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RUPTURE AND PERFORATION OF UTERUS IN ASSOCIATION WITH PREGNANCY, LABOUR, AND THE PUERPERIUM

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Rupture and perforation are comparatively rare accidents nowadays. Yet in certain circumstances they are apt to happen at any time. The practitioner should therefore be familiar with the clinical features. With early diagnosis and treatment, the prognosis for the mother is very good; if complete rupture should be overlooked a fatal outcome is usual.

The general incidence is about 1 in 2,500 cases. Over the past six years, in our period of office, there have been 54,000 deliveries at all stages of gestation in our two hospitals. The incidence of complete and partial rupture and of perforation has been 1 in 1,200 deliveries. Abnormal cases are admitted to our hospitals from the city and from the country. One woman in ten is delivered of her eighth or later foetus. These two factors increase the frequency of rupture as compared with its general incidence. The clinical picture is variable. Valuable lessons may be learned from a study of groups of cases or of individual cases. It is proposed, then, to treat the subject on an aetiological basis and to refer to points of importance in diagnosis and treatment.

Yielding of a Weak Point

The notes of 15 cases of rupture of caesarean section scars—comprising three each of complete and partial rupture of classical scars, and four of complete and five of partial dehiscence of lower-segment scars—and the notes relating to the rupture of a hemihysterectomy scar, are summarized in Table I. Classical caesarean section is seldom performed nowadays, but women bearing classical scars are still being delivered towards the end of their child-bearing years. Our interpretation of complete rupture is that the tear involves the endometrium, muscle, and peritoneum, thus permitting free communication between the cavity of the uterus and the peritoneal sac, with the risk of serious infection of the latter. In partial rupture the peritoneum is intact. One example of this variety is the laceration which opens from the uterus into the broad ligament but with the anterior and posterior leaves of this structure remaining unturned. Of the six classical scars which ruptured, five of the sections had been performed in rural hospitals. This is not intended as a reflection upon technique.

Although the classical section possesses inherent disadvantages, it may sometimes be the operation of choice for the occasional operator.

Several points of interest emerge from a study of the 16 cases and of similar ones brought to our notice.

The risk of rupture of a uterus bearing a scar is apparently increased by each following pregnancy; by each succeeding vaginal delivery; by high parity; by multiple pregnancy, large foetus, and hydramnios; and by implantation of the placenta beneath the scar. The primary function of fibrous tissue in a scar is supportive. Stretching and distension may cause rupture.

The clinical picture of rupture in these cases presented great variation. The following signs and symptoms were encountered in different cases and in varying degree: pain, tenderness, vomiting, faintness, pallor, tachycardia, changes in the foetal heart sounds, localized abdominal bulge, abnormal abdominal contour, ease of palpation of foetal parts, and vaginal bleeding. As exemplified, rupture may be quiet and painless, coming like a thief in the night. Silent rupture is of course more likely with the lower-segment scar. Attention is directed to two cases of coincidental rupture of the uterus and bladder; to the difficulty of diagnosis in the fatal case (No. 4); to rupture with deep engagement of the head in Case 10; and to the inertia which apparently followed rupture in Case 14. The infrequency of shock and collapse will be noted. Of course, violent rupture or haemorrhage may cause a rapid deterioration in the general condition of a patient. A uterus emptied of its contents by their extrusion into the peritoneal cavity may retract firmly, thus preventing haemorrhage from the placental site and from the wound in the uterus. The foetus and placenta do not necessarily escape at once, or at all, following complete rupture. Thus immediate laparotomy may save life.

In trial labour, after previous caesarean section, secondary inertia may indicate that the mechanism of labour has been interfered with by a partial or complete rupture. Here we postulate blocking of the neuromuscular impulses by the break in the continuity of the muscle. The cessation of labour pains, in the presence of a scar, is always suspicious of rupture.

The frequency of rupture in pregnancy and in the first stage of labour must be emphasized. It is very dangerous to try to induce labour by oxytocin in a uterus bearing a scar. Bougies should be introduced with great care.

Adhesions are more common after the classical section. When this operation was routine, and when anti-infective drugs were not available, patients were frequently sterilized by the formation of adhesions. Nowadays the number of sections which can be performed upon a woman is limited only by her inherent fertility and by her advancing years. One of our patients had three classical sections, six lower-segment sections,

and one section-hysterectomy over a period of 20 years.

In women in whom conservation of the uterus is desirable repair of a clean rent may be a feasible and safe procedure. The great value of blood transfusion is evident. For hysterectomy following dehiscence of a lower-segment scar the incision may be made posteriorly and circumferentially from the rupture. In an urgent case it may be inadvisable to perform total hysterectomy. Ureters have been injured in this way.

