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Extra uterine pregnancy

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EXTRA - UTERINE PREGNANCY.

JACOB F. SCHULTZ.

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HISTORY

Extra-uterine pregnancy was apparently unknown to the ancients, there being no reference to the subject in the works on Greek or Roman medicine. The first recorded case is that of Albucasis, an Arabian physician living in Spain about the middle of the eleventh century. He reports a case where he saw parts of a foetal body escaping from the abdomen of a woman by the process of suppuration.

This was a case of a long retained secondary abdominal pregnancy, and all of the older cases that were reported were of this type.

Another interesting example is that of the lithopedion of Sens, Reported by Cordeaus early in the sixteenth century.

In the early half of the sixteenth century Cornax dilated an ulcer which formed near the umbilicus and extracted a semi-putrid fetus, which had been retained for nearly five years. The woman recovered so well after the operation as to conceive again, had a natural delivery and died sometime later.

The earliest absolutely definite case of surgery for the removal of the abdominal fetus, is that of Primrose in 1594. The patient was twice pregnant with extra-uterine children. First in 1591 and again sometime before 1594. The cyst of the first child opened spontaneously through the abdominal wall. The fistula was enlarged and this child extracted by Jacob Neierus, a surgeon.

This operation proving successful Primrose removed the second infant gastrotomy two months later.

The first record of tubal gestation with rupture and the classical symptoms of this condition is that of Riolan, reported in 1604. He gives the case of a lady age 31, who with the exception of a hard, slightly painful tumor the size of an egg, situated above the right groin, experienced no unusual complaint until she was about four months pregnant of her eighth child. January 2, 1604 she was seized with violent pains about the pubes, extending from the pelvis to the upper part of the chest, with occasional syncope, which continued until the next morning when she died. The right tube was found to contain a fetus, but the uterus was healthy and uninjured. Riolan also reported a similar case in 1638.

In 1669, Mauriceau reported a case of ruptured ectopic pregnancy. He reported of a woman in whose abdomen was found, after death, a small fetus about $2\frac{1}{2}$ inches long together with a great quantity of blood.

The first evidence of a true understanding of the cause and the phenomena of ectopic pregnancy is found in the works of Pierre Dionis, published in 1718. Dionis says "If the egg be too big, or if the diameter of the tube is too small, the egg stops and can go no farther, but shoots forth and takes root there; and having the same communication with the blood vessels of the tuba that it would have had with those of the womb, had it fallen into

it, is nourished and grows big to such a degree that the membrane on the tuba, being capable of no such dilatation as that of the uterus, breaks at last, and the fetus falls into the cavity of the abdomen, where it sometimes lies dead for many years and at other times occasions the death of the mother by breaking open its prison."

The first recorded case of operation for extra uterine pregnancy in America is reported by Dr. John Bard a surgeon of New York, in a communication to the Journal "Medical observations and Inquires" dated December 25, 1759 and states the history of a case, in which a Mrs. Stagg, age 28, during her second pregnancy was more disordered than in her first, and at the end of nine months she had some labor pains but no flow of water or other discharge. The pains soon were off and there remained a large, hard, indolent mass inclining toward the right side. In five months she again conceived and at term, after a short and easy labor, was delivered of a healthy child. Five days later she was seized with a violent fever, purging pain in the tumor and fetid sweats. At the end of nine weeks, as the tumor developed fluctuation, Bard made an incision through the right rectus muscle and delivered the suppurating body of a full term fetus. Wound was drained and patient made a good recovery.

On January 14, 1791 Dr. William Baynham performed an operation on Mrs. Cecke successfully.

Dr. McKnight performed a successful operation in 1795 and Dr. Baynham was again successful on February 6, 1799, by performing an operation on a negro slave. In 1823 Dr. Wishart performed a

successful operation. Dr. A. H. Stevens of New York successfully operated on a patient in 1846.

From this time on interest in the subject grew, three varieties of ectopic pregnancy being generally admitted to occur; tubal, ovarian and abdominal. In 1824 Breschet added what is now called interstitial pregnancy.

In 1837 Dezeimeris gave an important monograph on ectopic pregnancy and included a careful study of the pathology.

Parry's work on ectopic pregnancy came out in 1876 and was the best up to this time.

After Parry, Loirson Tait in 1888 so definitely established the pathology and treatment of this accident that in the main, his views are still accepted by the profession.

The first case of ovarian pregnancy was diagnosed in 1682 by Dr. de S. Maurice.

Although abdominal section was first suggested in the treatment of ruptured tubal pregnancy by Dr. Hubert in 1849, the first operation was performed by Loirson Tait in 1883.

In 1882, T. Gaillard Thomas and H. J. Garigues, foremost gynecologists, in a paper read before the American Gynecological Society strongly advocated the use of electricity in cases of ectopic pregnancy, the principle being to destroy the life of the ovum by a strong galvanic current applied to the enlarged tube via the vagina. After viability of the child, Ceaserean section was permissible.

The first American operation for ruptured ectopic pregnancy

was in October 1883 by Dr. Chas. K. Briddon of New York City. Patient developed signs of ruptured ectopic pregnancy and Dr. Briddon made a diagnosis and proved his correctness by laparotomy and removal of fetus and ruptured tube. Patient died after forty - seven hours from shock.

From this time on operative interference in ectopic pregnancy has been recognized as the proper treatment.

FREQUENCY.

Schuman states that racial incidence in the United States is a negligible factor and this condition is found most frequently in women between the ages of 24 and 33 years.

