M. D. THESIS

TUBAL GESTATION; ITS PATHOLOGY AND DIFFERENTIAL DIAGNOSIS, as illustrated by the Record of twenty-two Cases,

by

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TUBAL GESTATION - by which we mean the deposit and growth of an öosperm somewhere along the course of the Fallopian tube - has occupied the minds of gynaecologists for the last few years perhaps more than any other subject in the course of their work. And justly, too, for is it not the end and aim of the teaching of medicine to save life? And, in order to do this, we must have knowledge, and thus much recent investigation has been brought to bear

upon this subject. In almost every journal devoted to diseases of women, we find a reference to this subject, showing how widespread is the interest, and how much on the increase is the information which is to be obtained from the perusal of modern gynaecological literature; and yet how many points remain, which still are in obscurity, and it is only by a careful record of every case that we shall come to the true and perfect knowledge of the subject. By degrees the general practitioner - in whose care the health of our community rests - is beginning to realize that tubal gestation is to be met with in everyday practice, and that it is not a rare and interesting pathological condition brought forward by specialists as a form of entertainment, and as a means of self-glorification at the meetings of the medical societies. It is a condition which should always be kept prominently before our minds when called to a case with the history of an acute attack of abdominal pain, the patient being a woman

in the child bearing period of life.

In our endeavours to be catalogued as "busy" in our practice, we might easily overlook the graver condition, and simply give a diagnosis of "abortion" or other less serious complication. Again, we might perhaps make matters worse by misjudged operative or manipulative interference, only recognising the gravity of the mistake when the patient becomes worse, or when death having supervened the condition is demonstrated in the post-mortem room. It is not necessary for me to go into the history of tubal gestation, as it can be found in most books relating to the subject. Albucasis was the first to describe this condition, and from his time in the eleventh century, up till about ten years ago, our knowledge was vague, and it is only during the last few years that we have got anything like a scientific grasp of this condition. Before this time such names as Mercerus, Josephi, Dezeimeris, Parry, stand out as having added to our knowledge; but our greatest

debt of gratitude is due to Mr. Lawson Tait for not only his valuable treatise, but also for the clear light which he shed upon the fallacies of the older writers, and for the stimulus which he has given to others to follow in his footsteps.

As all the cases which I shall bring forward in my paper are those of tubal gestation after haemorrhage has taken place, either from abortion or rupture of the tube, I shall confine my remarks to this early form, and not discuss such conditions as abdominal or interstitial pregnancies.

The pathology and diagnosis of tubal gestation are of special difficulty; I have made considerable investigation on my own account in the former, and the signs and symptoms which we have to guide us in a correct diagnosis I have drawn from a study of cases which I had under my supervision in the Wards of the Royal Infirmary and Samaritan Hospital. I have tried to illustrate my cases by original photographs and drawings of the specimens, and by diagrams

taken from my microscopical slides.

With all our knowledge of tubal gestation, and with all the researches of learned authorities, we have not arrived at any definite conclusions with regard to its etiology. The whole question seems to turn upon the point "where does fertilisation take place?" Some writers[x] take it for granted that fertilisation takes place normally in the Fallopian tube, and most probably in its outer half. If this is so, then it is quite easy to understand the theory of obstruction in the tube, and bring forward the whole train of causes, such as tumours, erosions, and inflammations, and conscientiously rest satisfied that we have for ever slain the demon of doubt. On the other hand, we have the theory that "fertilisation normally takes place in the uterus, and that

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[x] Galabin's "Manual of Midwifery" p. 47.

it is accidental when occurring in the tube.[x]

When the ovum is fertilised it makes for the nearest resting place it can find, and as the uterus seems in every way more suitable for its reception than the tube, it is not unlikely that in the uterus fertilisation takes place. The laws of nature do not admit of accidents, and although they may appear as such, it is only that the veil for us has not been torn aside.

In many cases fertilisation does take place in the tube, and this may be due to something preventing the ovum from getting down to the uterus, or maybe to undue activity of the spermatozoon.

But what is this obstruction?

Webster[xx] describes a source of obstruction produced by "the ring-like swelling of the deeper

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[x] Bland Sutton "Surgical Diseases of Ovaries and Fallopian Tubes," p. 242

[xx] "Ectopic Pregnancy" 1895, p. 10, [illegible]

layers of the mucosa, which resembles that of the uterine decidua." When the ovum is fertilised, the surrounding structures undergo a change, getting ready, as it were, to adapt themselves for the support and sustenance of the newly formed organism. This obstruction occurs on the uterine side of the tube when the ôosperm has settled in the intermediate or outer part.

This view is refuted by Taylor[x] who states that no one has been able to detect in the pregnant tube anything approaching to the decidual membrane of the uterus. In my own specimens, which can hardly be parallel as mine were after rupture had taken place, I found decidual tissue in several on the uterine side of the attachment of the ovum. During menstruation the turgescence of the uterine mucosa may extend slightly along the

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x "Extra-Uterine Pregnancy," p. 12.

tube, and thus may cause arrest of an ovum which has just entered the tube before the onset of the menstrual period.

Salpingitis as a cause, although dismissed by many modern writers, has many points in its favour; the thickening of the tube wall, the peritonitic adhesions occluding its lumen may interfere with the peristaltic action, and so arrest the ovum. But, on the other hand, if it has been far advanced, it will have occluded the abdominal ostium, and so prevent the entrance of the ovum, it may also occlude the uterine end of the tube. In all my cases, I made careful microscopical examination of the uterine end of the tube, and in every one found it patent.

The old theory that a desquamative salpingitis is necessary as a preparation for the settling down of the fertilised ovum is now given up, as most people now admit that it has no parallel in menstruation, which is not a preparation for, but a consequence of the failure of pregnancy having taken place.

Salpingitis, not as a cause, but as a factor in

its later progress, is more important with reference to tubal gestation. By setting up thickening or atrophy of the tube, it may influence subsequent rupture or tubal abortion.

It is difficult to decide the previous existence of salpingitis, as the pathological condition of the opposite tube is in many cases due to the pregnancy in the other tube: the history is a guide, of course. The age of the patient is the same as in ordinary pregnancy. The following table bears out this as taken from my own cases:-

Age		
20 - 25	=	3
25 - 30	=	7
30 - 35	=	6
35 - 40	=	7

Previous sterility is not a factor to be considered in tubal gestation, as shown by my own

experience - out of 16 cases -

Last pregnancy	1	year and less than	1	year	= 6
do	2	do	2	do	= 6
do	3	do	3	do	= 2
do	4	do	4	do	= 2

One of these occurred twelve weeks after birth of last child, only two cases were absolutely sterile. Previous uterine abortions may be a factor in the causation by setting up pelvic complications subsequently.

That tubal pregnancy is an abnormal condition is evident from its subsequent course, as no case can go on to full term successfully without operative interference; and it is also evident that the determining factor in its causation is some abnormal arrest of the öosperm or impregnated ovum in its progress towards the uterus from the ovary.

That this arrest may occur in the ovary is theoretically possible, but has as yet to be proved.

That it may occur in the abdominal cavity has been proved impossible on account of the strong absorptive powers of the peritoneal surfaces; cases recorded previously as such being tubal in origin, and afterwards growing within the abdominal cavity, the embryo being protected by an almost invisible pellicle or amniotic membrane.

Thus we see that all forms of extra-uterine pregnancy are tubal in origin. Some specimens appear doubtful on examination as the tube has become disorganised, or so incorporated with surrounding structures as to be almost unrecognisable, but on careful examination we will find that the placental attachment is where the tube wall is to be found.

Let us here shortly discuss the early life history of the growing ovum. It is difficult to be accurate with regard to the early stage, as the specimens from which we derive our knowledge have generally undergone some change before operation,

either injured by pressure from surrounding parts, or from haemorrhage. Classifying them all together, we find a general plan to guide us.

After the ovum has been fertilised it immediately seeks a resting place, and thus becomes engrafted on the tubal mucosa, the surrounding structures become more vascular, the mucosa surrounds and soon covers the öosperm; the chorionic villi develop in the special zone of mucous membrane. During this time the öosperm is increasing rapidly in size, the blood vessels become enlarged, and the tube is stretched and distended, and so compensatory hypertrophy takes place.

If as referred to before, salpingitis has been present previously, the walls may have become fibrosed, less vascular, and therefore less able to adapt themselves to changes. Thus the elasticity is very slight, and the tube must rupture sooner or later. If, however, the tube wall is able to resist the increased pressure the pregnancy may go on further, and may end as an abortion into the uterine or peritoneal

cavities, or as a later rupture of the tube wall.

During this time the uterus has been increasing in size by "sympathetic increase." This is due to increased vascularity, and also to the formation of a membrane in its interior, the "uterine decidua." This is not in direct contact with the öosperm, but is closely related with its life history, as it is shed when anything interferes with the growth of the ovum. Sometimes it is passed entire as a cast of uterus, but is generally in shreds mixed with blood-clot (see sketch) - the following case is illustrative.

Mrs. B. aet. 31. History "one month ago took severe pain in abdomen with inability to defaecate; pain was more severe in left iliac region, accompanied by haemorrhage lasting five days. Menstruation previously regular, but five weeks amenorrhoea before onset of pain." Patient was pale and collapsed, abdomen distended, and tender; dull over pubic region, uterus retroverted, mass in D. P. While

in hospital patient took severe "bearing down" pains followed by expulsion of decidua, with copious hemorrhage. She felt great relief after this.