In Cases 8 and 9 the appearance of the ruptured uterus and bladder, with exposure of the trigone, were most alarming. The lower edges of the bladder tears had

TABLE I.—*Rupture of Scars, Mainly Caesarean*

Case No.	Age	No. of Pregnancy in which Rupture Occurred	Nature of Previous Operation and Indication for Same	Time of Rupture	Degree of Rupture	Clinical Features	Treatment	Result to Mother	Result to Foetus	Notes
1	29	9	Classical section for praevia in 6th pregnancy	Pregnancy, 34 weeks	Complete	Pain, faintness, vomiting, and slight bleeding over 48 hours	Hysterectomy and transfusion	Recovered	Stillborn	Two easy vaginal deliveries between section and rupture. Very little free blood, due to firm retraction of empty uterus. No shock or collapse
2	35	8	Classical for rhesus in 7th pregnancy	Pregnancy, 35 weeks	"	Pain and tenderness	" "	"	Survived	The mistake of inducing labour by bougies and oxytocin was made
3	44	4	L.S. section for minor disproportion in 1st labour	Pregnancy, 37 weeks	"	Pain, pallor, tachycardia	Hysterectomy	"	Stillborn	Again, oxytocin was given in order to induce labour. Rupture occurred after 4th injection of 2 units
4	39	10	Classical for praevia in 9th pregnancy	Pregnancy, 30-32 weeks	"	Fever and anaemia	Hysterectomy and transfusion	Died	Stillborn twins	Fever, anaemia, and coincidental murmur suggested subacute endocarditis. Rupture was missed until collapse at 32 weeks. Grossly adherent and gangrenous bowel resected. Died 24 hours, shock and infection
5	43	13	Two classicals for rhesus in 11th and 12th pregnancies	Pregnancy, 37 weeks	Partial	Slight tenderness	Hysterectomy	Recovered	Survived	At elective repeat laparotomy, effusion of blood around attenuated scar
6	37	6	One classical and four L.S. for disproportion	Pregnancy, 39 weeks	"	None	"	"	"	At elective repeat laparotomy, classical scar thinned to point of translucency
7	36	4	Classical for minor disproportion in 1st pregnancy	Pregnancy, gradual	"	Tenderness in late weeks	"	"	"	Abortion in 2nd pregnancy; rupture of scar with repair in 3rd
8	32	5	L.S. for brow in 4th pregnancy	Early in labour	Complete	Sudden cessation of strong pains	Hysterectomy and transfusion	"	"	Normal pelvis. Two vaginal deliveries and one abortion before section. Afebrile convalescence after same. Bladder involved in rupture; closed with catgut
9	35	7	L.S. for praevia in 5th pregnancy	Labour, 2 hours after onset	"	Suprapubic bulge, tenderness, easily palpable foetus, slight vaginal loss	"	"	Stillborn	Afebrile convalescence after section. Easy vaginal delivery to follow. Large foetus—10½ lb. (4.6 kg.)—now. Bladder again involved in rupture
10	36	2	L.S. for foetal distress in 1st labour	Labour, at 4 finger-breadths dilatation	"	Quiet and painless	Repair and transfusion	"	Survived	Head deeply engaged in pelvis at onset of labour. Pains ceased quietly
11	28	3	Two L.S. for minor disproportion in 1st and 2nd pregnancies	Labour, after 12 hours	Partial	Quiet	Repair	"	"	Extravasation of blood beneath intact peritoneum. Another section since. As a result of introduction of x-ray pelvimetry, many cases designated as definite disproportion in first labour are now known to have only a minor degree of contraction. Trial of labour may therefore be permitted
12	36	5	Four L.S. for disproportion	Pregnancy, 39 weeks	"	"	Hysterectomy	"	"	At elective repeat laparotomy, extensive herniation of foetal membranes behind intact peritoneum
13	34	8	One L.S. for alleged disproportion spaced between 6 vaginal deliveries	Pregnancy, 39 weeks	"	"	"	"	"	Elective repeat laparotomy for placenta praevia on this occasion
14	36	9	L.S. for praevia in 8th pregnancy	Labour, second stage	"	Post-partum haemorrhage	Hysterectomy and transfusion	"	"	Haemorrhage occurred after low forceps delivery for inertia. Examination revealed rupture of muscle, but peritoneum intact
15	36	2	L.S. for toxæmia and inertia in 1st labour	Labour, at 3 finger-breadths dilatation	"	Quiet	Hysterectomy	"	"	On this occasion labour had been induced by bougies for recurrent toxæmia. Pains ceased quietly
16	41	6	Hemihysterectomy for double uterus 20 years previously	Pregnancy, 40 weeks	Complete	Slight pain, tenderness	Hysterectomy and transfusion	"	Stillborn	Rupture at site of scar in lateral wall with gradual extrusion of foetus, with intact membranes, and placenta