The figures given by the various authors has a wide variation. Bandl of Vienna saw only three cases in 60,000 births.

Wynne of Johns Hopkins reports 303 cases of ectopic pregnancy in 22,688 patients in the Gynecological Clinic.

B. D. Urdan of Mount Siani hospital in New York reports the incidence of 1.5% of all Gynecological patients over a nineteen year period. Only 22% being Primipara's.

M. C. Hennessy of Mercy hospital places the incidence at 1 to 40 normal pregnancies.

L. C. Scheffey of Jefferson Medical College, reports 82 ectopic pregnancies in 3,747 admissions to their gynecology service, an incidence of 2.19%.

Schuman in checking the records of the city of Philadelphia for the year 1918 found 186 ectopic gestations and 56,441 intra-uterine pregnancies. He also states that his estimate, after

reviewing the literature, is 1 ectopic to 303 intra-uterine pregnancies and that the increased frequency of ectopic gestation during the past 40 years can best be explained by more cases being accurately diagnosed.

ETIOLOGY

Interference of the downward progress of the fertilized ovum, on its route to the uterine cavity is the underlying etiological principle regardless what factor or factors may be causing this interference.

The ovum and sperm normally meet in the tube and the fertilized ovum continues on and enters the uterine cavity where it attaches itself to the endometrium as the ovum reaches the trophoblastic stage. If the ovum does not reach the uterus and it continues to develop, ectopic gestation is the result.

Conditions causing interference are:

I. Salpingitis:

The underlying factors here according to Crossen are the fact that the cilia of the tube are destroyed and the mechanical obstruction due to the swelling of the tubal mucosa.

H. C. Falk goes on to say that salpingitis is probably the most frequent etiological factor, as most observers are able to elicit a history of previous inflammation and gonorrhoea is the most frequent. Rabinowitz in a series of 147 cases believes gonorrhoeal salpingitis is the predominant cause of tubal pregnancy. Hahn of Vienna agrees after studying 246 cases. Alfred DeLee has observed the low incidence of ectopic gestation in the rural

areas and draws the conclusion that is due to the rarity of gonorrhoeal infections in the rural districts.

Falk was also unable to produce ectopic gestations in animals and they are gonorrhoeal free. He describes the process due to the fact that the epithelium covering folds of the tubes are destroyed by infection. The epithelium at the base of the folds regenerate and forms gland like spaces; called a follicular salpingitis. Reconstruction of these gland like spaces show them to be parallel to the lumen of the tube. Their ends may be opened or closed. Open ends may communicate with the lumen of the tube. Therefore it is easy to see and understand how an impregnated ovum traveling down a tube may be lodged in one of these tubal labrynth and develop there as an ectopic gestation.

These pseudoglands may be found (1) along the wall of the tube (2) filling the lumen of the tube or (3) in the wall of the tube. In type (2) it is formed by reversion of the epithelium (Mullerion duct) and the formation of an adenoma or gland like structure. Type (3) is formed by outgrowth of the epithelium to line the cavity of a mural abcess which has ruptured into the lumen of the tube; or a true gland is formed by metaplasia from stimulation of the epithelium.

These growths are most frequently found in the ampulla of the tube and rarely in the isthmus. This fact bears a direct relationship to frequency of ectopic gestation in various parts of the tube.

Falk states in his series of cases follicular salpingitis was the etiological factor in 90% of tubal pregnancies.

It is generally believed that inflammation of the fallopian tubes by narrowing the lumen and thus preventing the passage of

impregnated ovum to the uterus, an important factor in ectopic gestation," says H. C. Taylor of Roosevelt hospital.

But R. C. VanEtten in a series of 77 cases over a five year period found only 8 cases showing evidence of previous pelvic inflammation which is contrary to the findings of most writers.

II. Adhesions:

These may be internal caused by previous inflammation in the tube either of specific or non-specific character and thus blocking the lumen of the tube in a mechanical block. The same type occluding the tubal lumen might be produced by external adhesions which by their pull has distorted the tube or by a circular band constricting the tube.

III. Tumors.

These abnormal growths also cause a mechanical occlusion of the tubal lumen due to pressure or direct growth. Also the fact that they tend to produce sterility may be a factor.

IV. Malformations.

The chief anomalies are spiral twists of an embryonic tube, diverticulae and rudimentary tubes according to Crossen.

V. Ovarian pregnancy.

According to Sutton there is the true type in which the fertilized ovum undergoes it's development entirely within the ovary. Or the second type in which the ovum following fertilization, undergoes a certain stage of its development in some nearby structure or cavity, usually the tube and then becomes planted in the ovary.

One theory postulates that the occlusion of the rupture by a small blood clot makes expulsion of the ovum impossible. This would also prevent the entrance of spermatozoon into the follicle.

The second theory assumes the ovum is dislocated, does not get into the stream of escaping liquor and may be retained in the follicle. But this condition could not be demonstrated by Strassman after an extensive study.

A. Wollner in reviewing the literature says Sutton & Bass found that a history of long standing sterility of 6 to 16 years previous to ovarian pregnancies was the usual case. This demonstrates the pathology is not confined to a graafian follicle, but the whole ovary is involved. The pathology consists of a changed mechanism of ovulation. The follicles do not discharge the ovum, but the ovum remains within the follicle and perishes there except in rare cases when fertilization takes place.