The accompanying drawings show the condition. The decidua is triangular, resembling the shape of the interior of the uterus, the base being at the fundus, and the apex at the os internum. The outer surface is shaggy, the inner smooth showing the glandular openings. The external, or surface next the uterus is shaggy (see section) and shows large glandular interspaces with decidual cells. This is the spongy layer of the decidua. The cells in these spaces are cubical. In the other section, which was taken from the more superficial part, both being cut parallel to the surface, the glandular spaces are smaller, the epithelium being flattened and the interglandular tissue increased in quantity. Large decidual cells were well marked in both sections.

To return to the tube, we find that the preg-

nancy will take one of the following courses:-

(1) It will go on growing in the tube, and become either aborted through its ostia, or it will cause rupture of the tube by its increased size.

(2) It will become changed into a tubal mole, which will either abort or cause rupture of the tube.

The condition of the ostia of the tube is important; the patency of these predisposing to abortion rather than to rupture. In all my cases of tubal abortion, the abdominal ostium was patent, and in many it was even dilated. I made a careful and minute examination of the uterine end of the tube in all my specimens, and in every one the lumen of the tube was patent, although in several the opening was very small. The sketches of slides illustrating my cases will demonstrate this condition.

TUBAL MOLES only arise in the first two months of pregnancy, and the changes are similar to those which occur in the formation of a uterine mole.

"A mole is an early embryo and its membranes, into which blood has been extravasated."[x] They vary in size, the smaller ones being cylindrical, and the larger ovoid in shape. The amniotic cavity is usually at one end, due to the pressure of the haemorrhage. The embryo may or may not be present, but it is the exception in my experience to find the embryo in a tubal mole, as it usually has become disorganised by pressure from the surrounding blood-clot, or it has been lost in the peritoneal cavity, when the mole has ruptured at the time of dislocation from the tube. The blood lies between the amnion and the chorion, in what Bland Sutton calls the "sub-chorionic chamber."[xx]

He maintains that the blood is derived from the circulation of the embryo, owing to his having found nucleated blood corpuscles in it. It appears

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[x] Sutton & Giles 1900, p. 240

[xx] Ibid, p. 240.

to me incredible that such a small organism as the embryo could be the source of so much haemorrhage. Is it not more reasonable to assume that the inflammatory fibrin covering the outer surface of the chorion, and in whose walls fresh vessels are formed, is a possible source of the blood. The formation takes place by stages, as the blood clot shows a laminated structure. The causation of tubal moles is not quite understood. The following explanation may deserve consideration - when the ôosperm is in the tube, and more especially when near its abdominal end, it weighs the tube down, dragging it behind the uterus, in which position it is liable to meet with sudden pressure. Then if its early attachment to the tube wall is slight, there may be some haemorrhage, which is the result of undue exertion on the part of the patient. This exertion is repeated, and thus we have a succession of haemorrhages, until finally there is one attack so severe as to bring the con-

dition under our notice. When the mole is formed it is liable to expulsion into the uterine or abdominal cavities, forming complete tubal abortion. The more usual condition is where the mole remains partially attached to the tube wall, like a polypus. Tubal moles vary in size, and are generally ruptured before the specimens are obtained. The outer surface or chorion is covered with villi, and the inner or amnion, investing the amniotic cavity, is usually nearer to one pole of the mole. On microscopical examination we will find the presence of villi more easily if we examine either pole, as they are more numerous at the poles. Now we have to consider the probable termination of the tubal pregnancy - the two methods being by:-

1. Tubal Abortion;
2 Tubal Rupture

1. TUBAL ABORTION, or "the partial or complete separation of the ovum from the tube wall, accompani-

ed by haemorrhage into the tube lumen, and the escape of the blood along with part or whole of the ovum into the peritoneal cavity."[x]

This is most likely to occur early in the pregnancy, as after the eighth week the abdominal ostium is usually closed. In all my nine cases the abortion occurred before the eighth week.

"In tubal abortion the öosperm is nearly always converted into a mole,"[xx] but not always, as proved by Case II. It occurs, as stated by most writers, in those cases where the öosperm is situated near the abdominal ostium. In five of my cases, however, it occurred when the attachment was at the uterine end. It may also occur into the uterine cavity when near the isthmus; the abdominal form is the most common, as in this case the mole is following the route of least resistance. It also

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[x] Webster "Ectopic Pregnancy" p. 70.

[xx] Bland Sutton "Surgical Diseases of Ovaries and Fallopian Tubes" p. 257.

occurs in a healthy tube whose walls are elastic, and easily contractile. The mole is discharged with considerable haemorrhage into the peritoneal cavity, giving rise to the symptoms of collapse etc., at the same time haemorrhage takes place into the uterine cavity, that is the "discharge or flooding." But in most cases the mole becomes only partially detached from the tube wall, and thus acts as a source of irritation, keeping up a continuous haemorrhage into the abdominal cavity - the characteristic "blood drip."

Complete expulsion of the ovum is rare, although cases have been recorded by Bland Sutton, Ortheman, and others. The difficulty of recognition being in the fact that it becomes lost. The blood passing through the abdominal ostium may be so copious as to cause death, but the more common form is where the blood is gradually poured through the opening, thereby forming a blood cyst or <u>intra-peritoneal haematocele</u>. This by a gradual increase

of its contents forms an outer or firmer layer of laminated clot, forming the sac; it is attached to the fimbriated extremity of the tube, and occasionally by means of its adhesions incorporates the whole tube, and ovary in its walls. The lumen of the tube may be shut off from the haematocele cavity, and thus no fresh haemorrhage takes place, the haematocele remains quiescent and becomes absorbed, but more usually the sac in its turn ruptures and grave symptoms supervene. If the abdominal ostium becomes closed, the blood in the tube may suppurate, forming a pyosalpinx, or it may increase in size until the tube ruptures, the latter is a very common condition in tubal gestation. The symptoms of tubal abortion are less severe than those of tubal rupture as the process is more gradual. The patient complains of colicky pains in the abdomen, with irregular uterine haemorrhages, as contrasted with the collapse and shock attendant on rupture, although it must be remembered that subsequent rupture of the

haematocele sac has often very grave consequences, and that it is more often on account of the rupture of this sac that patients come under our notice, than on account of the abortion, the history concerning which is often very vague. In describing tubal abortion I refer to the incomplete form. I have endeavoured by the following table to illustrate my remarks by reference to my cases, the pathology of which I have discussed separately at much fuller length.

CASES OF TUBAL ABORTION

Case	Age	Married	Children	Youngest	Last Menstrual Period	Symptoms	Signs	P. V.	Condition of Uterus	Condition at Operation
I	39	Years 10	2 3 abortions	1 year	12 weeks	5 weeks before sudden left iliac pain while at work, 2 days later "flooding," discharge ever since - 5 days ago passed decidua.	Secretion in breasts. Hard, tender mass in left iliac region. Uterine haemorrhage.	Cervix close to symphysis. Hard, irregular mass in D. P.	Enlarged	Left tubal abortion (incomplete) with mole containing foetus. Haematocele.
II	39	7	2 2 abortions	1½ "	16 weeks	11 weeks ago severe "flooding," discharge present ever since. 2 weeks ago expulsion of decidua with labour pains.	Secretion in breasts. Flattened mass in hypogastric and left iliac regions. Haemorrhage.	Cervix close to symphysis. Firm, irregular mass filling pelvis. Pulsation in left fornix.	Enlarged Soft sound passes 4" to right side.	Left tubal abortion (incomplete) with foetus. Haematocele.
III	26	4	1 1 abortion	1¼ "	3 months	2 months ago severe and sudden pain in hypogastrium, faintness. Haemorrhage present ever since.	Abdomen prominent in left iliac region. Large mass extending up to umbilicus. Haemorrhage.	Cervix normal. D.P.filled by firm irregular mass. Rounded mass in right side.	Anteflexed Sound 3"	Left tubal abortion (incomplete). Haematocele. Right ovary cystic.
IV	29	12	6	3	4 months	3 months ago severe "flooding," haemorrhage present ever since. Pain in right iliac region, no faintness.	Firm mass in hypogastric and right iliac regions. Not tender haemorrhage	Cervix close to symphysis. Firm round mass in D. P. and right side.	Sinistroposed. Sound 3"	Right tube thickened passing into haematocele sac. Tubal abortion (incomplete).

V	21	1	1	4 mos.	14 weeks	6 weeks ago severe pain in lower abdomen with haemorrhage, present to lesser degree ever since. Clots with "stringy" material.	Secretion in breasts. Fulness and tenderness in lower part. Haemorrhage.	Cervix near pubis. Tense elastic swelling in D. P.	Enlarged and softened.	Right tubal abortion (incomplete). Haematocele
VI	23	3	2	1 year	16 weeks	8 weeks ago severe pain in abdomen. Haemorrhage onset a week before, lasted 1 week. Returned for last 2 weeks.	Firm mass in lower abdomen. Extending more to right. Haemorrhage.	Cervix close to symphysis. D. P. filled by firm elastic tumour. Pulsation in both fornices.	Dextroflexed. Sound 3½"	Right tubal abortion (incomplete) with haematocele.
VII	32	7	7	3½ "	14 weeks	10 weeks ago severe left iliac pain with haemorrhage, discharge ever since. "Flooding" days after onset.	Rounded mass in hypogastric and right iliac regions.	Cervix normal. Rounded mass felt behind and to left.	Anteflexed Sound 3"	Right tubal incomplete abortion with pus.
VIII	38	12	4 3 abortions	1½ "	8 weeks	3 weeks ago, sudden pain with haemorrhage, fainted, sickness; pain and haemorrhage present till admission.	Abdomen tympanitic all over, but dull in hypogastrium. Haemorrhage.	Right and posterior fornices filled by mass, irregularly solid and cystic. Pulsation.	Enlarged	Pelvis filled with blood clot. Left tube distended. Haematocele.
IX	30	12	4	3 "	2 months	3 weeks ago sudden pain with haemorrhage, ceased for 2 days. Returned, and present ever since	Fulness in hypogastrium Dulness in lower abdomen, mass in right iliac region.	Cervix close to symphysis. Fluid effusion filling D. P.	Sinistroflexed	Right tube contained a fleshy mole.