retracted postero-laterally and were bleeding. The temptation to transplant the ureters in the first case encountered was strong, but, with the risks and discomforts of a uretero-colic life in mind and knowing the great healing capacity of the bladder itself, it was decided to attempt repair. Friability of the edges, the proximity of the ureters, and haemorrhage all caused difficulty. The muscular cervix behind provided a firm buttress for the sutured organ. Post-operative care comprised continuous drainage of the bladder for three weeks and the administration of antibiotics.

Two instances of the above unusual and serious obstetrical injury caused us to consider carefully the anatomical relationship between the uterus and bladder, and certain points in the technique of the lower-segment caesarean operation. Caudalwards to the uterovesical fold of peritoneum, the lower part of the anterior wall of the uterus and the upper portion of the vagina are in close contact with the posterior wall of the bladder. The interposition in this potential space of loose cellular tissue permits limited movement of the bladder at all times and expansion of the uterus in pregnancy. The visceral pelvic fascia is reflected upwards for a short distance on to the posterior wall of the bladder and the anterior wall of the uterus and becomes fused to their connective-tissue coats, on which the vesical and uterine vessels and nerves form dense plexuses. Interposed, then, between the bladder and uterus are connective tissue and blood vessels, lymphatics and nerves.

Observation of the bladder, at different stages of filling, during abdominal operation shows that the fundal portion and the anterior wall undergo active distension, the lower posterior wall remaining relatively immobile. Apparently, free movement of the bladder on the uterus is not intended below the uterovesical fold of peritoneum.

The loose cellular tissue referred to above is composed of fine connective fibrils with abundant but poorly supported blood vessels. After surgical trauma, organization of clot results in the formation of scar tissue, which is denser and coarser than the cellular tissue in which it develops. With infection causing oedema, exudation, and fine fibrosis scarring is still more pronounced.

When, after caesarean section, the posterior wall of the bladder becomes adherent to the transverse incision in the lower segment of the uterus, coincidental violent rupture of both organs is likely to occur if splitting or tearing should begin in the uterine scar in a subsequent pregnancy or labour.

It is obvious, then, that surgical trauma should be minimal and infection, if possible, be avoided in caesarean section. Downward dissection of the bladder, as in total hysterectomy, is both unnecessary and inadvisable. It results in fine haemorrhages in the cellular tissue and opens the space for the spread of infection, if this should occur during the puerperium.

In caesarean section the uterovesical fold of peritoneum is picked up and divided transversely. The index finger is then inserted and the peritoneum and underlying fascia are gently separated from the uterus immediately below the level of the incision in the peritoneum itself. This exposes the uterine muscle, into which the caesarean incision is made. The upper limit of the bladder, with its venous plexuses, is seen, but its downward displacement, if at all effected, should be limited to the traction-force of the bladder retractor.

The process variously described as "wiping-down," "blunt dissection," "gauze dissection," "disengagement," or "mobilization" of the bladder should be both gentle and slight.

At one time we were concerned that the transverse incision in the uterus was not sufficiently close to the cervix to be strictly lower segment in position. After we had performed an occasional hysterectomy, immediately after section and at the level of the incision in the uterus, and had inspected the specimen, we came to realize that our incision had been low enough to fulfil all the functions of the lower-segment operation. In labour, the "assumption" of the cervix into the lower segment and the expansion of that part of the uterus render a truly lower-segment section or even a laparo-trachelotomy quite practicable without vigorous displacement of the bladder.

From time to time, in the light of experience and acquired knowledge, obstetricians should review their technique of the closure of the incision in the uterus in lower-segment caesarean section. Crushing and tearing of the edges of the wound by haemostatic forceps and strangulation of tissue by suture material should be avoided. Accurate and viable apposition rather than haphazard ischaemic union should be aimed at. Fine plain catgut should be used, especially for the inner endometrio-myometrial and the outer peritoneal layers. The insertion of single rather than continuous sutures has much to recommend it. The disturbance of the bladder, as already noted, should be minimal. If possible, post-operative infection and abdominal distension should be controlled. A salutary lesson may be learned from a histological report reading thus: "The scarred area of the uterus showed oedematous and congested fibrous tissue, but no muscle."