The force required to move the ovum depends upon the intra-follicular pressure and the resistance of the membranous wall of the ovary. Any pathology of the tunica albuginea is likely to increase resistance of the follicle wall. When the follicle wall's resistance is increased, the extent of the rupture is smaller and the liquor will not escape with a gush, but dribble out slowly thus not having enough force to free the ovum and flush it into the abdominal cavity. Thus the ovum if fertilized must take place within the ovary.

Microscopic studies have shown the thickened tunica albuginea with ovarian stroma filled with follicle cysts which could not rupture because of the thickened coat. These cysts were non-ruptured Graafian follicles.

The Criteria necessary before an ovarian pregnancy can be considered as a true type was laid down by Speegelberg and is as follows. The tube on the affected side must be in tact, the foetal

sac occupying the position of the ovary, be connected with the uterus by the ovarian ligament and ovarian tissue must be found in the wall of the sac. There have been 45 cases reported that meet these requirements.

VI. Gold Spring pessary:

C. Potter had a series of three cases of ectopic gestation with pessary in place.

Because fecundation rarely takes place with a foreign body in the uterus and the construction of the pessary and its position in utero makes it an ideal scaffold for the transmission of sperm through the uterine cavity into the tube where conception takes place.

VII. Multiple pregnancies:

L. C. Scheffey and T. R. Morgan in studying their series of cases found that as parity increases the incidence of ectopic gestation increased and 80% of their ectopic cases were multiparous.

VIII. Functional Changes.

M. R. Robinson also believes that functional disturbances of the tubal peristalsis of a congenital or psychic origin should be considered as well as a precocious development of the properties of nidation in the ovum.

PATHOLOGY.

In considering first the implantation of the ovum in the tubal wall. Peters demonstrated that an ovum can develop only on a spot free from epithelium sinking through the decidua to rest on the sub-epithelial layer of the muscularis and producing such reaction as to

provoke dilatation of the lymph spaces and edema of the myometrium and endometrium immediately surrounding the ovum. A decidua not being necessary for the imbedding of an ovum. There is also a marked hyperemia, increased growth of all tissue elements of the tubal wall, the stroma cells becoming decidua cells according to Crossen.

Asehoff and Kuhne greatly doubt the very existence of tubal decidua; only a pseudo-decidua consisting of fibrin connective tissue and invading ectoderm cells being present.

Implantation may occur as columnar, intercolumnar or centrifugal types.

Columnar imbedding is very rare occurring when the ovum attaches itself to one of the tree-like folds of the tubal mucosa, later becoming attached to other folds, but nowhere in contact with the tube wall itself. The ovum derives its food supply from blood vessels of the mucosa for a short time, but soon the mucosa is eroded by the phagocytic action of the syncytial cells and the ovum comes to lie in the tube wall, the villi of the chorion penetrating the muscularis of the tubal wall.

Intercolumnar implantation occurs when primary imbedding takes place between the folds of the tubal mucosa, the ovum resting upon the surface of the tube wall, burrowing beneath it to lie in direct contact with the muscularis, compressing and eroding the adjacent folds of the mucosa. In such cases the adjacent mucosal folds unite over the implanted ovum form a sort of false decidua capsularis or reflexia.

The centrifugal form of implantation according to Bandler

occurs when the ovum sinks into the wall of the tube and an invasion of the wall and vessels by the villi may take place even up to the serosa. The capsuloritis is formed by muscularis and mucosa. Bandler thinks that this type of imbedding forms most of the tubal ruptures.

No matter what form of implantation is taken by the ovum, one factor is constant. There is always an excessive amount of hemorrhage about the ovum. Otherwise the attachment of the ovum to the tubal wall is closely akin to that seen in normal intra-uterine implantation.

The tubal and uterine placenta are identical in formation, except as development proceeds, the thin tubal wall lacking the true decidua serotina is easily invaded by the trophoblast and syncytial cells since there is no active connective tissue reaction set up in the tube by the presence of fetal cells. The villi rapidly penetrate the tubal wall and are soon found just beneath the serous coat, which is in turn invaded with resulting rupture. The tubal placenta also suffers from lack of nutrition, the false sinuses formed by the penetration of tubal vessels by the trophoblast being in no way comparable to the rich blood supply developed in the uterine wall. Microscopically the tubal and uterine placentas are identical in all respects.

The implantation process according to Schuman is as follows:

There is formation of a gestation sac bounded on all sides by a layer of trophoblastic cells and masses of fibrin. This capsular membrane is formed of trophoblastic elements and products of degeneration of the tubal mucosa overlying the ovum. The trophoblastic

cells besides forming a portion of the sac wall, lie in masses between the muscle fibers of the tube and tend to separate muscle bundles from one another. There is rarely formed a true decidua, in the sense of a proliferation of maternal sub-epithelial stroma as in the uterus. These same cells invade the walls of the tubal vessels, especially near the site of implantation of the ovum.

There is but slight connective tissue reaction to the corrosion of the invading trophoblast, this explaining the lack of resistance of the tube wall to the distention of the growing embryo. In as much as the decidua is supposedly an important factor in inhibiting excessive corrosive action of the trophoblast cells, the absence of true decidua in the tube predicates an excess of blood surrounding the ovum, especially, since the inter-villous space in tubal pregnancy is always markedly vasculated and the vessels widely invaded by masses of the trophoblast.

The influence of an impregnated and embedded ovum, wherever situated, always brings about an evolution of the uterus to some degree together with the development of a decidua vera in that organ. The increase in size of the uterus is due to hyperemia and thickening of the endometrium according to Sampson.

"The site of greatest decidual reaction is in the placental area and the tissues in its immediate vicinity," M. R. Robinson.