CASE I:

ON OPERATION - left tube was distended by a mole near its abdominal end, and was stretched over top of the haematocele sac, which filled the lower part of the pelvis. The tube ruptured during removal.

SPECIMEN (See photo taken from behind.) The tube is in upper part with rupture near its uterine end where the walls were thinnest, below is mole sectioned to show embryo in its amniotic cavity. The mole was attached near the abdominal end, so that the pressure of the haemorrhage must have caused thinning of the tube walls near the uterine end. It was dark red in colour, cylindrical, and was covered with fresh blood clot: it measured 2½" in length, and 1½" in diameter. After hardening in formal sol. I found on incision that it contained an embryo of about six weeks, lying in the amniotic cavity, which was about 1" in diameter, and surround-

ed by laminated blood clot, the latter being in "the sub-chorionic chamber." The ovary was cystic, filled with a jelly like substance.

Section near uterine end of tube shows patency of the tube lumen, with erosion of the epithelium in some places.

CASE II:

ON OPERATION the haematocele sac, with the left pregnant tube were found in a mass of blood clot filling the pelvis, roofed over by omentum.

SPECIMEN (See Photo, Case II.) This specimen is of great pathological interest on account of its rarity. The left tube is shown in longitudinal section, containing a mass of placenta and blood clot within its unruptured walls: while the cord passing through the abdominal ostium is attached to the foetus which lay in the haematocele sac. The foetus was in a shrivelled condition owing to the

pressure: it had passed through the ostium at an earlier date, the amnion remaining intact, inside which it continued to grow, and protected by it against the surrounding blood clot - the result of its dislocation from the tube. The pressure from this haematocele had caused death of the foetus. Haemorrhage had occurred eleven weeks before operation, at which time the abortion may have taken place. The uterine decidua was not expelled until nine weeks later, which may, on the one hand, be a proof that the foetus continued growing after its expulsion from the tube, or, on the other, there may have been a gradual and partial separation of the decidua keeping up the uterine haemorrhage, along with that from the tube. Cases such as this are extremely rare, one has been recorded by Webster (page 56 of his book), it occurred in the practice of Halliday Croom, and one was reported by Mr. Lawson Tait to the Obstetrical Society in 1892. But in neither of these the exact process by which the em-

bryo was extruded is explained. Webster says "in a manner unknown, escape of the foetus took place into the peritoneal cavity;" he mentions a gradual thinning or hernia-like protrusion of the tube wall, or an escape by the abdominal end of the tube. In my specimen the wall of the tube was absolutely intact, so that the escape must have been through its abdominal ostium. I think this case clears up this form of tubal abortion, our knowledge of which was rather vague.

Section of the tube near its uterine end shows erosion, and also flattening of the columnar epithelium, with atrophy of the plicae, and increase in the connective tissue of the tube walls.

CASE III:

ON OPERATION - the unruptured left tube was found stretched and distended over the haematocele sac.

SPECIMEN - (see sketch from behind - Case III). The left tube is seen, a slit having been made in its posterior wall in order to show the mole in its interior attached near the uterine end. Part of the haematocele sac is left attached to the fimbriated end to show its interior, shaggy from the deposit of fibrin. The fimbriae are thickened, and a peritoneal "collar" or ring was formed at their base, causing rigidity of the tissues round the ostium, which was slightly dilated. I found on taking sections from the insertion of the mole that chorionic villi, with decidual cells were present (see drawing).

Microscopical examination of the uterine end of the tube shows erosion of the epithelium almost over the whole surface of the folds, the lumen being patent.

CASE IV:

ON OPERATION - right tube was found the thick-

ness of the thumb, passing outwards and downwards to the haematocele sac, which was densely adherent all round; sac was ruptured, and gave exit to old blood clot. Left tube and ovary closed, and sacculated.

SPECIMEN (see photo - Case IV.) Left tube and ovary in upper part of photo, and in lower is right tube seen from before. The tube is unruptured, and at its fimbriated end is the haematocele sac, the anterior wall of which is turned up to show its shaggy interior. The ovary is enlarged, the tube walls greatly hypertrophied; the abdominal ostium is patent surrounded by a peritoneal "collar." The mole was not found, but its attachment had been near the uterine end, on the wall of which I found chorionic villi, with decidual cells (see drawing). The uterine end of the tube was patent, and I found numerous glands in its walls, with several villi, when examined under the microscope. The haematocele sac contained laminated blood clot, and the

bursting of this sac was the cause of the symptoms which led patient to seek admission to the hospital. The right ovary contained a corpus luteum.

CASE V:

ON OPERATION - right tube distended by mole ruptured during removal. The omentum was thickened, and blood-stained: it was adherent to abdominal parietes, and to haematocele sac: the bowel also was adherent to the latter. Tube was filled with firm blood clot, protruding at the gaping abdominal ostium. Left appendages were normal.

SPECIMEN - (See sketch from behind.) On opening into the tube a mole was found attached to its lower and posterior wall near the uterine end, it was pedunculated like a polypus (as shown in the sketch), the upper part of the tube wall being cut away. The tube walls were greatly hypertrophied,

plicae increased, ovary contained a fresh corpus luteum.

I found chorionic villi and decidual cells at the attachment of the mole (see drawing of villus highly magnified); uterine end of tube was patent, and showed great increase in circular muscles and connective tissue, decidual cells being found (see drawing).

In this case patient's symptoms were all directed to the opposite side. This is not usual, but a similar case is mentioned by Taylor (Extra-Uterine Pregnancy p. 32) in which a left tubal pregnancy caused a right iliac haematocele.

CASE VI:

ON OPERATION - right tube dilated, omentum adherent over it, adhesions on upper surface very friable, but dense behind at junction of tube and uterus, where a coil of bowel was adherent posterior-

ly, dipping down into haematocele.

SPECIMEN - (See Photo - Case VII.) Tube in section unruptured, a mole consisting of laminated blood clot was attached to the upper and posterior part of the wall, near the inner end of tube; walls of tube thinned at middle portion. No embryo found. Abdominal ostium patent. Plicae and fimbriae hypertrophied. Villi and decidual cells were found at inner part of tube, portions of the mole being sectioned previous to the taking of the photograph.

CASE VII:

ON OPERATION - a pool of serous fluid was found covering the contents of the abdomen, immediately below the anterior wall; uterus and appendages completely enveloped in dense adhesions, out of which right appendages were raised, and found to contain pus. Chief mass in left side was composed of thin walled peritoneal cysts, packed round a spherical

blood cyst about the size of an orange, enclosed in a thick capsule (ovary). Left tube presented a small blood cyst near its fimbriated extremity, which was the site of the pregnancy.

SPECIMEN - showed left pregnant tube with part of the haematocele sac. The site of the pregnancy was the middle third of the tube. The tube was enormously lengthened, and thickened, but was unruptured. Abdominal and uterine ends were patent.

CASE VIII:

ON OPERATION - omentum bound down by greatly thickened border to upper surface of bladder and uterus by organising blood clot, a large quantity of fluid blood in pelvis. Left tube lying in blood clot.

SPECIMEN - (see sketch - Case VIII.) This case was very similar to Case VII. The left tube

was greatly distended with blood clot, as it was originally a small tube, the mole was near the uterine end, over which the tube walls were thinned (thickened, however, in the outer extremity). The blood was laminated in the mole, and no embryo was found. Abdominal ostium was patent, the fimbriae being surrounded by a "collar," and some of them withdrawn inside the tube-lumen. Examination near its uterine end (see drawing) showed a great increase of fibrous tissue, with erosion of the epithelium covering the surface of the plicae.

CASE IX:

ON OPERATION - pelvis and lower abdomen were filled with blood clot: right tube enlarged. Left tube cystic, with blood clot in outer part.

SPECIMEN was so disorganised by pressure that I was unable to produce a satisfactory illustration of it. The right tube contained a large fleshy

mole near its ampullary end, attached to the lower part of the wall, where I discovered the presence of decidual cells (see drawing). Chorionic villi also were present, but were extremely degenerated. Tube walls thin, but plicae increased. Abdominal ostium was patent. Uterine end of tube showed erosion of epithelium with numerous glandular interspaces (see drawing High and Low Power) with decidual cells.

In the majority of these nine cases of incomplete tubal abortion, the ovum had become attached near the uterine end, in only two was it near the ampullary end (Cases I and IX). In all of them the abdominal and uterine ostia were open, although to the naked eye the latter often appeared occluded, and it was only when I made a microscopical examination that I found its lumen to be patent.