Choice of Method of Delivery

The choice of the method of delivery in young women who have previously undergone caesarean section for some temporary indication is an important one. Vaginal delivery should be considered in most cases, the following precautions being adopted: (1) Information is obtained about the indication for the section, the type of operation, the size of the baby, and the presence or absence of puerperal fever. (2) The pelvic proportions are assessed by careful clinical and radiological examinations. (3) The patient is delivered in a hospital with facilities for transfusion and operation instantly available. Cross-matched blood must be at hand when labour starts. (4) Pituitary extract should not be used either to induce or to stimulate contractions. (5) The patient is under close observation during labour and the theatre is kept ready for immediate use. (6) The second stage may be shortened by forceps. (7) If rupture is suspected in the post-partum period, the uterus should be explored. With these precautions all mothers and the great majority of the babies can be saved.

Other Varieties of Scar

Rupture of a myomectomy scar is extremely rare. If fibroids have been removed for sterility, and if the patient should become pregnant thereafter, she will often be an elderly primigravida, and caesarean section will usually be performed. Provided the circumstances of operation are conducive to sound healing, however, myomectomy scars in themselves do not contraindicate labour and vaginal delivery in younger women. If, on the other hand, the fibroids had been numerous and deeply placed, if the endometrium had been opened, if accurate apposition of the wound edges and haemostasis had not been secured, if convalescence had been complicated by fever, and if the placenta is now shown by x-ray examination to be implanted upon an endometrial scar, then elective caesarean section should be performed.

Incomplete rupture during labour is believed to occur occasionally and to heal quietly in multiparae. Gibbon FitzGibbon, observing three cases of complete rupture in labour, recalled that in the previous delivery the final expulsive effort of the second stage had been accompanied by pain of such intensity as to cause the patient to cry out. The presumption was that incomplete rupture had occurred at the time of the agonal contraction and had become complete at the next delivery.

One of our colleagues treated a case of fundal rupture in a patient who had had a previous difficult manual removal of the placenta.

Spontaneous Rupture With Shoulder Presentation

There were two cases of spontaneous rupture with shoulder presentation. Both mothers recovered, but the foetuses were lost. One was an emergency admission. In the second the oblique lie and quiet labour in a non-complaining multipara during the night resulted in complete rupture of the expanded lower segment.

Case A.—The patient, an 11-gravida aged 37, was admitted from a distance with a ruptured uterus which had occurred during labour with a transverse lie. An arm and the cord lay outside the vulva, whilst the head appeared to be free in the peritoneal cavity. Laparotomy showed a transverse rupture of the lower segment exactly as if the patient had performed a lower-segment section on herself and had then forgotten to sew up the wound. On the right side, the anterior leaf of the broad ligament was torn and there was clot around the uterine vein, which had probably been involved in the rupture. Hysterectomy was performed at the level of the rupture. The cervix, which was almost fully dilated, was sewn over with catgut. One pint (570 ml.) of blood and one pint of glucose-saline were administered. Convalescence was uneventful. The amount of free blood in the peritoneal cavity was not more than half a pint (284 ml.). The major portion of the foetus and the placenta were lying free amongst the intestines.

Case B.—A 10-gravida aged 40 was admitted at midnight in early labour with ruptured membranes. The presentation was vertex, with the head unfixed but centrally placed. At 1.30 a.m. labour appeared to be progressing normally with the cervix three fingerbreadths dilated and the head still over the brim. At 2.30 a.m. the patient experienced what, in the ripeness of her experience, she described as "forcing pains"—contractions with strong bearing-down sensations but without result. She did not complain. At 3 a.m. tachycardia and pallor were observed. The foetal head had become "dislocated" towards the iliac fossa and there was an arm in the vagina. The abdomen was tender and contractions had ceased. There was a complete vertical

rupture of the anterior wall of the lower segment. Bleeding was minimal. Following hysterectomy, recovery was smooth.

The uterine vessels are liable to be involved in rupture of the uterus itself. If the artery has been torn and has then retracted, with the formation of labile clot in its mouth, it may be difficult to identify it in the base of the broad ligament. Under these circumstances the authors advise that no time should be wasted in trying to isolate the artery. The internal iliac artery on that side should be identified and ligated. This is a comparatively simple procedure. The base of the infundibulo-pelvic (ovario-pelvic) ligament is opened, the ureter retracted medially, and the internal iliac artery picked up between the surgeon's thumb and index finger and pinched off the side wall of the pelvis before passing the ligature. The last step is necessary in order to avoid injury to the iliac vein.

