ECTOPIC PREGNANCY

'A place for everything, and everything in its place'

By ROBERT C. PERCIVAL, F.R.C.S., F.R.C.O.G.
Obstetric and Gynaecological Surgeon, London Hospital

Ectopic gestation has always held a peculiar fascination, probably because of its somewhat macabre potentialities. Such pathological oddities as lithopaedion and extruding foetal bones through various fistulous tracks speak for themselves. Perhaps, though, the attraction lies in the comparative rarity of this complication of reproduction, and the wonder is that it does not happen more often.

The first to record a case is said to have been Abucasis, an 11th-century Arabian physician from Cordova, and, although accounts of what must have been ectopic pregnancy appeared from time to time in the following centuries, the subject did not receive full prominence until Lawson Tait (1884) did the first successful operation. In publishing his series of five cases of tubal pregnancy operation soon after rupture he stressed the importance of early surgical treatment. Only one patient died. So began the decline in the mortality for this complication, which, treated on the existing conservative lines, reached a figure of 70 per cent. or more.

By definition ectopic pregnancy means the implantation and development of a fertilized ovum somewhere else than within the decidual lining the cavity of the body of the uterus. By using the term 'ectopic' rather than 'extra-uterine' all forms of misplaced pregnancy are included, even those lodged in rudimentary horns, the interstitial part of the tube, in the cervix, and even in the decidualized endometrium of a pocket of adenomyosis in the very wall of the uterus itself. Thus the pregnancy may be lodged anywhere between the peritoneal cavity and the cervix and may be classified as follows:

1. Extra-genital

- (a) Primary and secondary abdominal.
- (b) Intraligamentous.

2. Genital

- (a) Uterine:
 - (i) Interstitial.
 - (ii) Rudimentary horn.
 - (iii) Cervical.

(b) Extra-uterine:

- (i) Ovarian.
- (ii) Tubal.

The incidence of ectopic pregnancy as a whole is said to be one in every 300 pregnancies, and by far the commonest site is the fallopian tube. In deciding the frequency, however, one must keep in mind that different countries and climes do have different rates. For instance, according to Charlowood and Culiner (1955), the urbanized Bantu woman is particularly susceptible, a fact which enabled them to gather together the records of 56 cases of advanced extra-uterine pregnancy, and they needed to go back only 20 years to do so.

Aetiology

Considering tubal gestation first, because it is by far the commonest, conditions that result in anatomical abnormalities of the tube are obviously important. Previous inflammation resulting in scarring, narrowing and pocket formation would cause fatal delay, and so would loss of normal tubal function due to impairment of ciliary action and peristalsis; and in the same way would congenital diverticulum formation, leading the ovum into a blind alley. Novak (1947) suggested that increased receptiveness of the tube due to decidual reaction more advanced than is usual, might be important. At best it is a patchy change, but is found more often than is commonly thought. He also explains that the probable reason why the ovum does not normally embed in the tube where it is fertilized is that the villi do not develop until the ovum reaches the uterus, unless it is held up. In primary ovarian pregnancy the fertilized ovum embeds directly into the ovary, possibly into an island of ectopic endometrium, but, in spite of this, there is never any decidual reaction. It may be because of this that it has been said that ovarian pregnancies occur much more commonly than they are diagnosed, but end their lives very early, owing to bleeding, and pass unnoticed as haemorrhage from a ruptured follicle. The reason is not at all clear why the ovum prefers to embed in the ovary rather than to pursue its natural course to the uterus.

especially as Curtis (1946) says that fertilization probably still takes place in the tube. Anti-peristalsis or reverse ciliary action would have to be invoked.

That primary abdominal pregnancy happens from time to time is undoubtedly true, though the number of authentic cases in the world literature is small. Here again decidual changes in the pelvic peritoneum may attract nidation, but, like ovarian pregnancy, why the fertilized ovum prefers to reverse its course and leave the genital tract almost defies explanation.

