis and peri-oöphoritis. Hydrosalpinx of right tube. Cysts in both ovaries. Probably dilated Graafian follicle.

#### ETIOLOGY OF HYDROSALPINX.

It is exceedingly difficult to get at the true cause of the affection from the literature, all the writers speaking of it in a vague manner.

Klebs states that the fimbriated extremity from its position and relations is especially prone to pathological changes depending upon circulatory disturbances. Martin claims that half the cases of salpingitis are due to extension of the disease from the uterus. Bandl supposes that a hyperæmic condition of the uterus and tubes predisposes to salpingitis, and hence that women, when menstruating or during pregnancy, are then more susceptible to pathological changes. Kelly thinks that in those cases where the fimbriæ are inverted and project into the tube cavity there has been a discharge of an irritating fluid from the tubal mucosa, that this produced a slight exudate over the peritoneal surface of the fimbriæ, and that these surfaces then became adherent to one another. Landau believes that in some cases of dysentery the tube becomes adherent to the intestine. He further makes the statement that pyosalpinx may terminate in hydrosalpinx, the pus cells undergoing fatty degeneration and only watery fluid remaining. Of this he gives no proof, and from the marked changes that occur in pyosalpinx, namely, the great connective tissue cell proliferation and frequently almost total destruction of the mucosa, we can hardly conceive of such transformations occurring. However, we must bear in mind the fact that there may be a hydrosalpinx on one side and a pyosalpinx on the opposite side. Such cases have been reported by Baer, Boivin and Duges, Dudley, Hegar and Lewers.

In only six of our 27 cases was it possible to get any clue as to the cause.

One gave a history of gonorrhœa a year previous to admission. Two dated their trouble from miscarriage and three from confine-

ment. It is possible that in these cases there was some slight infection. The infection passed to the tube, and an inflammation sufficient to close the fimbriated extremity was thus produced.

The most probable sources of origin, we believe, are from infection during a miscarriage or confinement, or from gonorrhœa.

As is well known, streptococcus pyogenes, staphylococcus pyogenes aureus and gonococcus produce purulent salpingitis. We also know that an infection which in some persons will set up marked purulent changes, in others will only produce a slight reaction, so it is natural to suppose that these organisms in especially resistant individuals only set up a moderate inflammation, enough, however, to occlude the fimbriated extremity.

In Hydrops tubæ profluens the exciting factor is undoubtedly the same, but the uterine end remains patent, being, however, at times temporarily closed. This closure is probably caused by the tonic contraction of a circular muscular band at the uterine end of the tube. This band has been described by Hennig and bears the name of "Hennig's sphincter." When the tube becomes distended with fluid the pressure reaches such a degree that the sphincter is overcome and the fluid escapes.

*Follicular hydrosalpinx.* From the appearances found on microscopical study there is evidence of an endosalpingitis antedating the hydrosalpinx, for the folds of the mucosa have become adherent to one another, the epithelium of the one fold becoming continuous with that of the opposite one. Small alveolar spaces being thus produced, these become distended when the hydrosalpinx develops, and thus give rise to the honeycombed appearance described.

It must be remembered in this connection that the tube in a certain percentage of cases presents a follicular appearance where there is no evidence of a previous inflammation. This condition cannot be considered pathological, as it occurs with striking regularity where the tubes are perfectly normal. In these cases it would only be necessary for the fimbriated extremity to become occluded to cause the follicular hydrosalpinx.

*Origin of tubo-ovarian cysts.* According to Burnier, the tube becomes adherent to an ovary which contains a dilated Graafian follicle. Both gradually dilate, and as continuous pressure promotes absorption, the intervening wall partially disappears. He accounts

for the fimbriæ being on the inner cyst wall by supposing that the fimbriated end has first spread out over the cyst and that later the tube itself forms part of the cyst wall. Our limited number of cases does not permit of our forming an opinion as to the correctness of this view.

Klob thinks that the tube approximates itself to the ovary when a corpus luteum is about to rupture and that it then becomes adherent. We are inclined to the belief that the cysts arise both from the Graafian follicles and from corpora lutea.

*Origin of the fluid.* Numerous endeavors have been made to produce hydrosalpinx experimentally by ligating the tube, on the assumption that it normally secretes a certain amount of fluid, and that if both ends be occluded hydrosalpinx must naturally result. For this purpose rabbits and guinea-pigs have been used.

Josephson, from his experiments, concludes that the normal secretion is, under favorable circumstances, sufficient to produce hydrosalpinx. Kehrer, in 2 out of 6 experiments, obtained hydrosalpinx. Landau and also Woskressensky were likewise able to produce hydrosalpinx in a certain number of cases.

#### SYMPTOMS OF HYDROSALPINX.

According to Munro, Hofmeier, de Lacaze-Duthiers and Kiwisch, there may be no symptoms whatever.

Usually the patient complains of pain in one or both ovarian regions; this is dull, dragging, aching or sharp in character, and may be constant or intermittent. Where present, it is most severe at the menstrual periods. The pain is often felt in the back, and in a percentage of cases radiates down the thighs to the knees.

Three of our cases complained of painful defecation, the pain being referred to the ovarian region, and two had a great deal of discomfort during coitus.

*Effects on menstruation.* Hausammann says that in all his cases menstruation was either irregular or ceased entirely, and later on the disease might be followed by metrorrhagia.

Martin found that the menses were in some cases irregular, painful and profuse, but that in others they were normal.