The tube walls in tubal abortion show the presence of compensatory hypertrophy more frequently than those which have ruptured. But it must be remembered that many cases which have been classed under tubal rupture have originally been those of

incomplete tubal abortion, the tube being distended by haemorrhage, and afterwards becoming ruptured.

RUPTURE OF THE TUBE may occur very early in the pregnancy, or later on in those cases where the tube wall is more expansile; we, therefore, recognise the two forms as

1. Early Rupture
2. Later Rupture

Both of these may rupture with discharge of their contents into the peritoneal cavity, or outside it, forming the extra and intra-peritoneal varieties.

1. EARLY RUPTURE usually takes place before the sixth week, and is often the cause of very sudden and fatal haemorrhage. In these cases, I have observed great thinning of the tube walls, which condition probably accounts for the rupture, and may be due to some increase in the fibrous tissue of the wall, at the expense of the more contractile

or muscular tissue, as well as to the pressure of the growing ovum which has perhaps become distended by haemorrhage. The event is generally hastened by such acts as straining during micturition and lifting of heavy weights. The rupture may be so small as to close up afterwards by the formation of adhesions; rupture with extrusion of its entire contents being delayed until a later period. But as a rule rupture takes place suddenly, and the haemorrhage is so severe that surgical aid is required immediately. When the tube wall bursts, the contents including the embryo or mole, may become lost, especially if sudden, but if they are expelled by a gradual thinning, or so-called "erosion" of the tube walls, the membranes may remain intact, and thus the embryo will go on to a further stage of development. In <u>intra-peritoneal rupture</u> the tube wall bursts into the peritoneal cavity, and usually takes place when the ovum is attached to the uterine or abdominal ends of the tube. When the ovum is attached to the middle zone of the tube it is more liable to burst in

between the layers of the broad ligament, i.e., outside the peritoneum. The former condition is generally accepted as most usual, only a small portion of the tube being left uncovered by peritoneum; in nine out of twelve, however, of my cases of tubal rupture, the tube had burst in its middle third, the pregnancy being situated there. According to most authorities the thinnest portion being at the attachment of the ovum, the ovum may or may not be expelled, and in some cases it remains blocking up the rent in the tube, while fresh haemorrhage is forming behind it, later on the pressure from the latter may expel it more forcibly. The blood may become encysted in the peritoneal cavity, forming a haematocele sac, adherent to surrounding organs, and roofed over by the protecting omentum. This may in its turn rupture, or become absorbed by slow degrees.

In extra peritoneal early rupture the contents of the tube, with the resulting haemorrhage are discharged in between the layers of the broad ligament, the tubal space as it were becomes by this means

enlarged, and the embryo goes on increasing in size, or the haemorrhage is kept in check. In many cases the haemorrhagic tumour increases to a great size. In these cases the rupture is more often due to erosion of the tube walls, so that the embryo has a better chance for a further existence than in the intra-peritoneal form. The embryo still derives its nourishment from its original tubal attachment, and goes on growing surrounded by its amnion, which forms a lining to the haematocele sac. This is readily seen in many specimens which I have examined.

2. LATER RUPTURE OF THE TUBE INTO THE PERITONEAL CAVITY. This takes place any time after the first month, but usually occurs about the third, it occurs earlier if the ovum is attached to the uterine end of the tube. The haemorrhage may not be so severe as in early rupture, but this depends upon the site of the placenta. As the tube contents increase in size, the walls become stretched

and thinned, and are thus unable to bear the strain, one layer finally remains, which in its turn gives way, and the gestation sac is extruded into the peritoneal or sub-peritoneal cavities. The resulting haemorrhage may set up a local peritonitis, which by its adhesions may limit the increase of the flow. Fresh haemorrhages occurring may break down these adhesions, and so we have fatal collapse and shock. As mentioned before, under tubal abortion, the haemorrhages may become deposited in layers, forming a laminated condition of the walls of the haematocele sac, and thus absorption may take place, or the sac may burst later on. If the rupture has taken place at the placental site, the haemorrhage is severe, owing to the rupture of the vessels. If it occurs away from the placenta in the thin tubal walls the resulting haemorrhage is often slight in quantity. The placenta remains attached to the tube, while the foetus escapes upwards into the abdominal cavity, and the pregnancy

may go on to full term, provided that the amniotic membrane has remained intact, as it acts as a protection against the peritoneum. This condition of abdominal pregnancy having its origin in the tube was first satisfactorily described by Taylor[x] in 1897, the amnion being in the form of a thin membrane or pellicle. In most cases the foetus after extrusion becomes buried in the resulting haemorrhage, and its blood supply being cut off, it either becomes completely absorbed, or decomposition ensues, with the formation of pus. The placenta with the tube help to form the gestation sac, along with the haemorrhage which has become encysted. The foetus lying inside, covered by its amnion increases in size until the sac bursts with the well-known signs and symptoms of intra-peritoneal haemorrhage. This gestation sac is adherent to surrounding organs. The placenta is situated below

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[x] "Extra-Uterine Pregnancy, p. 48.

the foetus, as during rupture of the tube the foetus is generally discharged in an upward direction.

In extra-peritoneal later rupture of the tube, the pregnancy has generally begun at the middle portion of the tube, it gradually expands, and passes in between the layers of the broad ligament, that is into the connective tissue space below the peritoneum. When haemorrhage occurs a broad ligament haematoma may be formed, which by its pressure may stop the haemorrhage, and so become absorbed. When the rupture of this broad ligament in pregnancy takes place, the foetus escapes downwards, the placenta remaining attached above. The tube and placenta roof over the gestation sac, and the latter owing to its high position is a continuous source of danger of haemorrhage. The pregnancy displaces the peritoneum, raising it up from the surface of the uterus and bladder, and from the anterior and lateral abdominal walls, forming the so-called sub-peritoneal variety. At first it is confined to

the pelvis, that is sub-peritoneo-pelvic, but later on as the haemorrhage increases, it invades the abdomen, and is then called sub-peritoneo-abdominal. This is when the pregnancy increases in an anterior direction. If it extends posteriorly it raises up the posterior fold of peritoneum from the sides and back of the uterus, from Douglas' pouch, and rectum, and also from the posterior pelvic wall up to the sacral promontory; this being the limit in most cases, the anterior peritoneum being undisturbed.

On opening the abdomen, we at first think the pregnancy is everywhere covered by peritoneum, but if the hand is placed behind the haematocele sac the peritoneum is found reflected from above on to the mass. This form is called the retro-peritoneal variety, and has only been recognised for the last few years, owing to the researches of Taylor, Webster, and others.

There is more room in this form for the growing foetus owing to the sac developing posterior to the

tube, the foetus passing behind the placenta. I have not discussed the advanced forms of extra-uterine pregnancy, as I have wished to confine my remarks only to those cases which I can discuss and verify from my own personal experience. The following table includes cases of all the forms above mentioned, and are arranged as a means of illustration, the pathological anatomy of such being discussed fully in the next pages.

CASES OF TUBAL RUPTURE

Case	Age	Married	Children	Youngest	Last Menstrual Period	Symptoms	Signs	P. V.	Condition of Uterus	Condition at Operation
X	29	Years 10	0	—	7 weeks	3 weeks ago severe abdominal pain in right side, faintness, collapse, 3 days later haemorrhage, present till admission.	Great collapse, peritonitis. Firm mass in hypogastric and iliac regions. Haemorrhage.	Cervix near pubis. Firm mass fills whole pelvis.	Pressed forwards	Right tube ruptured. Fresh haematocele.
XI	33	10	1 1 abortion 6½ years	8	11 weeks	6 weeks ago sudden pain in abdomen, vomiting and faintness. Haemorrhage began a week before, lasting 4 weeks.	Firm swelling in abdomen, extending up to umbilicus and to right iliac region.	D. P. tensely distended with blood clot.	Lies forwards and to right.	Left tube ruptured. Pelvis filled with blood clot.
XII	31	9	6	1	3 months	2 months ago sudden haemorrhage, 2 days later right iliac pain, present ever since.	Firm mass above pubis, irregular. Haemorrhage.	Cervix behind symphysis. D. P. filled by firm uneven mass, not movable.	Dextroflexed, movable, sound 2½"	Right tube ruptured. Haematocele sac.
XIII	36	15	6 3 abortions	3¼	4 months	3 weeks ago severe pain in lower abdomen, followed by a "flooding." Rigors and sweats.	Rounded tumour in hypogastric and left iliac regions. Very tender.	Left lateral and posterior fornices bulged down by a cystic swelling.	Uterus anteposed, Sound 3".	Left tube ruptured. Haematocele.