Whilst a multipara with premature rupture of the membranes is awaiting the onset of labour, or if she is in labour with an unfixed presenting part, she should be regularly palpated. The head which has slipped over towards the iliac fossa may provide, in a short while, a neglected shoulder presentation. The term "neglected" suggests long delay in treatment, but this is not always the case. One to two hours may be sufficient to place the strongly contracting multiparous uterus in imminent danger of rupture.

Rupture Caused by Obstetrical Operations

The 11 cases included in the present series are summarized in Table II.

Internal podalic version is risky when performed under any or all of the following circumstances: (1) with the uterus firmly retracted upon the foetus after drainage of the liquor and strong pains; (2) with expanded lower segment; (3) with poor anaesthesia and failure of relaxation of the abdominal muscles; and (4) when done in haste or with lack of skill. After version and extraction, especially if performed with difficulty, the following signs should raise the suspicion of rupture: immediate and significant post-partum haemorrhage; continued vaginal trickle or ooze of blood; abdominal pain and tenderness; shock or a slow downhill progression in the general condition over a number of hours. In connexion with the observation of a patient about whose condition there may be some doubt, it is important that there should be an exchange of information and of impressions when a fresh shift of medical or nursing staff takes up duty. All blood-stained vulvar pads should

TABLE II.—*Rupture and Perforation Caused by Obstetrical Operations*

Case No.	Age	No. of Pregnancy	Condition	Operation	Clinical Features	Treatment	Result to Mother	Result to Foetus	Notes
I	44	5	Transverse lie	Internal version	Collapse 2 hours after delivery	Hysterectomy and transfusion	Died 13 days, ileus	Stillborn	Emergency admission with complete rupture of body extending into broad ligament.
II	25	2	Placenta praevia	Braxton Hick's version in labour	Immediate haemorrhage	"	Recovered	"	Partial rupture of cervix extending into lower segment
III	36	4	"	"	Post-partum haemorrhage	"	"	"	Partial rupture of lower segment
IV	34	6	Impacted face	Failed forceps	"	Craniotomy; transfusion	"	"	Emergency admission. Laceration of fornix extending into broad ligament
V	28	1	Occipito-posterior vertex	Failed forceps; symphysiotomy	"	Laparotomy; repair; transfusion	"	Neonatal death	Complete rupture of posterior wall of lower segment
VI	35	7	Foetal distress	Low forceps	Collapse 35 minutes post partum	Hysterectomy and transfusion	Died 3 days, renal and hepatic failure	Survived	Complete rupture of cervix and posterior wall of lower segment. This may have caused the foetal distress
VII	38	10	Placenta accreta	Manual removal	Rupture felt by fingers	"	Recovered	"	Once the injury is recognized the prognosis is good
VIII	26	6	Secondary P.P.H.	Evacuation of placental debris by ring forceps	Perforation of fundus and prolapse of small intestine into vagina	"	"	"	The point of perforation was surprisingly small. Repair could have been effected
IX	30	5	Abortion	Evacuation	Perforation of fundus by sound	Observation and antibiotics	"	Abortion	Insertion of a plug is not favoured
X	26	4	"	"	Perforation by curette	"	"	"	Use of a sharp curette is not recommended
XI	28	3	"	"	Perforation of fundus and posterior fornix by curette	Hysterectomy and transfusion	"	"	Emergency admission. Abortions should be cleared out in good light and instruments should be introduced under direct vision

be preserved and laid out on a flat white surface so that the responsible medical officer may have a bird's-eye view, so to speak, of the total loss of blood to date. An obstetrical trickle, ante-partum or post-partum, is pernicious and should be investigated without delay.

Serious injury of the genital canal may be inflicted by the rough and unskilful use of the midwifery forceps. It is indeed a great pity that an instrument so beautifully designed and so useful can be so traumatic in its misuse. We have experience of two cases (not included in the present series) of rupture of the anterior wall of the lower segment inflicted during classical application of the anterior blade of Kielland's forceps.

It is important to teach students and postgraduates that good light and exposure are essential in the evacuation of an abortion.

Hydrocephaly

This is an important cause of rupture because it is so easily missed in minor and moderate degrees. Having investigated and reported 304 cases treated in our hospitals over a period of 20 years (1932-51), we have a special interest in this foetal abnormality.