Of our cases fourteen had painful menstruation, eleven little if any pain; in the remaining two the menstrual history was unknown.

From these figures we are not able to make any definite statement

as to the effect on menstruation, as in nearly half the period was normal, and as many women who have no appreciable pelvic lesion suffer with menstrual pain.

*Sterility resulting from hydrosalpinx.* As the fimbriated extremities of both tubes are usually bound down, it is evident that the ova cannot find their way to the uterus, and hence sterility must result. In the cases that come to us we cannot tell how long the hydrosalpinx has existed, and hence are unable to give accurate data as to the sterility.

Winckel says that as both tubes are usually affected the patient is generally sterile.

Out of our 21 cases in which a history could be obtained, 13 had children, and 3 of the remaining had conceived, thus leaving only 5 that were never pregnant.

*Tendency to abortion.* There appears to be some tendency toward miscarriage. Of the 21 cases 10 had miscarried, one case having had no less than 9 miscarriages. From the accompanying tabulation one will be able to compare the fruitfulness of these patients with their sterility.

*Data as to Sterility from 21 Cases.*

Name.	Number of years married.	Number of children.	Number of miscarriages.
K. B.	12	1	2
L. L.	17	0	0
E. R.	16	4	1
L. F.	15	9	0
C. M.	10	1	0
E. W.	10	0	9
E. S.		1	1
H. F.	16	2	0
J. B.	11½	0	1
M. G.	13	0	0
M. B.		4	2
J. M.	17	0	5
M. G.	8	1	1
M. H.	15	7	1
M. A.	20	0	0
M. W.	19	1	0
M. A.	8	0	0
B. G.	26	1	0
M. H.	17	0	0
J.	15	1	1
C.		2	0

In those cases where the tumor is of large size it can be palpated in the region of the ovary; this, however, is rarely the case.

On vaginal examination the uterus is sometimes found to be very sensitive and is enlarged. Passing outward from the uterine cornu a small cord can be felt; this resembles a lead pencil and rolls under the finger. It gradually increases in calibre, and can then only be outlined as an ill-defined mass. If the abdominal walls be lax, the elasticity and a sensation of fluctuation may be made out. In many cases the tube has dropped down behind the uterus, which accordingly is displaced forward. If the uterus be pressed backward by the examining finger it gives the sensation of resting on an air cushion, and on withdrawing the finger it suddenly springs back to its former position. Landau lays much stress on this sign and considers it pathognomonic.

Hydrops tubæ profluens, as its name indicates, presents a symptom which differs from those of the other varieties, namely, the escape of fluid into the uterus from the median end of the tube.

Frank reports the case of a woman who, after a severe fall, striking on the epigastrium, developed a large tense tumor in that region. Its growth was accompanied by pain, and with each menstrual flow there was an abundant discharge of clear watery fluid. The menses ceased and for six months the patient lost about one pound of fluid daily. At autopsy the left tube was found to contain 31 pounds of fluid.

Hausammann cites a case of Frankenhauser's: a woman aged 27 had a slightly fluctuant tumor in the left vaginal vault. Pressure on this caused an escape of about 50 grams of fluid from the vagina. At varying intervals pressure yielded the same result and finally the fluid became purulent, nearly costing the patient her life.

In Martin's cases the commencement of the pain was sudden and the discharge of fluid was not realized until the clothes were wet.

Semple, in 1835, published a case of a woman 80 years of age who suddenly developed an abundant menstrual discharge; this was accompanied by much pain. After a short time the discharge disappeared. Klob, in reviewing the case, thought it was one of hydrops tubæ profluens.

There is one affection we must think of in this connection and that is hydrometra, where there may be periodic gushes of fluid; but if

we are able to outline an elastic tumor on one side of the uterus, and find that on pressing it clear fluid escapes from the uterus, the swelling meanwhile disappearing, our diagnosis of hydrops tubæ profluens is correct.

#### DIFFERENTIAL DIAGNOSIS.

When considering this affection the possibility of subperitoneal myomata, pyosalpinx, extra-uterine pregnancy, ovarian tumors, or in some cases a dilated and convoluted sigmoid flexure, are naturally thought of.

*Subperitoneal myomata* are usually attached to the uterus by a broad base, but occasionally only by a delicate pedicle. They are generally multiple and give a stony hardness to the feel. From the fact of their multiplicity, the stony hardness and their approximate roundness, together with the usual sign of metrorrhagia, the diagnosis is not very difficult: however, one is liable to error.

In *purulent salpingitis* there is usually some history of previous chills and fever, occasionally with great pain in the part. The patient's health is not as good as that of the patient suffering with hydrosalpinx. On vaginal examination the parts are usually matted together, and the tube, if palpated, presents a stony hardness, which microscopical examination shows to be due to connective tissue increase in the muscular coat. Kelly and Menge lay especial stress on this stony hardness and consider it an important factor in clearing up the diagnosis. In recent cases, however, even the gross appearances of the specimens may not differ from that of hydrosalpinx, and it is necessary to cut open the tube and find out the nature of its contents before making a positive diagnosis.

From *extra-uterine pregnancy* the differentiation is usually not so difficult. Here the patient has probably been in good health. She has missed one or two menstrual periods and may have had a slight discharge of blood from the vagina. Without warning she is seized with a sharp, cutting pain in one or other ovarian regions, becomes very pale and almost pulseless, giving evident signs of internal hemorrhage.

On vaginal examination the pelvis is found to be filled with yielding boggy-like material which frequently breaks up under the finger. The entire clinical picture is a very striking one and the diagnosis fairly certain.