	XIV	24	9	1	9	5½ months	7 weeks ago sudden pain in right iliac region, present ever since, sickness. Haemorrhage immediately after, present ever since.	Firm mass filling whole lower abdomen and to right. Haemorrhage.	Cervix close to symphysis. Firm, irregular, mass filling D. P.	Sound 4"	Ruptured right tube, foetus, haematocele.
	XV	36	11	1 1 abortion 7 years	10	12 weeks	5 weeks ago haemorrhage with severe pain, vomiting, 4 weeks ago passed a "flat triangular body."	Tenderness and fulness in left iliac region. Haemorrhage.	Tense elastic swelling in D. P. Pulsation in left fornix.	Forward and to right.	Left tube ruptured. Haematocele.
	XVI	33	16½	1	16	3 months	3 weeks ago sudden pain, faintness: haemorrhage lasting 4 days. Pain and haemorrhage at intervals since.	Areolae round nipples, abdomen tender and resistant in both iliac regions.	Cervix close to vulva. Fluid filling D. P.	Normal in size. Strongly anteflexed.	Right tube ruptured, foetus. Uterus enlarged.
	XVII	30	?	4	1½	3 months	Since onset of pregnancy felt pain, with occasional haemorrhage, faintness, collapse 4 days ago	Collapsed. Abdomen distended, mass in middle line: to right is 4½ months pregnant uterus. Dulness in both flanks, cystic boggy mass in left side.	Soft mass in left side, very tender. D. P. free.	Enlarged 4½ months.	Pregnant uterus. Ruptured left tube.
	XVIII	38	13	8	7 mos.	6 months	3 months ago took a "flooding" lasting 6 weeks, ceased for 1 week. Present for 2 weeks before admission. Colicky pains.	Secretion in left breast. Firm, resistant mass in hypogastrium, more to right side. Haemorrhage.	Cervix enlarged and softened. Irregular, firm mass filling D. P.	Anteposed sinistroflexed. Sound 3½"	Right tube ruptured, foetus, haematocele.

XIX	30	2	0	—	?	Previous ill-health, 6 months amenorthoea one year ago. Incontinence of urine.	Old cicatrices of previous abdominal operations.	Left ovary enlarged and cystic. Right fornix free.	Normal	Left tube ruptured, ovary cystic.
XX	31	3	3 Abortions	—	6 weeks	1 year ago severe pain with frequent micturition. 9 weeks ago sudden haemorrhage and pain in right iliac region. Haemorrhage till admission.	Rounded mass in hypogastric and right iliac regions. Haemorrhage.	Cervix low in vagina. Irregular, sensitive mass in right side of pelvis.	Forwards Sound 3"	Right tuba rupture. Haematoce
XXI	27	1½	1	14 mos.	4 months	3 months ago severe right iliac pain, faintness and haemorrhage. A month later haemorrhage with clots, present ever since.	Firm, tender mass in right lower abdomen.	Tense swelling filling pelvis, cervix close to symphysis.	Anteposed	Right rupted tube. Foetus, hmatocele.

CASE X:

ON OPERATION - whole lower abdomen filled with fresh blood clot, roofed over by omentum, which was adherent along its lower surfaces to anterior abdominal wall. Right tube stretched over haematocele and forming upper part of sac was ruptured in middle third.

SPECIMEN was completely disorganised by the surrounding haemorrhage, so that I could not make an illustration of it, the tube walls were very friable, and contained decidual cells. The contents had ruptured into the peritoneal cavity, with absorption of the embryo. This is an example of early rupture of the tube, the symptoms being sudden in onset and extremely severe.

CASE XI:

ON OPERATION - left tube and lateral ligament

greatly thickened, uterus pushed forwards and to right, bowels adherent to haematocele sac.

SPECIMEN was entirely broken up, the tube being almost completely severed from the uterine wall by the suddenness of the rupture. Its walls contained round celled tissue, with broken down chorionic villi and decidual cells about its middle third. The rupture had occurred before the fifth week. The embryo was absorbed by the blood clot in the peritoneal cavity.

CASE XII:

ON OPERATION - right tube was found to be ruptured, its walls were connected with the haematocele sac which was filled with fresh blood clot.

SPECIMEN - nothing could be made out except the ragged pieces of the tube walls, the whole being a mass of blood clot. Rupture had taken place before

the fifth week into the peritoneal cavity, the haemorrhage becoming encysted, this sac afterwards ruptured giving rise to the more acute symptoms.

CASE XIII:

ON OPERATION - haematocele adherent all round to pelvic wall and posterior wall of uterus, ruptured during removal. Left tube enlarged.

SPECIMEN - (See sketch - median section - Case XIII.) Shows tube sectioned down its centre, the whole tube was enlarged along with the mesosalpinx which was thickened; the mole was found distending the tube in its middle third, the abdominal ostium being closed. Rupture had taken place into layers of broad ligament, and secondary rupture under the peritoneum. No embryo was found. Section of uterine end of tube shows atrophy of plicae, decidual cells, and glandular interspaces (see drawing).

CASE XIV:

ON OPERATION - a large mass of blood clot and placental tissue was found connected with right tube. Foetus enclosed in membranes in centre of mass.

SPECIMEN - (See photo - Case XIV.) Shows ruptured haematocele sac, foetus in lower part. The ruptured tube formed part of the upper wall of the sac along with the placenta, the tube having ruptured in its outer third, the other part of tube being intact, the walls thickened. The placenta was above, the partially macerated foetus lying below, attached by its cord to the placenta, the amniotic membrane lining the interior of the gestation sac. Rupture had taken place into the broad ligament, where the embryo had continued to grow until secondary rupture had taken place in below the peritoneum. Section of uterine end of tube shows hypertrophy of the mucous folds, and the connective tissue elements.

CASE XV:

ON OPERATION - left tube expanded out to form haematocele sac, with its ovary were very adherent to surrounding parts.

SPECIMEN - (see sketch from behind - Case XV.) In lower part is ruptured tube, in upper is placenta with cord attached. Tube had ruptured in outer third in posterior and upper part; abdominal ostium fused in peritonitic adhesions, was occluded. The tube walls were dilated, smooth, the plicae being stretched out into thin lines. Ovary was cystic, containing a corpus luteum, which had become partially transformed into a haemorrhagic cyst. The placenta was attached to the upper posterior surface of the tube where rupture had taken place into the peritoneal cavity. Chorionic villi (as shown in drawing) were taken from the placental tissue. No embryo was found. Section of uterine end of tube shows absence of plicae, with almost complete oc-

clusion of the lumen.

CASE XVI:

ON OPERATION - omentum adherent to brim of pelvis, and to anterior abdominal wall, and surrounded by adherent bowel; immediately below this was foetus in unruptured haematocele sac, and surrounding it was broken down foetid blood clot. Sac ruptured during removal. Patient died from septic peritonitis.

SPECIMEN - (See photo of pelvic organs from before - Case XVI.) In anterior is bladder with uterus and rectum behind, right tube completely disorganised, haematocele sac shown with part of anterior wall removed to show foetus in its interior. The foetus was about the twelfth week, and was below the placenta, surrounded by amnion, which lined the gestation sac. Uterus was enlarged, and covered with adhesions. Section through its walls show groups of decidual cells, the part shown being near

the mucosa (see drawing). There was great increase in fibrous tissue. Uterine end of tube shows great increase in muscular tissue, with patency of its lumen.

CASE XVII:

ON OPERATION - a large quantity of fluid blood escaped, uterus was lying to right side. Large ruptured haematocele sac on left side, from which a well developed foetus was withdrawn. Placenta had extended upwards, and was largely adherent to sigmoid; the cavity in the broad ligament extended deeply down into the floor of the pelvis below level of cervix. Total hysterectomy was performed for control of the haemorrhage.

SPECIMEN - (See photo - uterus opened from behind - Case XVII.) Uterus contains a twin pregnancy, transverse presentation. Right tube small and sacculated. Left tube almost completely torn

from its attachment at the time of rupture, part of the haematocele sac with placenta is shown, with the foetus attached below by its cord. The pregnancy was advanced about four months. What had taken place was as follows - the pregnancy had first ruptured in between the layers of the broad ligament, the walls of which had subsequently ruptured, the contents being expelled below the peritoneum. The haematocele sac was formed by the dense adhesions which matted together the intestines in the upper part of the pelvis; and also by the placenta in its upper part. The interior of the sac was lined by amniotic membrane. This case is of great interest owing to the concurrent uterine pregnancy.

CASE XVIII:

ON OPERATION - right tube distended in its outer part to about a diameter of 2", with blood clot. Below this was foetus, outer end of tube

torn off from rest during removal. Placenta partly attached to enlarged tube. D. P. filled with blood clot.

SPECIMEN - (See photo from behind - Case XVIII.) In upper part is haematocele sac with placental tissue, below is foetus, which was of a slaty green colour with softened tissues. Rupture had taken place as in preceding case in between layers of broad ligament, then secondary rupture into the sub-peritoneal tissues. Section of the uterine end of the tube showed great increase in the connective tissue, the lumen being very small (see drawing).

CASE XIX:

ON OPERATION - left tube found ruptured, ovary contained several haemorrhagic cysts.

SPECIMEN - (See sketch from before - Case XIX.) Shows tube ruptured in outer third, and having chorionic villi attached. The tube was

dilated, and adherent to and around ovary, its fimbriated end opening directly into the largest cyst of the ovary. Owing to the adherent and cystic condition of this specimen its illustration was difficult, the villi are seen projecting on the right side of the sketch. Section near the uterine end of the tube shows patency of its lumen with erosion of the epithelium: numerous glands? are seen in its walls (see drawing).

CASE XX:

ON OPERATION - pelvic organs matted together with omentum adherent over and between them. Right appendages connected with a firm mass external to uterus, formed of blood clot.