Instances of extra-pelvic primary abdominal pregnancy have been recorded, the commonest single organ affected being the liver. Murley (1956) recently described such a case, the ectopic pregnancy no more than 3 cm. in diameter, being easily shelled out from the under surface of the right hepatic lobe.

The only other primary ectopic site left to discuss is the cervix. This last possible harbour to give precarious anchorage to the passing embryonic mariner is occupied least often of all. The reason is that it offers such a poor nidation site. What seems to need greater explanation, however, is why the cervix is preferred to the decidedly more receptive decidua of the uterine cavity, even though perhaps the latter may be only poorly developed. It is, of course, impossible to say how often the fertilized ovum is expelled without making any attempt to embed.

Pregnancy in a rudimentary horn should not strictly be called ectopic; the pregnancy is hardly out of place, but rather it is maldevelopment of the uterus that is at fault. However, the dangers with which it is associated are the same as with interstitial tubal pregnancy. When the horn is not in communication with the rest of the uterine cavity it means that either the sperm or the fertilized ovum must have transmigrated across the pelvic cavity to the deformed side.

The cause of secondary abdominal ectopic gestation needs little discussion. It almost always begins as a tubal pregnancy and depending on whether the tube ruptures along its free margin, or along its attachment to the mesosalpinx, so the gestation sac will be extruded into the abdomen to become a secondary abdominal pregnancy, or into the broad ligament to become an intraligamentary one. Two factors govern the fate of any rupturing tubal pregnancy: the amount of bleeding and whether or not the placental attachments are significantly disturbed. The former is the more important, for excessive bleeding would bring the patient to urgent operation. It is only when bleeding falls short in severity, and when the villi are relatively undisturbed, that the stage is set for continuation of the pregnancy outside the tube and, as it grows,

so the placenta too will come to be largely extra-tubal.

Pathology

When the fertilized ovum becomes embedded in any one of the possible ectopic sites the normal train of events that accompany any pregnancy is set in motion—the corpus luteum persists, the anterior-pituitary-like hormone begins to be secreted by the developing chorion and the decidua-like reaction, already present in the late secretory endometrium becomes emphatically decidual. Thus the changes that take place as a result of early ectopic pregnancy before rupture could be said to be general and local—general influenced by the pregnancy hormone and causing uterine (and possibly breast) enlargement, and local due to the developing ovum and causing an enlargement at its ectopic site. For practical diagnostic purposes at this early stage the pregnancy test would be positive and curettings would show decidua and the absence of chorionic elements. Later, and usually as a result of a vascular complication with death of the embryo, the pregnancy test commonly becomes negative, but if enough chorionic villi survive, the test may remain positive in spite of the fate of the embryo itself. Further, the villi may remain active enough even to cause tubal perforation after the embryo has perished. Naturally, if the embryo survives the crisis, the pregnancy test would continue to be positive. The fate of the uterine decidua is intimately related to that of the embryo. If the embryo lives, there will be no decidual separation from the uterine cavity, and so no bleeding per vaginam. ‘Ovular unrest,’ a term used for the precarious state that accompanies disturbance of the ectopic pregnancy short of rupture, does sometimes, however, cause slight vaginal bleeding, but the decidua is not cast off. It is, as it were, a ‘threatened decidual abortion.’ When the embryo dies there always is bleeding from the uterus, due to decidual separation, which may be expelled as a cast or, more commonly, in unrecognizably small pieces. There is, however, a noteworthy exception to this rule, and that is when there is an intrauterine pregnancy as well. Clearly the bleeding per vaginam as a result of rupture or abortion of a tubal pregnancy comes from the uterus itself, and not from the pregnant tube. In interstitial tubal pregnancy, however, some uterine bleeding may originate from the pregnancy site.