Hydrocephaly may be expected in about 2 to 3 per 1,000 hospital deliveries at and past 28 weeks. The presentation is breech in 30% of cases. Even taking into account that some of the foetuses are small, macerated, and compressible, difficulty in labour may be expected in 60%. Clinical and radiological diagnosis of the mild and moderate degrees is not as easy as the textbooks indicate, but if the suspicion is aroused the course of labour is carefully observed and the significance of failure of progress appreciated. It is suggested that the practitioner should think of hydrocephalus when the findings on palpation of the foetus do not appear to be normal—that is, when the typical cephalic pole cannot be identified, when the head is not engaged at the onset of labour or when it fails to descend during labour in the multipara with a good history, when the lower part of the uterus is tender during labour (distension), when unexpected difficulty arises at any time in labour, when vaginal examination of the foetal head indicates an abnormality, and when the radiologist sounds a warning. It is important to note that in several recorded instances rupture occurred before full dilatation of the cervix.

In the present series there were three cases of rupture, all in multiparae. With transfusion and hysterectomy, the mothers survived. One woman, treated outside the hospital in the first instance, was extremely fortunate to recover from complete rupture, traumatic inversion of the injured organ, replacement of same, and abdominal hysterectomy with ligation of one internal iliac artery. The presentation was cephalic in the three cases. The upper segment was torn through in two and the lower segment in the third. Rupture took place at or before four fingerbreadths dilatation in two of the cases.

Posterior Pituitary Extract

Two cases in which posterior pituitary extract was given are included in the present series.

Case C.—A 6-gravida aged 36 was under the care of a doctor outside the service of the hospital. He failed with forceps applied to the presenting breech of a large foetus. Oxytocin (5 units) was then administered and the patient collapsed. She died a few minutes after admission to hospital, whilst a transfusion was being set up. The lateral wall of the lower segment had ruptured into the broad ligament. The dead foetus weighed 10 lb. 10 oz. (4.9 kg.).

Mistakes in this case comprised: (1) a previous repair operation had been performed and the patient should have been admitted to hospital for her delivery; (2) forceps application was not in accordance with the usual practice; and (3) oxytocin should not have been administered.

Case D.—This woman was aged 32 and a 6-gravida. Whilst in labour with a large foetus, outside the service of the hospital, oxytocin (5 units) had been administered in order to improve the

pains. She was admitted in a collapsed state. After resuscitation by blood, hysterectomy was performed. The lower uterine segment was extensively ruptured. The stillborn foetus weighed 11½ lb. (5.1 kg.). The mother made a good recovery.

In our opinion it is safe and proper to administer oxytocin, in six or eight spaced doses of 2½ units each or as a drip, in conjunction with puncture of the membranes in accidental haemorrhage. With a dead and usually small foetus the risk of rupture is negligible, and early delivery is desirable. Likewise, oxytocin is safe for induction with missed abortion, with missed miscarriage, with vesicular mole, and with a small dead or macerated foetus. Given by means of a tuberculin syringe or in an intravenous drip, the dose can be accurately regulated. After the delivery of baby and placenta, oxytocin causes firm and safe retraction of the uterus.

With a living foetus great care should be exercised in the use of oxytocin, both for induction of labour and for the stimulation of inert pains. In the grand multipara special care should be taken, on account of the increased risk of rupture. For the stimulation of inert labour the following postulates for safe administration have been suggested by Eastman and others: labour should be true, not false; the inertia should be of the hypotonic variety; wait until the cervix is two fingerbreadths dilated; the oxytocin should be adequately diluted or divided and given over a safe period of time; there should be no disproportion and no scar in the uterus; the medical officer should be in constant attendance and prepared to administer a suitable anaesthetic if the uterus should react violently; the foetal heart should be frequently auscultated; hesitate to use oxytocin if the patient has had more than four babies; if there should be any doubt, do not use it at all.

Labour in So-called Grand, Grande, Dangerous, or Unpredictable Multipara, or in Any Multipara

Three cases serve to exemplify the points mentioned below.

Case E.—A 12-gravida aged 40 was admitted in a shocked condition after 12 hours' labour on the district. Clinically, she was a clear case of internal haemorrhage, with a painful tonic uterus showing a suprasymphysial protrusion (marked perivesical oedema). The head was impacted in the inlet and the cervix nearly fully dilated. After 3 pints (1.7 litres) of blood, the patient's condition permitted laparotomy, which showed the dead foetus to be contained within the uterus. There was much free blood from a posterior complete rupture, which extended downwards between the utero-sacral ligaments into the posterior fornix. After preliminary extraction of the baby and placenta through an anterior transverse incision, total hysterectomy was performed. The contused and retracted vaginal fragments were trimmed and sutured. Blood was continued. She made a good recovery.