The diagnosis between hydrosalpinx and large *ovarian tumors* need not be considered, as large tumors are invariably of ovarian or parovarian origin. It is only the smaller ones that need be taken into account. Where the abdomen is lax it is not impossible to follow the non-dilated tube over the upper surface of the tumor; this is sufficient to clear up the diagnosis.

The diagnosis of a *tubo-ovarian cyst* from a simple ovarian cyst is out of the question before operation, and with the specimen before one's eyes it is frequently impossible to decide until it has been cut open. Here, however, the importance of an accurate diagnosis has not so much weight, as the treatment in both cases is the same.

Occasionally the *sigmoid flexure* has a longer mesentery than usual, becomes distended with fæces and lies in the pelvis. Hoffmann has pointed out the liability of mistaking this for a hydrosalpinx, the contours of both being somewhat analogous. It is known, however, that solid fæcal masses usually yield to the pressure of the examining finger, which fact is of great assistance in diagnosis. If this condition be suspected, free purgation and an enema will elucidate matters.

The subject has been dealt with at length by Prof. Kelly in the Johns Hopkins Hospital Reports under the title "Deviations of the rectum and sigmoid flexure associated with constipation, a source of error in gynecological diagnosis."

#### TREATMENT.

Various modes of treatment have been adopted. Apostoli employed the galvano-puncture per vaginam and reported some cases of cure. Barnes and Landau advocate puncture through the vagina, the latter stating that he has never seen any untoward symptoms resulting.

Sabolotsky reports 4 cases in which he dilated the uterus with laminaria and sponge-tents, aiming at the same time to dilate the uterine end of the tube. He said all of his patients got well.

Strong dilates the uterus and packs it with iodoform gauze; this, he thinks, suitable in some cases.

When one considers the impossibility of making a positive diagnosis and the likelihood of his dealing with a pus sac, and at the same time of its liability to rupture, he no longer feels justified in treating it blindly, but will, if the symptoms are at all urgent, make an exploratory section and thus see exactly what he is dealing with.

For this operation the patient is best placed in the Trendelenberg position.

On opening the abdomen the omentum will frequently be found adherent to the pelvic structures; this should be immediately liberated, and if bleeding much, the points of hemorrhage ligated.

The intestines should now be gently pushed upward and kept in place by gauze pads, preferably 6 inches long,  $2\frac{1}{2}$  wide and 1 inch thick.

The relation of the dilated tube to the ovary and surrounding structures should now be studied. If the adhesions be of only moderate density and the rectum not involved, it is well to commence posteriorly with the enucleation, shelling the tube and ovary out of their bed of adhesions, any dense adhesions being meanwhile cut with the scissors. When the appendages are free the "clear space" in the broad ligament is sought out and the tube tied off close to the uterus by interrupted sutures. Prof. Kelly lays especial stress on the "clear space," as one can there boldly plunge through with a sharp needle. In other places there is danger of wounding one of the veins, troublesome oozing ensuing.

If the tube and ovary be found densely adherent, the uterine cornu may be resected just in the same manner that a thumb is removed, lateral flaps being made. The flaps of the uterine cornu are immediately brought together by silk ligatures precisely in the same manner as the flaps of the thumb wound are. By this procedure one is able to get a starting-point and the remaining portion of the enucleation is not so difficult.

The bleeding surfaces left by the adhesions are drawn together by ligatures so that raw surface approximates raw surface, and after the operation little if any oozing area is left.

Should the bleeding from the uterine cornu be persistent the uterine artery on the same side may be tied low down near the cervix. If the uterus has been adherent posteriorly it is always well to release it from adhesions before attempting to remove the appendages.

When the opposite side is densely adherent it ought to be treated in like manner, but if the adhesions be slight and the fimbriated end only partially occluded, it is our bounden duty to save it if possible. The adhesions may be cut, the folds of the fimbriæ liberated and the tube returned.

If oozing still continues after operation and it be impossible to check it completely, it may be necessary to introduce a small gauze drain into the pelvis through the lower angle of the wound. This should be introduced in a slightly folded manner, which insures easy removal.

The drain may be withdrawn a little the next day, and if there be no oozing, can be dispensed with entirely; it is always safer, however, to leave it forty-eight hours.

From our histories it will be noted that in some cases glass drainage tubes were used. None have been employed for the last three years, and when drainage is required the gauze is always used.

#### COMPLICATIONS.

The most serious complication is that of intestinal adhesions. This was exemplified in Case 8. If the adhesions be very dense the wisest plan is to leave the structures in the pelvis, or at least the portion of the tube wall adherent to the gut.

#### PROGNOSIS.

Hydrosalpinx of itself is not as a rule dangerous to life, but the suffering in many cases is so intense that the patient is willing to undergo any risk for relief of the symptoms. There is always, however, a certain amount of danger which should make the surgeon hesitate before operating. On the other hand, if there be uncertainty as to the diagnosis, and this is usually the case, it is much better for him if the symptoms warrant to make an exploratory section.

The majority of the patients recover.

Of our 26 cases 1 died; her case was a simple one and she should have recovered, but was one of the 4 fatal cases of purulent peritonitis described in the accompanying article.

The 27th case was one performed by Dr. Kelly in Cambridge, Md. The operation was exploratory, and beside the hydrosalpinx a row of calculi could be felt in the region of the pancreas. The patient's temperature at the time of operation was 105.5°, and she died seven hours after.