The Outcome of Ectopic Pregnancy

This, to a large extent, depends on its site. For instance, interstitial tubal pregnancy and that in a rudimentary horn characteristically rupture early and with much haemorrhage, whilst cervical preg-

nancy does not have an opportunity to progress far. The vast majority of tubal and ovarian pregnancies terminate spontaneously with haemorrhage some time during the first three months. The end may come suddenly, with shock and internal bleeding, and the treatment will be just as expeditious; or it may have a much less dramatic end, with small, intermittent, internal blood loss and the formation of a pelvic haematocele (or broad ligament haematoma). In fact, in the end it may be the pressure of the blood mass causing retention of urine that calls attention.

The least obtrusive of all are those that terminate very early, producing a tubal carneous mole. The decidua is cast and it is often only by recognizing this, and confirming by histology, that the true nature of the case is realized. Usually nothing further needs to be done and the mole gradually resorbs.

So much for those that end early. If tubal pregnancy is to progress towards term, then it must do so by escaping to roomier surroundings, and this it does by rupturing the tube wall slowly or extruding through the ostium. The gestation sac may, or may not, remain intact and the villi, retaining their original attachment in the tube, grow out to form a placenta that adheres to any conveniently placed nearby organ, usually the uterus. A secondary abdominal pregnancy in this way comes about and there is usually in the history an episode of abdominal pain and bleeding in the earlier months. In primary abdominal pregnancy the tubes and ovaries and broad ligaments will be intact (Best, 1931) and the reflexa of the ovum will be composed of peritoneum (Hirst and Knipe, 1908). If these criteria are fulfilled, only very few of the reported cases of primary abdominal pregnancy would be proved. Primary ovarian pregnancy is more common, but here, too, certain diagnostic conditions must be fulfilled: the gestation sac to occupy the position of the ovary and to have ovarian tissue in its walls; to be connected to the uterus by the ovarian ligament; to be separate from the intact tube. The outcome of both primary abdominal and ovarian pregnancies is the same as with tubal.

Multiple pregnancy in the same tube is said not to be uncommon, but simultaneous bilateral tubal pregnancy is indeed rare. Combined intra- and extra-uterine gestation is probably more common than is generally believed. Lawson and Chouler (1955), in reporting a case of co-existent primary ovarian and intra-uterine pregnancies, point out the importance of substitute progesterone therapy after operation. Suspicion of the presence of a concurrent intra-uterine pregnancy should be aroused if vaginal bleeding does not begin within 24 hours of removal of the extra-uterine one. Con-

secutive tubal gestation occurs not infrequently and might be expected and the author has treated a patient (a doctor's wife) in one of her three tubal gestations.

If an ectopic pregnancy goes to term and the condition remains unsuspected, spurious labour with contractions of the uterus and cervical dilatation are said to take place and the foetus dies. According to Charlwood and Culiner (1955), this was noted in only a few of their 52 cases, and they considered the pain felt by patients at this time is due more commonly to peritoneal irritation from liquor leaking from the gestation sac. The dead foetus, if it is not removed, will in time be converted into a lithopaedion and can remain undiagnosed and apparently free from causing symptoms for many years. In some instances, it seems, fistulous tracks develop into bowel or bladder through pressure or infection and foetal bones may be extruded from time to time.

Hydatidiform mole formation in an ectopic pregnancy is rarely seen and, according to Novak, less than 60 have been reported and many of these are doubtful. Chorion-carcinoma, naturally, is exceptionally rare. Pearson (1949) has reported a fatal case of primary ovarian chorion-carcinoma.

Symptoms and Signs

Space does not permit a detailed account of the diagnostic points associated with the different varieties of ectopic gestation and only the salient features will be mentioned.

Before early rupture or abortion usually one period has been missed and vague cramping pains noted in the lower abdomen and slight vaginal bleeding. On pelvic examination some uterine enlargement and softening may be recognized and a tender, small lump in the position of tube or ovary. However, such is the difficulty of early diagnosis that these findings will prove to be due to ectopic gestation in probably no more than one in ten cases. Further close observation is almost always rewarding.