A. R. Moritz and M. Douglas disagree with Sampson in that the endometrium in over half their cases was in the resting phase and in 30% of their cases the endometrium was in varying degrees of cyclic hyperplasia. While only half of their cases showed any tubal decidua being present.

B. S. Kline also found that the decidual reaction occurs most frequently at the site of implantation but it is not constant. But when decidual tissue is present it persists as long as the chorionic villi are in tact.

Upon death of the ovum and termination of the ectopic gestation the uterus always undergoes involution if any evolution has taken place.

In terminating a tubal pregnancy the tube undergoes a measure of intermittent contractions endeavoring to expell its contents. These contractions transmitted to the uterus, which in turn contracts as in labor, but to a far less degree.

"The clinical expression of such uterine contractions is bleeding from the endometrium, with extrusion of portions of the decidua. It may be concluded therefore, that uterine bleeding and the passage of decidua in ectopic pregnancy invariably predicates hemorrhage about the aberrant ovum and the termination of the extra uterine gestation. So long as the embryo is living and development is in progress, there is no uterine bleeding." Schuman.

Kline believes that the relative frequent occurrence of vaginal bleeding in ectopic gestation probably depends upon changes other than casting off of uterine decidua as in only 28% of cases was decidual tissue found upon currettage.

Robinson says that uterine bleeding in ectopic is due to the death of the ovum and to the simultaneous suspension of the inhibitory function of the corpus luteum, which begins to involute, thus partially agreeing with Schuman.

The size of the decidual cast when present depends upon the duration of the pregnancy at the time it is cast off. It is usually somewhat fleshy, being several millimeters in thickness and is of a pink color. The inner surface is smooth and glistening. The outer is rough or shaggy and numerous shreds of blood clot are found scattered over it.

Crossens pathological classification is as follows:

I. Before rupture:

(a) Embryo intact surrounded by the tubal tissue.

II. Intraperitoneal rupture with a single moderate hemorrhage.

(a) Blood gravitates into culdesac of Douglas.

(b) Adhesions form and hematocele formed.

(c) Blood may be absorbed.

(d) May require surgical drainage.

(e) Embryo cast off with all its membranes, but it is usually absorbed.

III. Intraperitoneal rupture with repeated moderate hemorrhage.

(a) Membranes usually remain partly intact and embryo continues to grow.

(b) Adhesions are formed.

(c) As growth of embryo continues repeated hemorrhages occur due to tearing of the vessel walls and opening of sinuses.

(d) Majority of operable cases are of this type.

IV. Intraperitoneal rupture with profuse hemorrhage.

(a) Patient passes into severe shock.

(b) Usually occurs when ovum is at the isthmus of the tube.

V. Tubal abortion.

(a) Complete, when embryo and membranes are extruded into the peritoneal cavity via lumen of the tube.

(b) Incomplete, when a portion of fetal elements remain in tube.

VI. Rupture into broad ligament.

(a) Hematoma formed in the connective tissue.

(b) Hematoma may involve both broad ligaments.

VII. Interstitial pregnancy.

(a) Development takes place in wall of the uterus outside of the uterine cavity.

(b) Rupture is usually late in the pregnancy and may be into the uterine cavity.

(c) Symptoms and signs those of a normal intra-uterine pregnancy.

VIII. Ovarian pregnancy.

(a) Previously discussed.

IX. Wandering pregnancy.

(a) Pregnancy in peritoneal cavity without apparent connection with tubes, uterus or ovaries.

(b) Abdominal pregnancy never primary.

FATE OF THE EMBRYO.

In the great majority of cases of ectopic gestation the embryo is destroyed during the early weeks of development. Mall states that in normal implantation in the tube most of the ova are destroyed in the early stages by the hemorrhage which is produced for their

nourishment.

Embryo's may develop to full term or nearly so but here deformities are usually found to be present and to be from the effects of pressure.

SYMPTOMS & DIAGNOSIS.

A discussion of symptoms and diagnosis of extra-uterine pregnancy opens a large and somewhat confused subject. That pregnancy of some type exists must first be confirmed, after which a localization of the imbedded ovum may be attempted. If extra uterine, which structures are invaded by the aberrantly situated ovum.

A: SYMPTOMS & SIGNS.

1. Menstrual irregularities.

Crossen, R. M. Grier, J. J. Dumphy, M. Sabel, S. R. Meaker, Polak and many other writers found complete amenorrhea or menstrual changes in almost every case they reviewed. The exception being a proper diagnosis following rupture after the last regular period and before the time for the next period.

2. Pain.

This was the initial symptom in 80% of J. J. Dumphy's cases and the pain was acute and sharp in character. M. Sabel says pain is the most constant symptom in ectopic gestation and is usually found on or toward the affected side. S. R. Meaker makes the statement the only constant symptom in ectopic is pain which is irregular in occurrence, severe in degree and sharp in character, and often radiates to the shoulders, back or thighs. Severe attacks of pain accompanied by weakness and faintness are very important. M. R.

Robinson says that the shoulder pain is referred along the phrenic nerve when blood is in the subdiaphragmatic space and when present is very important as a diagnostic sign. T. E. Lovell agrees that abdominal pain is always constant in some form and is usually severe, irregular and colicky in character being very common.

3. Bloody vaginal discharge.

This symptom was found to be present in nearly all the cases reviewed in the literature, but varied greatly in character. However it usually starts a few days after onset of the pain, not so profuse as a menstrual flow, irregular, and often persisting for a week or two.