#### RECAPITULATION.

Hydrosalpinx is a collection of serous-like fluid in a Fallopian tube.

The tube is rarely larger than a child's head, but may be much larger in some instances.

At the uterine extremity it is usually normal in size, and passing outward dilates, assuming a convoluted appearance; after curving backward and inward the occluded fimbriated end usually drops into Douglas' cul-de-sac. The walls are generally thin and covered externally by adhesions. The muscular coat may be normal or atrophic. The mucosa is lined by one layer of epithelium which, according to the degree of dilatation, may be cylindrical or cuboidal, but rarely flat. The folds of the mucosa are separate from each other and are finger-like or slightly branching.

In some instances the walls contain hard "bony" plates. These are, according to our experience, areas of calcification and not bone. The tube may contain a calculus free in its lumen.

We have divided hydrosalpinx into four groups:

1. *Hydrosalpinx simplex*, which closely resembles the general description just given.

2. *Hydrops tubæ profluens*, whose macroscopical and microscopical appearance are the same as in hydrosalpinx simplex, save that the uterine end of the tube is patent. The tube may reach an immense size. The affection is comparatively rare.

3. *Hydrosalpinx follicularis* resembles hydrosalpinx simplex in form. It is rarely of large size. Its outer surface is covered by adhesions. The muscular coat is frequently atrophic, being infiltrated by new connective tissue cells. The mucosa presents a honeycombed appearance, being everywhere traversed by alveoli. The larger ones are lined by cuboidal epithelium, the smaller by cylindrical epithelium. Some of the lumina contain desquamated epithelium.

4. *Tubo-ovarian cysts* consist of a dilated Fallopian tube communicating with an ovarian cyst. The dilated tube resembles a simple hydrosalpinx; its outer fimbriated end is, however, glued to the cyst. The cyst may be uni- or multilocular, has connective tissue walls which may contain ovarian stroma, Graafian follicles or corpora fibrosa. The inner surfaces of the cyst may be lined by cylindrical, cuboidal or flat epithelium.

The fluid from these does not differ much from that of simple hydrosalpinx.

*The Etiology of Hydrosalpinx* is indefinite. It is most probably due to infection at childbirth or miscarriage or to gonorrhœa, the inflammation being sufficient to occlude the fimbriated end.

In *Hydros tubæ profluens* Hennig's sphincter probably temporarily occludes the uterine end of the tube.

In *hydrosalpinx follicularis* there has usually first been a salpingitis, the folds of the mucosa becoming adherent to each other, thus forming "alveoli." These become distended on retention of the fluid.

In *Tubo-ovarian cysts* the tube becomes adherent to a small cyst of the ovary, each dilates, and as pressure promotes absorption the intervening wall disappears, the one then freely communicating with the other.

The fluid in *hydrosalpinx* from the experiments mentioned is seen to have its origin normally in the tube, and closure of both ends of the tube suffices to produce *hydrosalpinx*.

*Symptomatology.* There are no fixed symptoms. The pain is usually present in one or both ovarian regions; this is sharp, dull, intermittent or continuous, and may radiate down to the knees. Occasionally defecation is accompanied by pain in the ovarian region, or there may be painful coition. Menstruation may or may not be influenced by the disease, but no definite statement can be made.

*Hydrosalpinx* undoubtedly causes sterility, but in what percentage of cases it is difficult to state. There is tendency for these patients to miscarry.

On vaginal examination, the feeling of a round, cord-like mass running off from the uterus, the sudden dilatation of this and a sense of elasticity aid one in diagnosis. A positive diagnosis can rarely be made except in *hydros tubæ profluens*.

The usual affections from which *hydrosalpinx* must be differentiated are subperitoneal myomata, *pyosalpinx*, tubal pregnancy, ovarian tumors, and a prolapsed and distended sigmoid flexure.

*Treatment.* If the tube be densely adherent and distended it should be shelled out of its adhesions, and with its ovary removed. Should the commencement of the enucleation be impossible, the uterine cornu may be amputated with the tube, thus giving one a starting-point. The "clear space" should now be sought for and the tube and ovary tied off. If the opposite tube be only partially occluded,

leave it; but as in almost all cases the opposite side is also dilated or adherent, this is impossible. Where the oozing is very profuse a small gauze drain may be inserted in the lower angle of the wound.

The only complication of note is rectal adhesions. If the tube be densely adherent it should be left entirely, or at least that part of the wall adherent to the gut.

The prognosis is good.

### EXPLANATION OF PLATES.

#### PLATE XVI.

Shows the uterus with a dilated and convoluted Fallopian tube on either side. The tubes are translucent, pass outward, then backward and inward, terminating in Douglas' cul-de-sac.

Broad adhesions are seen stretching across from the right tube to the uterus. The same condition is present on the left side, but it is impossible to see them when this view of the pelvis is taken.

In front of the uterine attachments of the tubes the round ligaments are seen passing downwards and outward. Anterior to the uterus is the contracted bladder, posterior to it the rectum.

#### PLATE XVII.

Fig. 1. Natural size. Hydrosalpinx simplex. The tube is markedly convoluted and the dilated fimbriated extremity is intimately adherent to the surface of the ovary.

Fig. 2. Natural size. The tube does not present so many convolutions as Fig. 1, and where it is adherent to the ovary there are three glistening subperitoneal cysts.

Fig. 3. Natural size. Is Fig. 2 on longitudinal section. The lumen is pervious to within a short distance of its uterine end. The folds of the mucosa are seen running parallel to the tube axis and ending abruptly in little bulbous extremities. The dilated and occluded fimbriated end is intimately adherent to the ovary.