After acute rupture or abortion the patient is overcome by sudden lower abdominal pain, causing fainting and collapse. Vaginal bleeding may have begun by the time the patient is seen. Referred pain to the shoulder is common. The patient is restless and in severe pain, unless shock is pronounced. The lower abdomen is tender, but usually not rigid. The absence of signs of free fluid is of no importance. The outstanding finding on vaginal examination is tenderness on moving the uterus. An adnexal tender lump may or may not be felt.

Less Acute Rupture of Abortion. Here there may have been a missed period, but often the 'period' is late or early and followed by recurrent small vaginal losses or bloody discharge. Attacks of

cramp-like lower abdominal pain, referred to shoulder or rectum, and faintness or dizziness are experienced. This patient is not acutely ill, but often has a sallow, debilitated appearance and will more commonly be seen in out-patients' than in bed. She may have a low-grade pyrexia and a sub-icteric tinge to her sclerotics. On examining the abdomen a tender lump will usually be found rising from the pelvis and it will often be tympanitic from adherent gut unless it be a chronically over-distended bladder caused by the pelvic mass. Dusky discoloration round the umbilicus (Cullen's sign) may be seen. A tender, boggy swelling, from which the uterus might not be distinguishable, will be found on vaginal examination.

Advanced abdominal pregnancy is seldom diagnosed before foetal death, according to Charlwood and Culiner (1955). It was made in only 12 of their 52 cases. The most reliable signs seem to be palpating the uterus separately from the gestation sac and persistence of an unusual foetal position. Injection of pitocin and noting the absence of contractions on the part of the 'gestation tumour' may be useful. Readings from a tokodynameter, especially if used in conjunction with pitocin injections, could be of the greatest help. After foetal death hysterography has been used successfully. Soft tissue radiography could nowadays make a useful contribution in the diagnosis. A lithopaedion apparently has a 'spiky' feeling on palpation and would be obvious on X-ray examination.

Cervical pregnancy presents usually as abnormal vaginal bleeding and low abdominal and back pain. Unless the pregnancy ends very early, as they commonly do, the cervix becomes distended and body of the uterus is perched on top. Bleeding may be profuse. Diagnosis is seldom made before operation and can then only be proved by demonstrating chorionic tissue in a section taken from the wall of the cervix. Retention of urine, strangely enough, seems to be an uncommon complication.

Treatment

All would agree with Lawson Tait that urgent surgical treatment is needed for the acute rupture. The patient is best anaesthetized on the operating table, using ether, and laparotomy proceeds during the preparations for transfusion, which, if it is necessary, will be begun as soon as the bleeding site is controlled. Improvement in the condition of the patient begins under the influence of ether and progresses further after the tube has been clamped. Where shock is far advanced, intra-arterial transfusion may be called for. Auto-transfusion has a place still in resuscitation if donor blood is not readily available or grouping un-

certain. Minimal lysis confirmed by microscopy is essential and the collected blood should be strained through at least six layers of fine gauze into anti-coagulant solution. The safest treatment is to excise the damaged tube and to close the abdomen speedily; if shock is pronounced, no time should be wasted in removing clot and free blood that is not within the operation field. Reconstruction of a damaged tube should be considered only if it is the sole remaining one and the patient young and childless. Ideally, she should be acquainted with the risk of further ectopic pregnancy that this procedure carries if it is possible to arrange. If the other tube and ovary appear normal, removal of the ovary as well as the tube on the affected side has been suggested by Jeffcoate (1955) to encourage regular monthly ovulation in the ovary nearer the remaining tube.

Conservative management of subacute rupture of early ectopic pregnancy has a place, but only a limited one. This is when operation is risky for some other reason or if the other tube has already been removed and further pregnancy greatly desired. Such a policy should be followed only if the pregnancy test is negative. The subject has been well reviewed by Lund (1955).

The treatment of pelvic haematocoele and broad ligament haematoma is operative. The affected tube is removed, together with as much of the adherent blood clot as seems safe. Broad ligament pregnancy is much more hazardous and hysterectomy may be needed or, indeed, ligation of the anterior division of the internal iliac artery to deal with the bleeding.