4. Slight Fever.

All authors again found a fever of over 102 degrees F. very rare except in cases complicated by an added infectious process. Usually the temperature is nearer 100 degrees F.

5. Syncope.

R. M. Grier found this condition present in 53% of his cases. C. A. Gordon noted syncope in 40% of his series of 120 cases.

6. Nausea and vomiting.

Only 26% of L. E. Lorell's 410 cases at Bellevue hospital complained of nausea and vomiting. C. A. Gordon says vomiting was present in 75% of his ruptured cases and that it usually accompanied the rupture of the tube. Morning nausea and vomiting was conspicuous by their absence in B. D. Urdans series of 474 cases.

7. Breast Changes.

L. W. Elston noted breast changes in only 12% of his cases, while Urdan makes the statement that again this symptom was

conspicuous by its absence.

8. Painful urination and defecation.

This symptom was found in 33% of C. A. Gordons cases; 15% had painful defecation. No other author mentioned these symptoms in reviewing their cases.

9. Abdominal tenderness.

The tenderness on palpation was localized in some cases while in others the entire lower abdomen was tender. R. M. Grier found this sign present in 86% of cases. Lorell says abdominal tenderness in ectopic is usually less than that of pelvic inflammation or appendicitis. Scheffy also found abdominal tenderness in 85% of his cases and rigidity in 42% of these cases. Meaker says there is pelvic tenderness as long as the tube contains the growing ovum and this can best be elicited by direct manipulation of the uterus.

10. Palpable mass.

Mass was found in only 52% of Grier's cases at Evanston hospital. Scheffy was able to palpate a mass in only 12 of 82 cases.

11. Uterine Changes.

Lorell calls attention to the fact that the uterus is usually forward, slightly enlarged and soft. Cervix if tender on motion is highly suggestive of ectopic gestation, after ruling out some pelvic inflammatory process, (however usually cervix is not tender on motion.) Gordon found in his series of 120 cases pain in 94% of his patients when the cervix was moved, especially if cervix was drawn forward.

12. Hemoglobin.

This was extremely variable as is the case with most of the symptoms of ectopic gestation. Scheffy found the hemoglobin readings between 55 and 85 (Sahli method) in 60% of cases. Urdan says the hemoglobin varied with the degree of hemorrhage.

13. White blood count.

Urdan found a white count of over 15,000 rare and says that a differential is of no value. While Scheffy found 40% of his cases with a white count between 8,000 and 11,000 and very few over 15,000.

14. Red blood Count.

Again this will vary with the degree of hemorrhage and Scheffy states that over half of his patients had a count of 2.5 million to 4 million.

15. Blood pressure.

The systolic pressure in practically all of Scheffy's cases was from 100 to 140.

16. Jaundice.

This condition present 8 of 12 cases of J. J. Dumphy, and occurs from intraperitoneal hemorrhage and absorption.

B. Diagnosis.

Schuman says that in diagnosing an ectopic gestation the cases fall into the following natural grouping.

I. The existence of a tubal pregnancy without any leakage of blood into the abdominal cavity.

This is the most difficult type to diagnose but the following facts will be of aid. A history amenorrhea, or a delayed period in a woman who is usually regular, previous pelvic operation or attack

of pelvic pain, due to a low grade salpingitis, or a mother of only one child is of some presumptive value. The concomitant signs of early pregnancy, amenorrhea, morning nausea and vomiting, pain and tingling of breasts with appearance of colostrum, increased pigmentation in various skin areas, softening of cervix, enlargement of uterus, cyanosis of vaginal mucosa, increased anti-flexion of the uterus, frequency of urination are all of value if present but they are usually absent.

Vaginally there may be detected a slight degree of softening of the cervix. The tube will rarely be palpable. There is little or no pelvic pain, no leukocytosis and no change in the urine.

Diagnosis of this type of case is usually by accident.

II. Tubal pregnancy with beginning tubal abortion or a minute rupture, permitting a small quantity of free blood to come into contact with the peritoneal surfaces.

This type of case should usually be diagnosed correctly from; history, behavior of menstrual flow, indefinite signs of pregnancy, presence of pelvic pain, even though slight in character and elicitation of tender mass in one or the other vaginal fornix upon bi-manual examination.

In Polak's series of 227 cases 222 of the women presented some menstrual anomaly, as a period of amenorrhea, prolongation of the normal period, anomalous character of the bloody discharge, followed by an intermittent or continuous metorrhagia. According to Polak the vaginal discharge has definite characteristics of brownish-red blood mixed with mucus which does not clot and its quantity is increased from time to time, co-incident with the painful paroxysms.

III. Tubal pregnancy with frank rupture of the sac or a tubal abortion.

These women are suddenly and without any premonitory symptoms seized with an agonizing and lancinating pain in the lower abdomen, usually accompanied by extreme nausea and vomiting, rapidly followed by syncope, collapse and shock. The pulse steadily increases in rate and equally decreases in volume, with cold, clammy, leaking skin, sub-normal temperature, pallid features, rapid and shallow respirations, contracted pupils, facies of extreme anxiety, intense restlessness, thirst, air hunger and with mentality unimpaired.

Examination reveals, abdomen slightly distended, rigid on the affected side, often very tender on palpation. On vaginal examination posterior fornix is bulged with clots of blood and presents a doughy feel to the finger.

The urine is scant, otherwise unchanged. Blood picture shows no great disturbance of its red blood cells the first few hours, although later a profound anemia is present. There is a leukocytosis and increase in polyneuclear leukocytes.