Fig. 4. Dilated occluded fimbriated extremity of the tube filled with serous-like fluid. It will be noted that the tube is entirely free from adhesions, being in no way connected with the ovary.

The opposite tube and ovary were densely matted together.

Fig. 5. Natural size. The hydrosalpinx in outline. The tube is dilated to within a short distance of its uterine extremity, and contains a nodular S-shaped calculus lying free in the lumen. The tube is intimately adherent to the ovary. For a description of this see Case 21.

Fig. 6. Natural size. Same as Fig. 5. It shows the appearance of the fresh specimen, the calculus being indistinctly seen in the interior of the tube.

#### PLATE XVIII.

Fig. 1. Cross section through the middle of the tube in hydrosalpinx simplex. Teat-like, finger-like and branching folds are seen projecting into the lumen of the tube. The smaller folds present marked constrictions at their bases. Hematoxylin and eosin. Leitz dissecting microscope. Ocular 16.

Fig. 2. Small portion of Fig. 1, more highly magnified. The peritoneal coat at this point is free from adhesions. The muscular coat appears to be normal. The lumen is lined by one layer of cylindrical epithelium. The smaller folds are constricted at their bases. All folds are covered by cylindrical epithelium, on which with a higher power the cilia were demonstrated. The stroma of the folds is normal.

Winckel, Obj. No. 3. Ocular No. 1. Hematoxylin and eosin.

#### PLATE XIX.

Fig. 1. Tube in cross section in a follicular hydrosalpinx, taken at the junction of its middle and outer thirds. Surrounding the lumen are many large and small cavities, round or pear-shaped. It will be noted that these spaces are more dilated on the free convex upper surface than on the under surface, which is attached to the parovarium.

Leitz dissecting microscope. Ocular 8. Hematoxylin and eosin.

Fig. 2. A portion of Fig. 1 more highly magnified. The peritoneal coat is covered by a few very recent adhesions. The muscular coat has almost entirely disappeared, its place being occupied by connective tissue. The small "alveoli" are lined by cylindrical epithelium, the larger ones by cuboidal epithelium, which, however, in protected places is cylindrical. The lumina contain a

moderate amount of desquamated epithelium. The stroma is almost identical with that of the normal tube.

Winckel, Obj. 3. Ocular 1. Hematoxylin and eosin.

PLATE XX.

Fig. 1. Natural size. Is a tubo-ovarian cyst from the right side. It is irregularly circular and has a slight boss on its lower and under surface. Coursing over the upper part of the cyst is the Fallopian tube, to the inner end of which a small piece of the uterine cornu is attached. The tube at its uterine end forms a sharp kink, and after passing outward, turns backward, and inward, terminating in a dome-like extremity, the under surface of which is intimately adherent to the cyst. At the junction of the occluded fimbriated extremity with the cyst is a small subperitoneal cyst.

Fig. 2. Is Fig. 1 cut open. The tumor is found to be composed of a small and a large cyst. A is a cross section of the tube and B the dilated fimbriated extremity. The sickle-like opening between the dilated fimbriated extremity and the cyst is distinctly seen. This allows the fluid from the tube to mix freely with that of the cyst.