Ruptured interstitial and rudimentary horn pregnancy usually need hysterectomy, but wedge resection would be considered where conservatism is called for.

Cervical pregnancy in its early stages may be treated by blunt curettage, but packing of the dilated vascular cervix may be needed (McInroy and Kelsey, 1955; Cummin, 1955). In more advanced cases hysterectomy, it seems, may be the safest treatment.

Advanced abdominal pregnancy should have surgical treatment as soon as the diagnosis is made. There should be no delay for the living foetus to become more viable, as the outlook for the child is so poor (Charlwood and Culiner, 1955). The foetus is removed and usually the placenta left undisturbed and the abdomen closed without drainage. Occasionally the placenta can also be taken out safely, but just because it is dead tissue is no indication that removal is the right course. Marsupialization of the gestation sac and packing carry the highest moribidity.

Bibliography continued on page 563.

conjunction with other methods, such as cytological study, which are available to us. The earlier the lesions being dealt with, the more difficult the diagnosis becomes, and every aid is worthy of exploitation.

The possibilities of colposcopic study of the cervix have only been outlined. It is not only possible to diagnose early squamous cell carcinoma, but also in certain circumstances to detect adenocarcinoma of the endocervix. The method is also useful in eliminating benign lesions from the field of controversy and enables many conditions to be treated in the out-patient department without the necessity of admission for biopsy. The use of the instrument is not confined to inspection of the cervix alone, but can be extended to lesions of the vagina, vulva and urethra.

The major drawback to the use of the colposcope

is the time taken in learning its capabilities. It is not an instrument for occasional or random use. Enough has been said, however, to indicate that the method is of real value and that effective trial should be given to this instrument in centres in this country where its usefulness can be properly studied.

Acknowledgment

I would like to acknowledge my debt to St. Bartholomew's Hospital, where the facilities to undertake this study were provided.

BIBLIOGRAPHY

- GANSE, R. (1953), 'Kolpophotogramme zur Einfuhrung in die Kolposkopie,' 2 vols., Akademie, Berlin.
 HINSELMAN, H. (1954), 'Colposcopy,' W. Girardet, Wuppertal-Elbertfeld.
 MESTWERTDT, G. (1953), 'Atlas der Kolposkopi,' Gustav Fischer Verlag, Jena.

The Carl Zeiss Colposcope

WITH OR WITHOUT ELECTRONIC FLASH,
 PHOTOGRAPHIC ATTACHMENT

full details on application to

RAYNER

100 NEW BOND STREET - LONDON W.1

Grosvenor 5081

Bibliography continued from page 553—R. C. Percival, F.R.C.S., F.R.C.O.G.

BIBLIOGRAPHY

- BEST, P. W. (1931), *J. Amer. med. Ass.*, **97**, 1521.
 CHARLWOOD, G. P., and CULINER, A. (1955), *J. Obstet. Gynaec. Brit. Emp.*, **62**, 555.
 CUMMIN, R. C. (1955), *Lancet*, July 9, p. 68.
 CURTIS, A. H. (1946), 'Textbook of Gynaecology,' 5th edition, Philadelphia, p. 560.
 HIRST, B. C., and KNIPE, N. (1908), *Surg. Gynaec. & Obst.*, **7**, 456.
 JEFFCOATE, T. N. A. (1955), *J. Obstet. Gynaec. Brit. Emp.*, **62**, 214.
 LAWSON, J. G., and CHOUER, F. J. G. (1955), *Ibid.*, **62**, 951.
 LUND, J. (1955), *Ibid.*, **62**, 170.
 MCINROY, R. A., and KELSEY, H. A. (1955), *Ibid.*, **62**, 428.
 MURLEY, A. H. G. (1956), *Lancet*, June 23, p. 994.
 NOVAK, E. (1947), *Gynaec. & Obstet. Path.*, 2nd edition, Philadelphia, p. 437.
 PEARSON, A. C. (1950), *Proc. Roy. Soc. Med.*, **43**, 443.