SPECIMEN - (See sketch - Case XX.) In this specimen it was difficult to show the condition, as it was covered by adhesions. The tube was curved round the top of the haematocele sac, forming part

of its roof. I slit this up transversely, and lifted the upper part of the tube, where it showed a rupture in its lower wall, the blod clot protruding into its lumen. This blood clot was continued down to the haematocele, the interior of which was lined with amnion, no embryo was found. The tube walls were hypertrophied, except at middle third where they were thinned, rupture having taken place there into the broad ligament, with subsequent rupture in below the peritoneum; the haemorrhage extending behind, and pushing the peritoneum in front of it. The fimbriated end of the tube was patent, the epithelium being eroded (see drawing), a "collar" of peritoneum was found round the bases of the fimbriae. At upper part of haematocele I found beautiful examples of chorionic villi which I have produced, having embedded them in celloidin (see drawing). On making a thorough examination of the whole tube, I found a small rounded projection near its uterine end, about size of a pea, smooth, and attached to the lower and

anterior part of the tube wall. This looked like a pedunculated mole. On section it contained firm blood clot, on microscopical examination of which I found chorionic villi, and decidual cells (see drawing), in no other part of the tube could I find villi, so that those found belonged to the mole, and not to the other pregnancy described above. The question is - was this a previous or concurrent pregnancy, the mole remaining quiescent at an early stage, or was it a case of later impregnation of an ovum while pregnancy was present in the outer part of the tube? The former seems the true explanation, as in the latter the ovum could not have passed down the tube from the ovary, and become deposited near its uterine end, while the outer part was blocked by the other pregnancy, nor is it likely that the ovum lay quiescent in the tube until fertilised. On studying the history of the case, the patient had an attack of severe pain about a year before, but she got all right again. At that time there

may have been a tubal pregnancy, with formation of a mole which became quiescent, giving rise to no other symptoms subsequently. These cases are rare.

CASE XXI:

ON OPERATION - haematocele sac covered over anteriorly and above by uterus and distended right broad ligament along which edge of omentum was attached. Sac adherent to posterior pelvic wall. Foetus in D. P.

SPECIMEN - (See photo.) In upper part is dilated tube, ruptured in inner part, and surrounded by adhesions. Placenta has been removed from the tube, and is shown outside it with foetus attached below. Foetus about three months.

Rupture occurred below the peritoneum, and pushed it forward from the posterior pelvic wall.

On looking over these cases, we find examples

of all the forms of tubal rupture as described before.

As examples of early rupture into the peritoneal cavity, we have cases X, XI, XII: the tube in these early cases becomes so entirely disorganised in many as to be unfit for illustration. The most common form of tubal rupture in my experience is the broad ligament form, cases XIII, XIV, XVII, and XVIII are examples of rupture having taken place into the broad ligament, then secondary rupture below the peritoneum, the haemorrhage taking an anterior direction, that is sub-peritoneo-pelvic form. In cases XX and XXI the haemorrhage extended in a more posterior direction - the retro-peritoneo-pelvic form. Rupture into the peritoneal cavity occurred in cases XIV, XV, and XVI. In most the attachment of the ovum had occurred in the middle third of the tube. In all the specimens that could be examined satisfactorily, I found occlusion of the abdominal ostium, with the exception of case XX, where it was patent. The

classification of these specimens is very difficult, as they present features similar to several forms, and they are often so completely changed by peritonitic adhesions, and by pressure, as to be almost unrecognisable as having an original connection with the Fallopian tube. It was only on repeated examinations by dissection, and by microscopic investigation of portions taken from along the whole tube wall, and also by serial sections by the paraffin method that I was able to come to a conclusion as to their real form.

After this study of the tube wall, I observed the following changes due to the abnormal pregnancy.

The serous covering is in most changed and thickened by peritonitis. This is more apparent in the later months when the surrounding pressure is greater. In many portions the entire interior of the tube wall was absent, only leaving the thickened serous covering. The walls become infiltrated with round cells, and in some I found spaces lined

with cubical epithelium, as described by Webster, page 114. These spaces in most of my specimens were nearer the mucous layer, and resembled glands, although I could find nothing resembling ducts leading from them. In these tubes the secretion seems to be increased, as the mucous folds were often covered by a thin serous fluid, which may have been the result of the haemorrhage, or it may have had some origin in these "glands"? When I make the statement of glands being present, I know that I am running counter to the opinion of all authorities, but I only give the results of my own investigations. The muscular part of the tube wall is increased, especially the circular muscle fibres, as in those cases where compensatory hypertrophy has taken place. In later stages the muscle fibres become atrophied and scattered, the connective tissue increasing in quantity. Webster says the placental attachment to the tube wall renders it thicker. In my opinion the wall is thinner, and that it

is there that rupture often takes place, as in case XV. The changes in the tube are less marked when rupture takes place early into the broad ligament. The mucous layer showed atrophy of the folds, with erosion of the epithelium, and in many the columnar had taken a more flattened or cubical form. I found decidual cells in many of my specimens, in some along the whole tube, in others only near the site of the pregnancy. These cells had no connection with the epithelial layer as some believe. They are large, round, but usually oval in shape, containing several nuclei, and having no particular form of arrangement. The presence of these cells is denied by Bland Sutton. The capillaries in the tube walls are often enormously increased in size, especially in the deeper layers. I reproduce a drawing of a normal Fallopian tube, taken at the uterine end, highly magnified, the epithelium is intact. I was unable to find a perfectly normal specimen hitherto among my own sections, and am indebted to the kind-

ness of Dr. Teacher for the loan of the slide from which I made the drawing. It seems to be impossible to obtain a tube showing normal ciliated epithelium throughout.

DIAGNOSIS

Before discussing the differential diagnosis of tubal gestation, it is necessary first to consider the symptoms and signs of this condition, as a knowledge of the latter is essential to the proper recognition of the condition. In my description I have adhered closely to my own personal experience of cases, and have only recorded the symptoms and signs as belonging to such.

In most cases the patient is within the child bearing period of life: she has been going about her work in every way as if she were in perfect health, when suddenly after perhaps some undue exertion, she feels a severe pain in lower part of

abdomen: this pain is said to be like the stab of a knife, or the shot of a gun. She becomes faint, and feels sick. The pain recurs, perhaps after a few weeks amenorrhoea, or often at the time a normal menstrual period is due. The pain may have been preceded or followed by a haemorrhagic discharge which is often of the nature of a "flooding," and is due to some interference of the pregnancy, either by rupture of the tube or by dislocation of the embryo in incomplete tubal abortion: the source of the blood being the ruptured vessels in the tube. It also has its source in the uterus, when some of the decidual tissue has become separated. Cases of tubal pregnancy show no appreciable symptoms before rupture or abortion has taken place, so that our description only includes these forms.

On looking at the patient what do we find? If the rupture of the tube has been sudden, the symptoms will be more severe than in tubal abortion: the face is blanched, with an anxious expression, lips livid,

pupils dilated, and skin covered with a cold perspiration: the respiration is sighing, in short we have all the evidence of internal haemorrhage from rupture of some of the abdominal viscera. The pulse is at first slow, and then increases in rapidity, becoming difficult to count, the temperature is subnormal, and we see death approaching one who a few hours before was in the full vigour of life. What a change! and if our experience has been limited well may we pause and ask the cause of such a state. Our first thoughts turn to the ravages of poison, and we may even get the length of applying the most likely antidote in our endeavours to aid the patient. We might think of rupture of the digestive viscera, or of interference of the circulation at the heart. Seldom does the average general practitioner think of an abnormal pregnancy, and it is on his knowledge and promptness of action that the life of the patient depends. Death may take place unless surgical interference is resorted to. This portrait is drawn

in the darkest colours, as these cases are not so common as those where haemorrhage takes place more gradually - namely in "tubal abortion" or in "tubal rupture" from gradual "erosion" of the tube. The patient has some slight pelvic pain, or if severe lasting only a short time, and complains of a haemorrhagic discharge which often comes on like ordinary menstruation, being, however, more copious, and containing shreds or clots. She may have passed her period by a few weeks, and has had slight morning sickness. My experience is that the patient rarely, if ever, believes herself to be pregnant, as most of the symptoms are absent, although occasionally we do meet with typical cases. She stays in bed for a short time under the impression that she has had a "miscarriage," her doctor is sent for, who probably treats her for such, and it is only on finding that the condition shows no improvement that he considers other factors in the diagnosis of the case. These attacks of haemorrhage generally

recur several times, and the accompanying pain is often due to the local peritonitis which has been set up. In intra-ligamentary pregnancy the symptoms are usually slight when the tube ruptures, and they only become well marked when the walls of the ligament become so stretched as to rupture with consequent extrusion of their contents into the peritoneal cavity. What histories do we usually obtain from patients affected with tubal pregnancy? There is in most cases a history of <u>previous good health</u>, which is an important aid in diagnosis. <u>Previous sterility</u> is out of the question as the majority of cases have occurred at the time when an ordinary pregnancy would have taken place: in one of my cases a child had been born three months before, and in another seven months.

AMENORRHOEA is generally present, but not always, the patient is aware of a slight sanguineous discharge at intervals, and complains usually of profuse leucorrhoea. (This symptom was present

in all my cases, and is one that is scarcely mentioned by most writers.) Absence of amenorrhoea is no sign of normal pregnancy, as menstruation is possible for the first two months, that is to say, until the decidual vera reflexa completely unite, which usually happens about the third month. The signs of pregnancy, such as morning sickness, secretion in the nipples, etc. may or may not be present.

INTERNAL HAEMORRHAGE is very important, as it is seldom we see the patient before this occurs. The attacks may be single or repeated, the first occurring usually before the eighth week. The abdominal pain is severe, and griping in character. There is generally some swelling and distension of the abdomen, but this symptom is more marked in tubal rupture than in tubal abortion.