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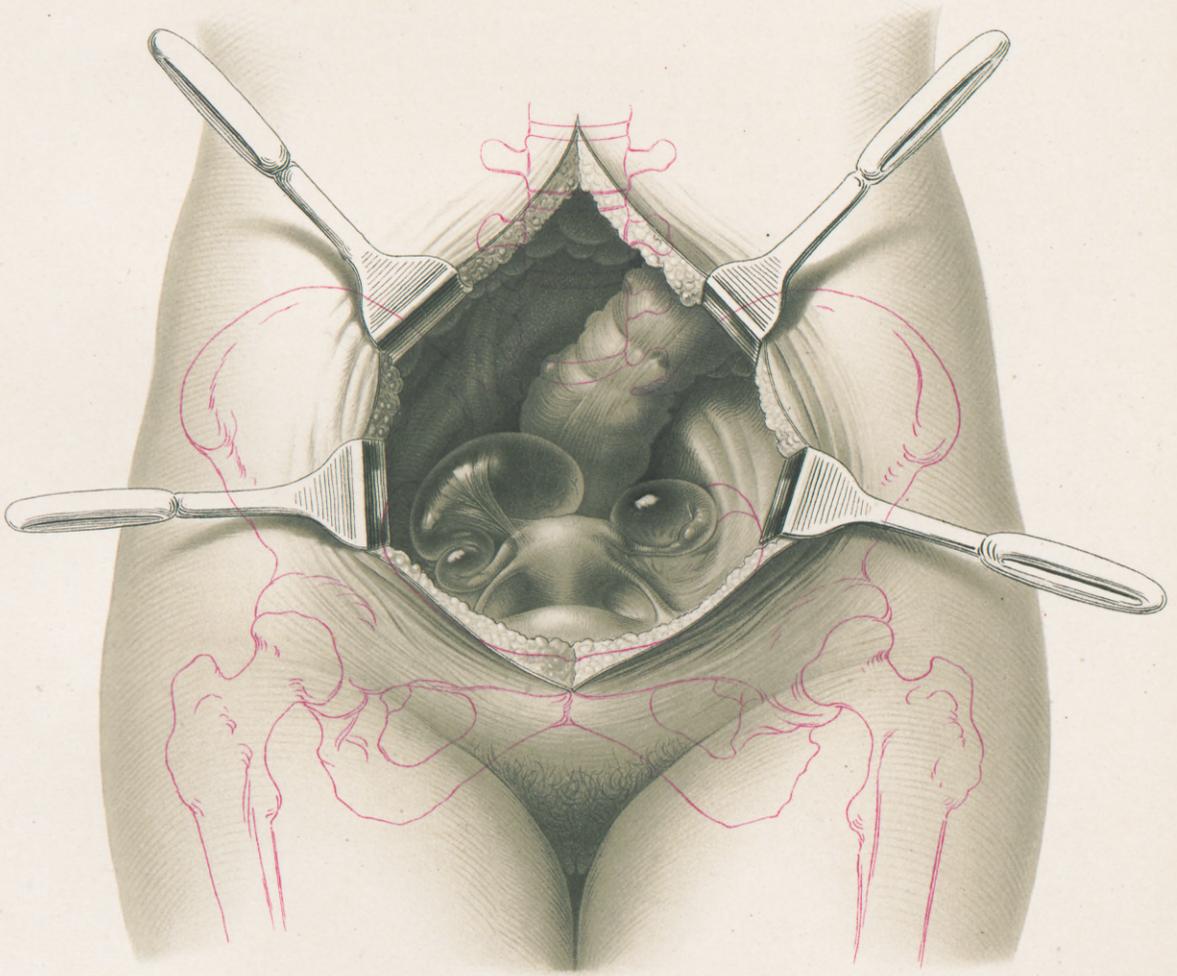
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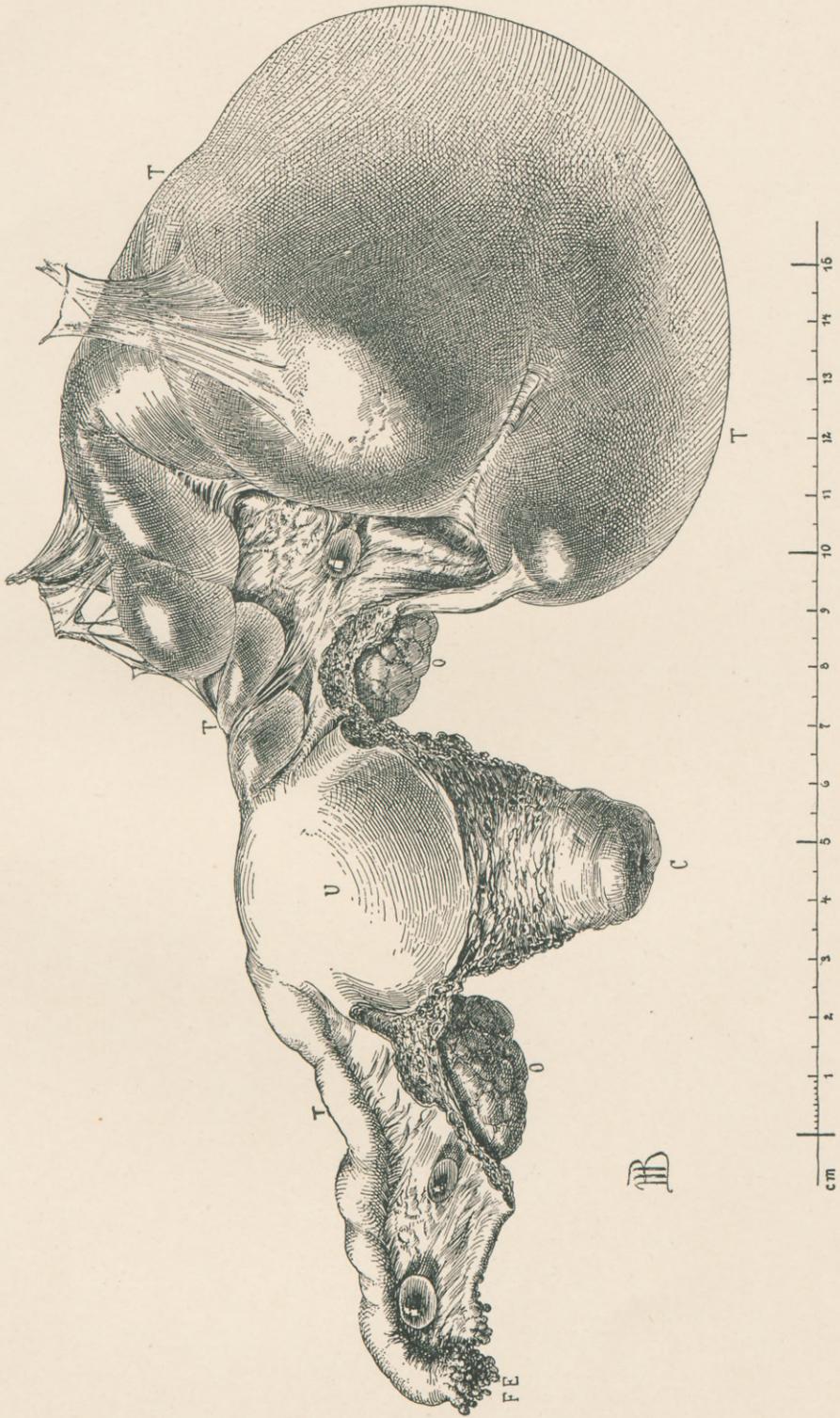
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HYDROSALPINX ON LEFT SIDE (Four-fifths Natural Size)







Fig.1.