Points of interest in this case: (1) There was a history of increasing dystocia. (2) X-ray examination showed a gynecoid flat pelvis with a brim antero-posterior measurement of 10 cm. (3) The absence of vaginal bleeding despite laceration of uterus and fornix. The lower segment and upper vagina were firmly compressed by the head. (4) Microscopical examination of the ruptured area showed the uterine wall to consist almost entirely of oedematous and congested fibrous tissue. Chronic subinvolution must have been an important factor in this case.

Case F.—A 14-gravida aged 42 had a spontaneous delivery of a living 8½-lb. (4-kg.) foetus. She collapsed 10 hours after delivery but responded to resuscitation. She was examined vaginally 24 hours later, when a haematoma became palpable above. Transfusion was followed by hysterectomy. There was an incomplete rupture into the broad ligament. The patient died of infection on the fourth day.

Collapse after delivery in a grand multipara is suggestive of rupture. Examination and active treatment should have been undertaken sooner in this case.

Case G.—The patient was aged 37 and a 7-gravida. A breech extraction had been performed for foetal distress in the second stage, but the 10 lb. 3 oz. (4.6-kg.) foetus could not be revived. There was no haemorrhage, but examination for retained placenta

showed that it (the placenta) had passed into the peritoneal cavity through a large rupture in the upper segment. With hysterectomy and transfusion, she made a good recovery.

In this case rupture may have preceded the breech extraction.

A history of easy deliveries does not preclude the possibility of difficulty in a subsequent labour. In multiparae difficult labour may be caused by :

Faults in the Foetus.—Bigger baby ; hydrocephaly ; brow or face, mentoposterior ; asynclitism ; shoulder ; breech with complications.

Faults in the Uterus.—Hypotonic inertia or other form of incoordinate uterine action.

Faults in the Abdominal Musculature.—Laxity may result in the abnormal presentations mentioned above or in poor bearing-down efforts.

Faults in the Bony Pelvis.—In our opinion secondary contraction occurs in a small percentage of multiparae. Let us visualize the woman who has delivered several babies in rapid succession. During pregnancy the joints of the pelvis softened in order to permit what Munro Kerr has so aptly described as the "give" in labour. After each delivery the mother resumed hard work in the home or elsewhere. Before normal joint or ligamentous tone was recovered she became pregnant again. In time the sacrum, as a whole, moved forwards or its upper part tilted anteriorly to cause flattening of the pelvis.

In 500 consecutive cases of disproportion in one of our hospitals, 40% were multiparae. The reader is referred to Donald's (1955) book and to a paper by one of us (Feeney, 1953).

Obstructed Labour Other Than by Shoulder Presentation or Hydrocephalus

Below are two instances of rupture associated apparently with disproportion and one with brow presentation.

If a multipara should advance in labour to full dilatation of the cervix and if the presenting part should remain above the brim despite good pains for a reasonable period of one hour, it signifies a serious abnormality. The patient should therefore be carefully examined with the whole hand, and if necessary an anaesthetic should be administered for the examination. In these circumstances, as indicated in the previous section, the following abnormalities should be considered : brow, face, hydrocephalus, marked tilting of the head, disproportion with larger foetus than previously, tumours, etc. If the presenting part should be a breech the fit may be "tight" with a large foetus, or extended legs may be delaying or preventing flexion of the body. Brow is of particular importance because (a) it is mechanically the most unfavourable cephalic presentation, (b) it is easily missed in rectal or one-finger vaginal examination, and (c) it may occur in the multipara in association with laxity of the abdominal and uterine walls or as an indication of disproportion. Marked asynclitism is, in itself, an occasional cause of serious dystocia.

Case H.—A 5-gravida aged 40 had a history of difficult vaginal deliveries. She was admitted in obstructed labour with signs of impending or actual rupture (rigidity of abdominal wall, tenderness with tonic contraction, thinning and expansion of lower segment, no foetal heart, constriction ring, tachycardia). It was difficult to palpate the foetus and the pelvis was empty. Laparotomy revealed that the uterus had ruptured transversely behind the uterovesical fold, which itself had split. It was again as if the patient had performed a lower-segment section upon herself, but the tear had extended laterally into the broad ligament to open the uterine vein and vertically into the anterior wall of the cervix. Total hysterectomy resulted in a good recovery. The pelvis was shown to be flat by subsequent x-ray examination and the foetus was large. There had been evident disproportion.