UTERINE HAEMORRHAGE is an important symptom, although not treated as such by most authorities, it was present in all my cases, and in most was the cause of the patient seeking admission to the

hospital. This discharge comes on gradually, or as a "flooding" as it is described by most patients. It may contain blood clot, with shreds of decidual tissue, or we may have a complete decidual cast. The blood is bright in colour, but afterwards becomes darker. According to Dr. Cullingworth the blood is always dark in colour, but in those cases which came under my notice, the blood was bright red at first.

This uterine haemorrhage is a symptom indicative of some interference with the course of the pregnancy, and of danger to the life of the foetus. On examination of the patient we observe the following signs - she may present the signs hitherto described under an acute attack, but as most of the cases which come under our notice have got over the acute stage, and are admitted to hospital complaining of haemorrhage and pain, it is to the milder form that we shall devote our attention - the patient is pale and anaemic, but otherwise healthy looking. Many cases have the appearance

of good health, and when on subsequent operation we found the pelvis filled with blood clot, it seemed to me that in no other condition do we have so great a variety in the facial expression. The breasts are sometimes full, the nipple secreting, but often they appear quite normal, although some pigmentation is generally to be seen around the nipple; the tubercles of Montgomerie are more often seen described in the pages of the text books than on the breast of the patient. The urine is often albuminous, probably due to pressure on the urinary tract, as it generally clears up after operation has been successfully performed.

The abdomen is enlarged and prominent in its lower part, and is distended if peritonitis has taken place, in many cases it is normal to inspection. The umbilicus may be depressed, especially if adhesions have formed with the anterior abdominal wall and haemorrhagic sac. On palpation a firm resistant mass is felt in lower part,

tender to pressure, and usually extending more on one side than on the other, although not necessarily on the side in which the haemorrhage has its source; it is often hard and irregular, and even elastic in some places owing to areas of fresh haemorrhages with old laminated blood clot. Seldom do we make out the foetal outlines, but often the fundus uteri can be made out as being more movable than the rest of the mass, which is usually fixed by surrounding adhesions. On percussion the abdomen is tympanitic, except where the mass is felt, and over it a changing note is heard, being deepest in the supra-pubic region. If the haemorrhage has been considerable the dulness may extend up the flanks, even to the costal margin, as in Case XVII. Occasionally the souffle can be heard, but rarely the foetal heart sounds, as in most cases which come under our notice the foetus is dead.

P. V.: The vulva and vagina are normal in

the early stages, but have the port wine colour of pregnancy later on when the pressure of the enlarging tumour has set up congestion. The tissues are very vascular, so that in most cases pulsating vessels are felt in either lateral fornix. The cervix is enlarged and softened, more especially in the early months: its position principally in those cases of the retro-peritoneal variety is close behind the symphysis pubis. So constant is this sign that I often relied upon it as one of the most certain signs of the condition. In some cases the cervix is pressed down by the tumour, until it lies low in the vagina.

The uterus is enlarged and softened, and is slightly elongated, the enlargement is uniform, the characteristic antero-posterior thickening of uterine pregnancy being absent. It is often pressed forwards in the pelvis, being anteposed and flexed over to the side opposite to that in which the haemorrhage has taken place. Most writers

describe the uterus as being retroposed, but the opposite condition has been my experience. The posterior part of the pelvis is generally filled by a tense mass continuous with that felt per abdomen, extending more to one lateral fornix than to the other. Sometimes when soft in consistence, the outlines of the foetus can be made out by the examining finger. This mass is found separated from the uterus by a distinct groove or by a ridge, but often the uterus lies embedded in the mass, and is difficult to differentiate from it. The vaginal walls are lax, and so obliterate the fornices. The sound - the passage of which should always be performed with extreme caution - usually passed beyond its normal length. There is usually tenderness and haemorrhage on examination. One point to notice in this condition is the gradual or even sometimes sudden enlargement of the tumour mass as evidenced by successive examinations, showing an increase of haemorrhage into the haematocele sac, or abdominal cavity.

DIFFERENTIAL DIAGNOSIS

During the last few years our knowledge on the subject of tubal gestation has so increased that in most cases we can arrive at a fairly correct diagnosis in cases where a thorough examination has been made. But cases are still to be found which show how limited one's knowledge is after all.

In the first place we must find out the condition of the uterus, and exclude normal pregnancy, then we should examine the appendages, and exclude all other complications. If the examination is unsatisfactory, as in cases where there is great pain, or extreme collapse, an anaesthetic will be of the utmost aid.

Tubal gestation is to be differentiated from -

I Simple Abortion

II Early Uterine Pregnancy with Pelvic Tumour

III Retroversion of Gravid Uterus

IV Tumours of Ovary and Broad Ligament

V Pyosalpinx

VI Sub-Peritoneal Myoma

VII Pelvic Haematocele and Pelvic Haematoma

VIII Appendicitis

IX Pelvic Cellulitis, Malignant Disease, etc.

I. SIMPLE ABORTION: In my opinion tubal gestation is one which almost invariably is mistaken for uterine abortion. There is the period of amenorrhoea, with symptoms of pregnancy, followed by sudden bearing down pains, with haemorrhagic discharge containing blood clot, coming on about the second or third month. There is perhaps the expulsion of the uterine decidua

which is looked upon as the complete expulsion of the products of conception. The patient is perhaps curetted, and this operation either leaves the symptoms unaltered, or it may bring on sudden haemorrhage due to the manipulative interference. Our only safeguard after evacuation of the bladder and bowels, is to make a careful bi-manual examination, and ascertain the exact condition of the uterus, and the presence or absence of a tumour outside it. The difficulty of diagnosis is great when we get a rigid abdominal wall with a soft uterus and slightly patulous cervix, as sometimes occurs after recent haemorrhage from the tube. If on careful curettage we examine the tissue microscopically, in tubal pregnancy decidual cells alone will be present: if decidual cells with chorionic villi are found, the diagnosis is that of an intra-uterine pregnancy.

II. EARLY UTERINE PREGNANCY WITH PELVIC TUMOUR: This condition may very closely simulate tubal preg-

nancy. The uterus is softened, and slightly enlarged with pulsation in the fornices, a cystic mass is felt bi-manually on one side of the uterus, and filling Douglas' Pouch, causing dulness to percussion per abdomen. There is the history of amenorrhoea, and perhaps breast signs, with morning sickness, etc.

In early intra-uterine pregnancy the uterus is softer, and is thickened antero-posteriorly, the fundus is rounded and less defined. Thinning of lower uterine segment felt per rectum. If previous chronic metritis has been present the condition is rendered more difficult.

On passing the sound in extra-uterine pregnancy the uterus is empty: if the interior of the uterus is thoroughly explored the presence of an intra-uterine pregnancy cannot be overlooked. There is, of course, the risk of inducing abortion in a uterine pregnancy, but it is the sacrifice of the lesser for the greater good, as the risk would be

much greater if an extra-uterine pregnancy were allowed to go on. The presence or absence of amenorrhoea is no guide, as menstruation may occur, as mentioned above, during the first few months of normal pregnancy. If the patient be kept under observation, the uterus in intra-uterine pregnancy will be seen to increase in size. If uterine abortion has taken place, and if a pelvic tumour is present, the diagnosis can only be made by microscopical examination of the curetted tissue.

The following case shows how easily an intra-uterine pregnancy with tubal complications may simulate a tubal gestation.

Mrs. C. aet. 27, married two years, I para eighteen months ago. Menstrual normal in character.

History - Six weeks before admission patient took a severe pain in left iliac region, coming on suddenly, lasting for several days, and continued more or less until admission. She fainted two

days before the onset of the pain, but has not fainted since. Previous to onset of pain she had 3½ months amenorrhoea, with other signs of pregnancy.

On examination - face flushed, temperature 100° Fahrenheit, pulse 106. Breasts secreting.

Abdomen - protuberant, dulness reaching to 2" below umbilicus. Hypogastrium contains a sensitive and slightly movable tumour in lateral direction. P. V. cervix enlarged and softened, close behind symphysis. Tense, irregular, sensitive mass filling posterior part of pelvis, which presses on rectal lumen, presenting there a more cystic feeling. From examination and the history, the case seemed to be typical of tubal gestation, with partial rupture, and formation of haematocele. The faintness indicated an internal haemorrhage, and the acute pain two days later seemed to have its cause in intra-pelvic pressure, and localized peritonitis. On the other hand the tumour was mobile, more like a 4½ months uterine pregnancy; there was

no anaemia nor uterine haemorrhage. The possibility of an extra and intra-uterine pregnancy was entertained, with some slight haemorrhage into D. P., the chief tumour mass being unruptured. On abdominal section the uterus was found to be 4 months pregnant. Left tube bent backwards and inwards, and adherent to bowel. The tube and ovary were found to be a mass of dark blood clot, gangrenous in appearance, and adherent all round in D. P. Tube and ovary removed. Patient made a good recovery, and was afterwards delivered of a female child at term, the labour being normal in character. The tube contained 6 ounces of brownish fluid, its walls were $\frac{1}{4}$" thick. The ovary was size of a small orange, completely infiltrated with blood. Internal walls thick and leathery. See accompanying sketch (haematoma of tube). Nothing could be made out on microscopical examination, although I examined sections from every part of the specimen. There is no record in any text book of.

a case similar to this. There was no torsion of the tube, nothing but an acute bend at inner ends of tube and ovarian ligament. Vessels in walls were enormously increased in size.