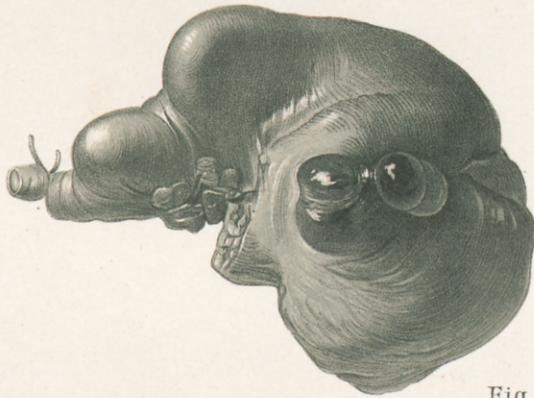


Fig.2.



Fig.3.



Fig. 4.

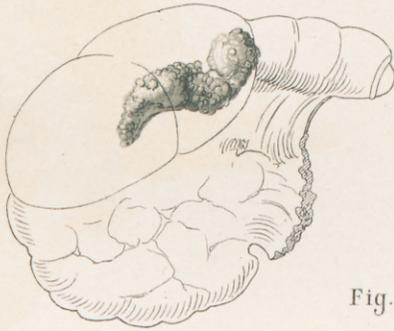


Fig. 5.

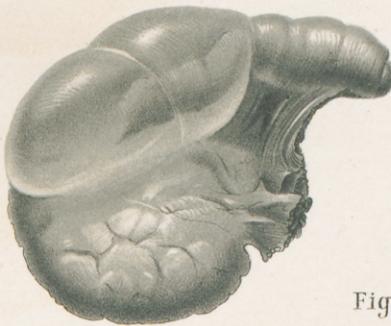


Fig. 6.





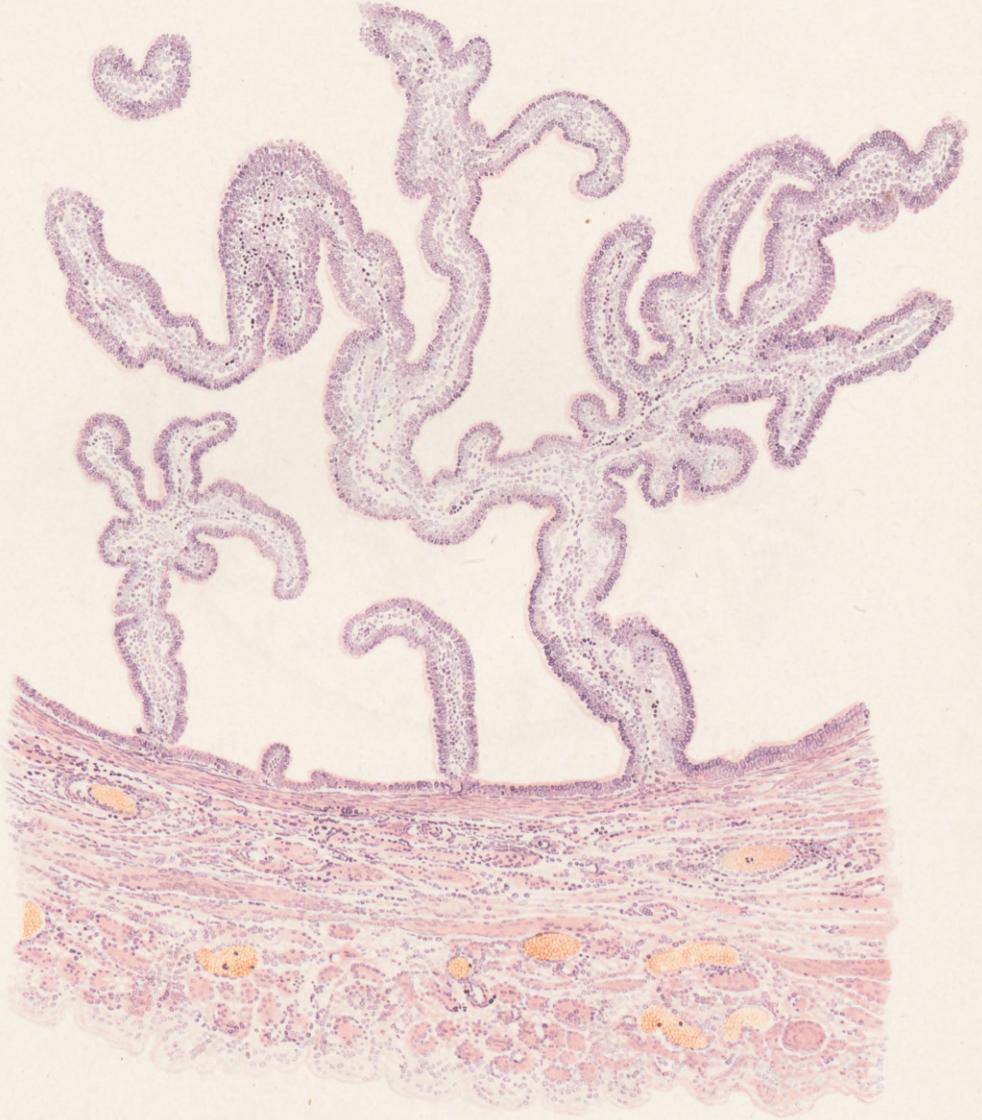


Fig. 2.