IV. Late abdominal lesions caused by a pre-existing tubal pregnancy, where rupture or tubal abortion has been unrecognized or at least not surgically treated.

The best guide in these cases is a history showing patient had a period of amenorrhea previously, which was followed by a sudden severe pelvic pain, with syncope and confinement to bed for several weeks, after which she recovered, menstruation appeared and patient resumed normal life.

V. Ectopic gestation other than tubal in character.

1. Interstitial pregnancy. Diagnosis is difficult before rupture and usually impossible after rupture, since the phenomena are identical with those of ruptured tubal pregnancy.

But pain is usually early and develops before bleeding or death of ovum occurs, this being due to the fact that the uterine horns don't stand distention and pain begins shortly after slight distention takes place.

2. Ovarian pregnancy. This condition presents no features which permit of its diagnosis before rupture, nor are there any distinctive signs after rupture which will serve to differentiate it from other forms of extra uterine pregnancy.

3. Abdominal pregnancy, of primary type cannot be demonstrated clinically, and therefore cases of this type are to be regarded as secondary to tubal rupture or tubal abortion. The diagnosis depends first upon a history of an acute attack of illness, which corresponds to the rupture of an ectopic gestation.

Should the ovum not be destroyed, development may continue and the fetus live and grow to maturity. In this case fetal movements are far more vigorous and demonstrable than in intra-uterine pregnancy. Vague abdominal pain is a common symptom, probably due to irritation of the peritoneum which may also cause nausea and vomiting.

On palpation, the fetus feels as though it is just under the skin. Usually fetus is excessively movable.

On vaginal examination the uterus is small, cervix may be soft but no Hegars sign.

Besides the history and physical examination there are some

laboratory measures which are of great value at times in making a correct and early diagnosis of ectopic gestation.

Because Dumphy found jaundice present in several of his suspected ectopic cases he did a quantitative Van den Bergh tests and found the serum bilirubin to be well above the normal and goes on to say it is a valuable procedure in doubtful cases.

But E. A. Horovitz and T. T. Kuttner have concluded from their work that ectopic gestation cannot be diagnosed by determination of the bilirubin concentration of the peripheral blood; as blood bilirubin values are no different in ectopic's than in other gynecological diseases. However they make no comment as to whether their patients were jaundiced or not.

By the use of the X-ray and injection of lipiodol into the uterine cavity and tubes, a doubtful case can be correctly diagnosed. Titus used this means in working out a case of an abdominal pregnancy of approximately eight months development which became calcified and was carried as a tumor mass for forty years. The X-ray plate thus showing the fetal mass outside the uterine cavity.

G. R. Osborn says that because of the high mortality attending the removal of an abdominal pregnancy anytime after the middle of the gestation period, whether fetus is alive or dead, an early positive diagnosis is important. Ten cubic centimeters of lipiodol was injected into the uterus and the skiagram confirmed the diagnosis of an abdominal pregnancy. No oil showing outside the uterus, indicates closed tubes and also shows definite size of the uterus.

The Aschheim Zondek test is valuable in diagnosis of ectopic gestation as well as for cases of doubtful intra-uterine pregnancy.

Aschheim says "The test can be expected to be positive in tubal gestation when the embryo is alive or not later than ten days after the death of the fetus. S. Klein considers this a valuable procedure in differentiating ectopic from adenexal disease.

DIFFERENTIAL DIAGNOSIS.

I. Salpingitis (acute)

One can often get a history of possible infection. The symptoms come on gradually, increasing pelvic pain with leucorrhoea and pain reaching its intensity several days after the onset. Also the pulse, temperature and leukocytosis is higher in a case of salpingitis. The swollen tube is more easily outlined and tenderness and pain on examination bi-manually is markedly less:

Evidence of urethritis or Barthelinitis is of help in differentiating as well as obtaining a smear showing the gonococci in cases of specific infection.

Urdan also found in his cases of acute salpingitis that the sedimentation time was 30 minutes or less in 90% of cases. While in ectopics the sedimentation time was over 30 minutes.

An interesting case of tuberculous salpingitis simulating a ruptured tubal pregnancy was reported by K. A. Meyer and A. F. Lash. Patient was a woman age 26 with a history and clinical picture of a ruptured tubal pregnancy. Cause of rupture and hemoperitonitis was due to necrosis of a blood vessel by the tuberculous process. The hemorrhage had dissected the peritoneum over the bladder and a broad ligament, giving rise to pain in the left lower quadrant and tenderness over the bladder.

II. Intra-uterine pregnancy with a threatened abortion.

In this condition the pain is cramp-like, intermittent and steadily grows more severe as the uterine contractions increase in frequency and force. In ectopic the pain is severe at onset and localized but becomes dull with generalized abdominal distress.

In intra-uterine pregnancy the bleeding is generally profuse and the blood is bright red while in ectopic pregnancy the hemorrhage is apt to be small and the blood brownish in color.

Mass in cul de sac suggests ectopic also.

III. Unsuspected tumor.

Here the pain should be dull and from pressure phenomenon, also a palpable mass should be present and an afebrile condition. Onset of pain should be gradual.

IV. Acute appendicitis.

In appendicitis the history is usually of nausea and vomiting following a meal, pain is first in epigastrium and then radiates down to lower right quadrant and localizes at McBurneys point. The temperature would be higher and patient would have a relatively high white blood count, usually over 15,000 and an increase in the Polys.

V. Perforations of the Gastro-intestinal tract.

Onset is very acute with a sharp lancinating pain and location of pain most likely in upper abdomen. Also previous history of gastric disturbance, very likely an ulcer history at some time during patients life.