The condition was due to an obstruction to the ovarian arteries and veins on the left side, caused by the bend. This probably took place at the attack of fainting. There may have been an old tubal condition present, and on the uterus rising out of the pelvis it may have caused a bend in the tube, which by its obstruction set up venous congestion, and thus we have the haemorrhage and subsequent necrosis. There may also have been a varicose condition of the tube present.

III. RETROVERSION OF GRAVID UTERUS: Only in early months. In this condition there is great difficulty on micturition, owing to pressure from displaced cervix. There is sometimes retention with pregnancy, from a distended bladder, also constipation. The

cervix is close to symphysis, looking forwards and upwards, and continuous with mass in D. P., that is fundus uteri. This condition of the fundus is found in some cases of early tubal abortion, but in most cases of tubal pregnancy it is lying forwards. In tubal pregnancy retention of urine is rare, and the uterus is separated from the mass, the cervix looking downwards, and more to one side. In the latter there is the history of a previous acute attack, the uterus is empty, and is anterior to mass in D. P. The gravid uterus can usually be replaced, although attempts at such should never be performed until the position of the body of the uterus has been thoroughly made out.

IV. TUMOURS OF OVARIES AND BROAD LIGAMENT: These are sometimes difficult of differentiation, especially when small, and when the ovarian disturbance has caused amenorrhoea.

If torsion of the pedicle of the tumour has

taken place, the symptoms may closely resemble a ruptured tubal gestation, in so far as it causes a haematoma or haematocele - the symptoms of collapse also being present. The tumour, if ovarian, is usually separated from the uterus, but if intraligamentary it is very difficult, as the following case will show.

Mrs. P. aet. 30, married eleven years, IV para, last six months ago, labour difficult owing to some pelvic obstruction.

History - Three weeks ago while lifting a heavy weight patient felt something give way in her right side, followed by very severe pain. Next day a profuse "flooding" came on, with clots, this lasted for four days. Had another similar attack four days later, accompanied by vomiting, and faintness. Six weeks amenorrhoea before onset of symptoms, but no symptoms of pregnancy were present.

Examination - Patient pale and anxious looking.

Abdomen tender, slightly tympanitic.

P. V. Cervix lying forwards, and to the left. Pulsation in both fornices. Uterus enlarged in normal position, slightly boggy and lobulated. A mass the size of an orange is felt closely adherent to right lateral wall of uterus, and to posterior and right pelvic wall.

On reading the history of this case, one would immediately think of a pregnant tube, the first rupture having taken place at the onset of the pain and haemorrhage. The uterus was slightly enlarged, suggesting pregnancy. But there is also the history of pelvic obstruction at the last confinement, which would negative the former assumption, unless the pregnancy had been of old standing, when it would have been more likely to rupture at the time of labour.

On abdominal section, a mass was found between the layers of the right broad ligament, involving the ovary and tube, the latter being enlarged. On

sectioning this mass it was found to contain pus, but no evidence of decidual cells or chorionic villi could be found, although I examined several portions under the microscope. The symptoms may have been due to a slight rupture of the cyst setting up pain, the haemorrhage being due to the involvement of a vessel together with the congestion of the surrounding parts. No rupture, however, could be found on examination of the cyst walls.

V. PYO-SALPINX simulates tubal gestation closely, as in the double form the ovaries are often rendered inactive, and we have a period of amenorrhoea. There may be acute abdominal pain from a slight perforation, and if pus gets into the abdominal cavity, we have all the symptoms of collapse. On examination the pyosalpinx forms a tubal swelling, one side being more distended than the other, so that it feels almost one sided: there may be numerous adhesions simulating a haematocele. The points to -

note, however, in these cases are the previous history of ill-health, purulent leucorrhoeal discharge, with perhaps previous similar attacks: the signs of pregnancy being absent. Example -

Mrs. R. aet. 36, married sixteen years, VI para, last two years.

History - Three weeks ago after two months amenorrhoea, while at her work patient took a severe pain in the lower part of the abdomen, and left iliac region; she felt faint, and sick. Two days later had a similar attack, accompanied by rigors and uterine haemorrhage. Pain present ever since. Has had rigors and sweats, with vomiting on two previous occasions. Has had no suspicion of pregnancy.

Examination - Pale and anxious looking. Temperature 100.2°, pulse 92. Secretion in both breasts.

Abdomen - a rounded firm mass felt in left iliac region, extending slightly to right of middle line.

P. V. Cervix enlarged, close behind symphysis. D. P. occupied by a rounded, irregular, doughy mass, slightly cystic. Uterus measures $2\frac{3}{4}$".

The diagnosis here was in favour of tubal gestation, and abdominal section was performed, when it was found that the mass was a large collection of pus, communicating with extremity of left tube, and with cystic ovary, very adherent all round. Right tube and ovary enlarged, and thickened.

We must always bear in mind the possibility of a pyosalpinx being the result of a tubal gestation which has become infected, as no doubt many originate as such.

VI. SUB-PERITONEAL MYOMA: Diagnosis easy, but a very adherent tubal pregnancy may be taken for a myoma: but in myoma there is no history of pregnancy, or of an acute attack.

VII. PELVIC HAEMATOCELE OR HAEMATOMA: These are

very rare apart from ectopic, but may have their origin in:-

1. Regurgitation of menstrual fluid.
2. Varicose rupture in broad ligament.
3. Rupture of ovarian vessels.

There is the history, and the absence of pregnancy to be considered in these. The following is an example of the third class.

Mrs. S. aet. 35, married sixteen years, VI para; last eighteen months.

History - eight weeks ago while undressing she suddenly took a severe pain in left iliac region, which caused her to faint. This was followed by a clear discharge, copious at first. She felt sick. Next day took a "flooding," the haemorrhage being present more or less ever since; it was bright red in colour, but did not contain clots or membrane. She had three subsequent attacks of faintness. Menstruation always regular, but was

absent for five weeks before onset of symptoms, but no signs of pregnancy were present. No secretion in breasts.

Abdomen - A mass is felt filling lower part, more to right side.

P. V. Cervix close behind symphysis. Uterus anteflexed. D. P. filled by a large soft mass, fluctuant at one portion. On abdominal section under the diagnosis of a ruptured pregnant tube, we found the pelvis filled with about 1½ pints of dark fluid blood with clots, numerous adhesions. Right tube normal, ovary distended with blood, and showing a rupture - the source of the haemorrhage. Other appendages normal. The question was had we at last come upon an ovarian pregnancy? The symptoms were so typical of what one would imagine this condition to be: but nowhere could I find any evidence of it microscopically, although I made sections from all parts of the ovary and tube.

VIII. APPENDICITIS: In this condition we have the situation, history and temperature to guide us, but there might be some difficulty in distinguishing between it and ruptured right tubal pregnancy, when in the former the uterus is so adherent that it cannot be made out: although in most cases the uterus can be diagnosed as free from the tumour. Appendicitis may be a complication of tubal pregnancy.

IX. PELVIC CELLULITIS, MALIGNANT DISEASE, ETC.: In these we have the history of inflammation, absence of pregnancy, and the difference on frequent vaginal examinations. The chief difficulty being at the menopause where there are irregular haemorrhages, with perhaps colostrum in the breasts.

The diagnosis of such rare abnormalities as pregnancy in a bicornute uterus, or in a rudimentary horn of a malformed uterus need only be mentioned to be dismissed as being so rare. For the latter the treatment is similar, and for the former there is

the presence of the vaginal septum, the furrow at the fundus and the round ligament to the outer side of gestation sac.

SPURIOUS PREGNANCY can be cleared up when an anaesthetic is used, although when occurring at the menopause, and complicated by a tumour of the appendages, it is sometimes difficult unless the patient is anaesthetised.

Tubal gestation has complications, such as -

I. UTERINE AND TUBAL TOGETHER, as in case XVII. Franklin in the British Medical Journal, 1894, Vol. I. page 1019, reports a case where patient was in labour, and owing to difficulty of delivery, caesarean section was performed, and an extra-uterine foetus was found, the patient dying from haemorrhage as so often happens in these cases.

II. UTERINE SUBSEQUENT TO TUBAL PREGNANCY is rare, the foetus is usually calcified, and thus quiescent

when the uterine takes place. Bozeman in the New York Medical Journal, 1884, page 693, reports a case where after delivery a mass was found in the posterior fornix, it was incised, and the sac of an extra-uterine foetation was found, which had taken place some years before.

III. BI-LATERAL, CONCURRENT TUBAL PREGNANCY AND REPEATED TUBAL PREGNANCY: Examples of these are reported by Walter, British Medical Journal, 1892, October 1st; Edgar. Trans. Glasg. Obst. and Gyn. Society, Vol. I, page 54; Haig Ferguson, Edinburgh Medical Journal, February 1899. The condition is more frequent on both sides. In my own case - see Case XX - the condition occurred on the same side.

It is only by a thorough and careful examination of all the post-mortem and post-operative specimens, which are at our disposal, that we can come to a true and perfect knowledge of this complicated

subject. I have endeavoured to illustrate my researches by photographs, and by drawings. As I found photographs of my microscopic sections much inferior to drawings as a mode of illustration, I had recourse to the latter, and have endeavoured to conscientiously delineate what I have personally observed.