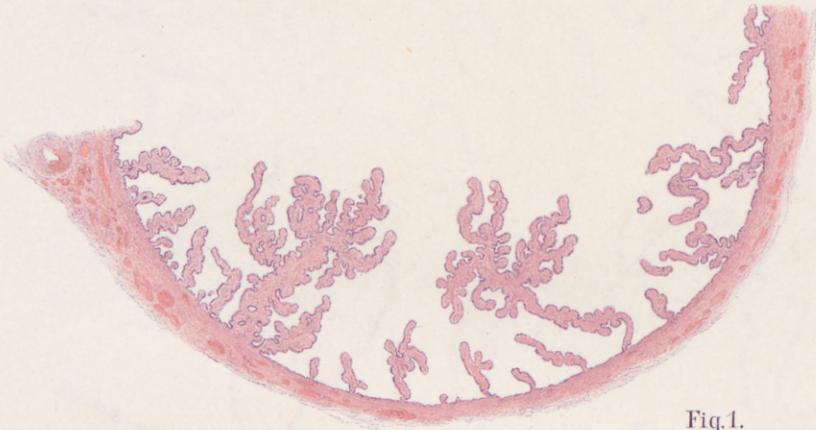


Fig. 1.







Fig. 2.

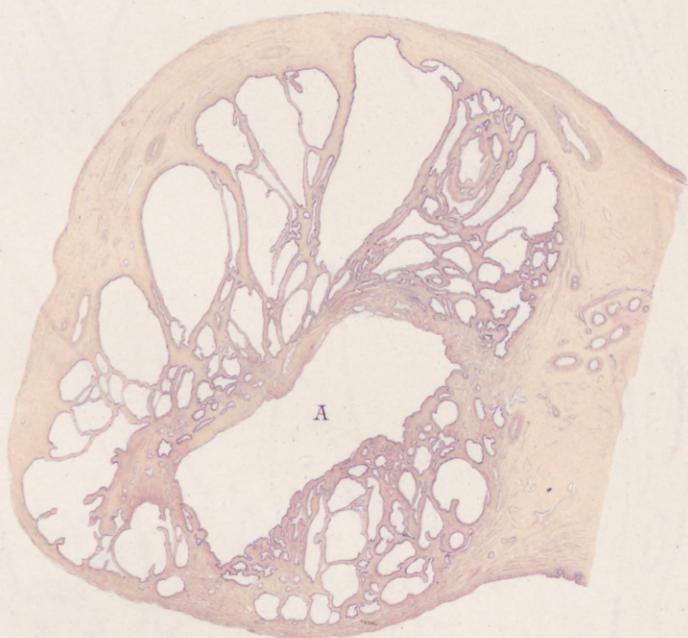


Fig. 1.





Fig. 1.

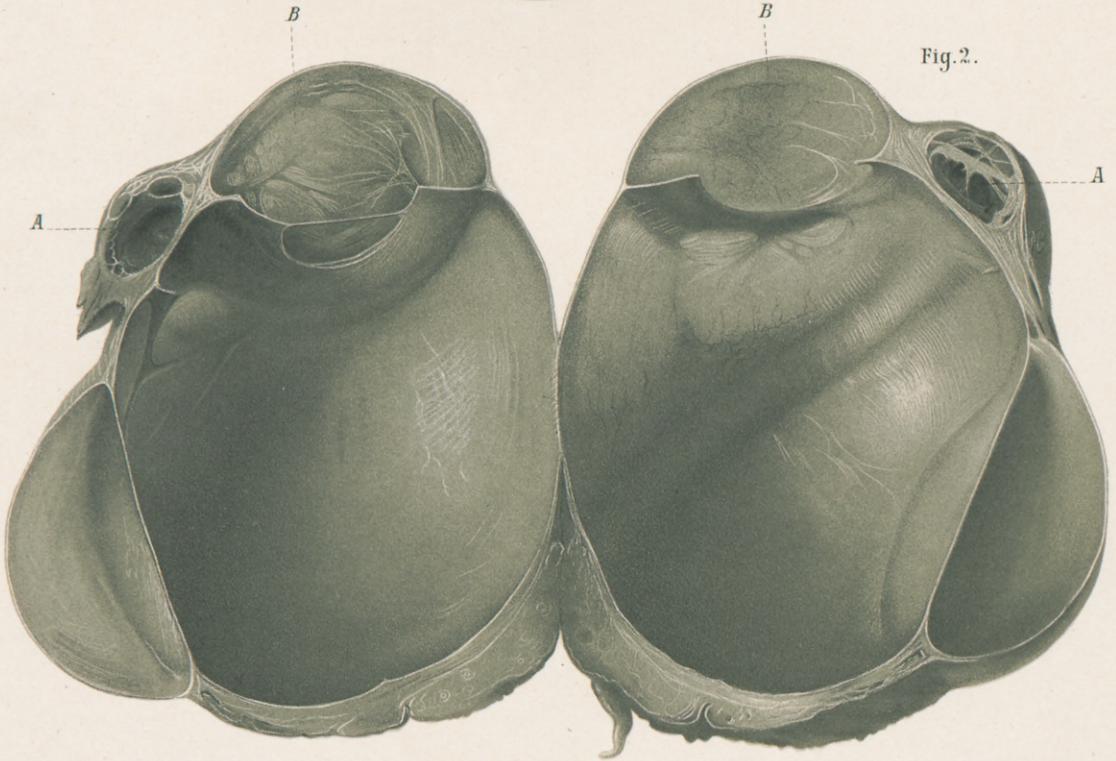


Fig. 2.