VI. Fulminating pelvic edema.

In this condition the skin is not persistently blanched and the pulse although rapid usually has a better volume than in cases of ectopic pregnancy.

TREATMENT.

I. Before rupture has occurred.

In a suspected case immediate hospitalization, and prior to going to hospital treat solely to prevent rupture or tubal abortion. Keep patient in bed at absolute rest. Do no manipulations and watch diet to prevent constipation. Prompt exploratory operation should be performed as soon as possible. This type of treatment is used by Schuman, Urdan, Sabel, Crossen, Brown, Polak and others.

II. Treatment when rupture of sac has occurred with intra-abdominal hemorrhage and when immediate operation is impracticable.

Under such conditions Schuman advises absolute rest, with no change from the recumbent position, on the part of the patient, for any purpose whatsoever. An ice bag is placed on lower abdomen, diet largely of liquids. Bowels being evacuated by means of low enemata.

The only drug of value is morphine, which should be administered in such doses as to give absolute rest and relaxation on the part of the patient.

In the event of increasing hemorrhage and evidence of acute anemia, extremities should be firmly bandaged and foot of bed elevated. Abundant external heat is to be applied. This treatment should be used only in preparation for operation.

Polak advises similiar treatment as described above on the theory that the patient is in better condition to withstand surgical operation if she has been in shock or had rather severe hemorrhage, but H. P. Brown feels that the risk of delay is greater than when the abdomen is opened and bleeding checked under direct supervision.

III. Treatment of ruptured ectopic with surgical facilities available.

It is the opinion of Schuman, Urdan, Sabel, Brown, Danzis and Crossen that all cases of ectopic gestation should be subjected to operation as soon as practicable, regardless of condition of the patient.

Give morphine Sulphate grs. 1/4 by hypodermic immediately upon diagnosis. Lower head of bed and maintain body warmth by use of external heat. Then operate as soon as operating room and assistants are in readiness.

In treating the affected tube; it may be amputated just proximal to the gestation sac or it may be split at the point of rupture and the sac removed or the tube may be excised down to the uterine cornu which is considered the best method by Schuman.

The unaffected tube is left intact, for future child bearing, as only one out of eight patients have repeated ectopics.

The incision is closed without drainage, as drainage only tends to an infection of a sterile field.

IV. Treatment of advanced cases of ectopic pregnancy.

In cases not seen until after the fifth month, the management of the placenta becomes the factor of first importance, together with the fact that a possible infant life is to be considered, as well as that of the mother.

"The placenta may occupy any position within the abdominal cavity, although it is most commonly found firmly attached to the posterior fold of the broad ligament, the floor and lateral walls of the pelvis with the villi dipping deeply into the pelvic vessels. In such a case, where the fetus is alive and the placental circulation active the removal of the placenta may be attended by absolutely uncontrollable hemorrhage." Sehuman.

No definite technic for performance of an operation for advanced ectopic can be formulated, but certain general directions are of value.

The incision is preferably made along the outer border of the rectus muscle overlying the gestation sac; since so many placentas are found between the folds of the broad ligament that the removal of fetus and placenta may be accomplished without entering the peritoneal cavity.

Having reached the sac it should be incised, the child being extracted and cord ligated as in a cesarean section. Then decide as to the advisability of removing the gestation sac.

If the sac can be removed, ligate vessels supplying the placenta and manually remove placenta and close wound without drainage.

If the sac cannot be removed the best plan is to simply leave the placenta in situ and close the abdomen without drainage,

depending upon the absorption power of the peritoneum for removal of the placenta. Beck found in animal experiments that the placenta was completely absorbed in two months. Some men object to leaving so much tissue in a closed abdomen.

"In the interest of the child the best time to operate is the 38th week. Since the risk in waiting for the 38th is slight for the mother," Schuman.

In a series of 100 cases that were poor surgical risks due to their severe exanguination. J. V. Ricci and Di Palma treated them by auto-hemofusion.

The technique is as follows:

The abdomen is prepared as usual plus the saline cleansing and patient kept in the horizontal position so free blood will gravitate into the pelvic basin. Then saline infusion is started at the time of abdominal incision at the rate of 5 to 6 drops per minute. When the intestines are exposed 25 cubic centimeters of sodium citrate solution of 2.5% strength is poured into the abdominal cavity. The blood immediately scooped out of the abdominal cavity and poured over 12 layers of citrate saturated gauze into 50 cubic centimeters of citrate solution. Clots are brushed aside. The citrated blood is then poured into the saline infusion bottle already in working order and the mixture kept at 105 degrees F.

This method has proved especially valuable where transfusion is not available and has proved a life saving measure. The mortality being 2.2% in a series of 282 cases reported in the literature having been treated as described above.

In cases of infection the vaginal approach is best, extraction of the gestation products and establish free drainage.

MORTALITY AND PROGNOSIS.

Parry's statistics of 1876 shows 386 deaths in 500 cases of ectopic gestation.

In Philadelphia during the year 1918, 169 ectopic cases entered city hospitals and 13 died. The mortality being 7.7%.

In Farrar's series of 309 cases of ectopic gestation there were 3 deaths for a mortality figure of 0.97%.

Williams had a series of 147 cases with four deaths for a mortality rate of 2.70%.

It may be concluded that the average mortality in a well conducted clinic will be 4 percent or under and that the patients chance for recovery from ectopic gestation is yearly growing greater.

CASES

Following are a few cases selected from the literature because of their rarity or because of general interest.

Case I.

This case was reported by Herschel Heinz and is a case of six months unruptured isthmal tubal pregnancy.

Patient was a French woman 27 years of age, admitted to the obstetrics ward of St. Lukes hospital 9-5-31. Her chief complaint was intermittent pain of one month duration in lower abdomen. Menses

ceased on March 11, 1931. Nothing unusual happened the first four months of her pregnancy but no fetal movements or heart sounds were heard. Patient had to be given morphia to relieve pain. Periods had always been regular before present illness. Her breasts were enlarged and sensitive. A freely movable mass was palpable in the abdomen reaching to the umbilicus, mass was firm and tense, tender to pressure. Vaginal examination showed violet tinged mucosa but Hegar's sign was absent. Blood pressure was 208 systolic.

Operation revealed a tubal mass; no blood or exudate present in the pelvis. Fetus was well preserved and evident that life was present only a short time before operation. Embryo weighed 375 grams. Overall length 25.5. centimeters.

Case II.

Case of recurrent tubal pregnancy reported by J. C. Hodgson.

In this case there occurred a ruptured tubal pregnancy twice within six months time.

Patient was 32 years of age and had one child living, six years of age. She walked into the hospital on August 27, 1931. Complaining of severe pain in right side and scanty menses a week overdue. On examination a tender pulsatile mass was found in the right fornix. At operation a ruptured tubal pregnancy was found in the ampullary portion of the right tube and some bleeding into the peritoneal cavity. Right tube was removed and an uninterrupted recovery was made.

On February 8, 1932 the same again walked into the hospital, complaining of pain on the left side and an excessive period with

clots for the past week. Vaginal examination was negative. Uterus not enlarged but the cervix was a little soft. She was given ergot and sent home to bed. Seventy-two hours later she had all signs of advanced internal hemorrhage. At operation the peritoneal cavity was full of blood clots, uterus small and a tubal mole extruding from a tear in the ampullary portion of the left tube.

Case III.

L. A. Richardson reports this case of an interstitial pregnancy in tubal stump after salpingoophorectomy.

Patient stated her menses began at age 16, periods were always regular and came 4 weeks apart, lasting for 5 days. She had children of the ages 15, 12 and 4 years. Never had any miscarriages. Five years ago she was operated on for ectopic and had right tube and ovary removed.

Her last normal period was five weeks before admission to the hospital. For the past 14 days patient had a dragging pain in her right side. On day before admission she felt definite epigastric discomfort and nausea. A few hours later she had a severe right-sided pain which lasted through the night. At no time was there any blood loss per vagina.

On admission patients temperature was 99, pulse 88, respirations 24. There was no rigidity of abdomen. On deep palpation tenderness was elicited above Poupart's ligament on the right side, vaginal examination also produced rightsided tenderness, uterus slightly enlarged, breasts showed no activity.

On opening abdomen, pelvis was full of blood, left tube was

normal, fundus on right side was raised. On upper aspect of the uterus, about 1/4 inch internal to point where right tube was originally attached there was a ragged bleeding cavity about 1/4 inch in diameter. Chorionic villi were found present within the cavity walls, and this cavity did not communicate with the uterine cavity.

Comments on the case:

Patient showed no signs of internal hemorrhage.

Rupture occurred in the fifth week although Curtis and others claim they should rupture four weeks later than a tubal pregnancy.

The ovum came from the opposite side, but it is most likely that the ovum crossed the peritoneal cavity and found its way into the right tubal stump which had regained its potency. Fertilization occurring within the right tubal stump.

Case IV.

W. E. Tanner reports a case of ruptured tubal gestation with discoloration about the umbilicus.

Patient was 30 years of age, primipara, last period on September 24th and on October 17th she suddenly felt a severe pain in vulva and a desire to pass water. Pain spread to lower abdomen and caused her to feel faint. She also had a severe vomiting attack and sickness continued. On October 20th she noticed discoloration in the navel and this spread over lower abdomen.

Examination disclosed a discoloration of the abdomen, lower abdomen distended, slightly rigid and tender. Rectal examination was negative.

At operation peritoneal cavity was full of blood. Right tube dilated at outer end and surrounded by a loose blood clot, lying free in the pelvis and not attached to any structure.

The discoloration of the umbilicus was via the lymphatics as there was no retro-peritoneal extravasation of blood.

Case V.

Case of bilateral tubal pregnancy with rupture of both tubes reported by H. H. Johnson and J. S. Diaso.

Patient was 37 years of age, had one miscarriage nine years ago and a forceps delivery 2 1/2 years ago. Menses regular for the year and no history of operations.

Patient admitted complaining of occasional cramp like pains in lower abdomen for the past six weeks. Three days before admission she was seized by a very sharp pain in left lower quadrant with faintness and has had several similiar attacks since.

On examination patient was lemon colored and appeared in state of collapse. Vaginal examination disclosed a soft, tender uterus and a boggy cystic mass filling the pelvis, with exquisite tenderness in both fornices plus a dark bloody cervical discharge.

Blood picture showed 2.5 million red cells, hemoglobin of 40% and a white count of 13,100 with 74% Polys.

At operation left tube was found attached to fundus by fresh adhesions. Distal half distended with a 3 centimeter tear and filled with blood clot. Right tube was enlarged and with ovary was adherent to the uterus bladder and gut. In the middle of tube was a one centimeter tear and blood clot protruding. Section showed chorionic villi. Bilateral salpingectomy and suspension was done and patient made a good recovery.

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