Case I.—A 9-gravida aged 37 was admitted from a distance after two to three days' poor labour at term. Previous history of dystocia, including difficult forceps, face, breech, and prolapse of cord. All the babies, however, had survived. The abdomen was tender and resistant ; there were no foetal parts in the pelvis

and the foetal heart was not audible. The doctor gave an accurate and graphic description of the "disappearance" of the foetus. On laparotomy the uterus was ruptured through the whole extent of the left lateral wall from fundus to cervix. The baby had apparently first escaped into the broad ligament and then through the posterior leaf of the latter. He (the foetus) was neatly tucked up behind the costal margin. The placenta was in the ragged remnant of the broad ligament. The peritoneal cavity contained about 15 oz. (425 ml.) of blood. A transfusion was set up and the uterus removed. Recovery was very smooth. Microscopical examination of the ruptured area showed no noteworthy abnormality.

In both of the above cases it is, of course, possible that the scar of a previous incomplete rupture yielded in the present labour.

Case J.—A 4-gravida aged 35 was in labour outside the service of the hospital, with a brow presentation. After sudden cessation of the pains and of the foetal heart she was admitted to hospital. On laparotomy the lower segment had ruptured anteriorly and laterally. The foetal head was in the uterus with its body in the peritoneal cavity. Hysterectomy and transfusion were followed by uneventful recovery.

Precipitate Labour

Case K.—This patient was an 8-gravida aged 36. A second-degree placenta praevia was treated by puncture of the membranes and scalp traction, but the labour which followed was precipitate. She collapsed 30 minutes after delivery of a living foetus. Examination revealed a complete tear in the lateral wall of the upper segment. Hysterectomy and transfusion resulted in a smooth convalescence.

If dilatation and expulsion are unduly rapid the soft tissues of the mother may be subjected to traumatic stresses and strains, occasionally resulting in rupture. In addition, powerful expulsive contractions may prevent placental exchange and cause foetal distress or death.

Scarring of the Cervix

Following previous repair (amputation or trachelorrhaphy) the cervix usually softens and dilates in labour. Fifty patients who had undergone operation on the cervix and who later proceeded to term or near-term labour were investigated by one of us : five had elective caesarean section for "age," "extent of repair," etc. ; two had caesarean section in labour because of failure of dilatation after reasonable trial ; one had bilateral division of the vaginal cervix and forceps delivery ; one had vaginal hysterotomy elsewhere ; and 41 had safe vaginal deliveries (Feeney). Each case must be decided on its own merits (obstetrical history, age, size of foetus, nature of operation, anatomical and functional result, dilatation in labour, etc.). The woman who has a scarred cervix or vagina must always be carefully observed in labour. The risks are splitting of scar tissue, extension of the laceration, and traumatic haemorrhage. In the operative treatment of prolapse in young women amputation of the cervix should be avoided, provided the result of the operation is not likely to be prejudiced by the omission of this step.

Spontaneous Rupture of the Vaginal and Supravaginal Cervix

In all reported series of cases of rupture of the uterus, traumatic haemorrhage, shock, and even death are described as having occurred after a lesion of this nature. The patient is usually a multipara, delivery is spontaneous, variable external haemorrhage occurs, and examination reveals a tear in the cervix which extends through the vaginal vault into the supravaginal cervix and not infrequently into the lateral wall of the lower segment, causing an effusion of blood into the corresponding broad ligament. The injury is a pernicious one in that it may be missed and may cause death within a few hours. Unexplained shock or haemorrhage after the third stage of labour demands immediate vaginal examination.

Case L.—A 10-gravida aged 45 had received no antenatal care. She was first admitted at 36 weeks with mild accidental haemorrhage. No placenta could be felt and she took her discharge after

some days. Pains started the following morning and she was re-admitted for the spontaneous delivery of a living 6-lb. (2.7-kg.) infant after 10 hours' labour. Third-stage bleeding occurred. A transfusion was set up. One hour after delivery the placenta was manually removed, but the tear in the cervix was not noted at this time. Further bleeding occurred and transfusion was continued. She now revealed a tear in the vaginal cervix, which was sutured. She died 1½ hours after delivery. Necropsy showed a laceration of the vaginal cervix on the right, extending through the vaginal vault into the supravaginal cervix and upwards in the lateral wall of the uterus, with a haematoma in the corresponding broad ligament. The amount of internal bleeding, which was limited by the broad ligament, was scarcely sufficient to cause death, but in combination with external loss and the shock of the injury it proved too much for a patient who was ill nourished.

Manual removal was delayed. The tear was not adequately sutured. At the age of 45 hysterectomy should have been performed.

Case M.—An 8-gravida aged 32 had a spontaneous miscarriage at five to six months. Traumatic post-partum haemorrhage occurred from a transverse tear in the anterior wall of the vaginal cervix which extended upwards into the supravaginal cervix on one side. The laceration was sutured. In all, 7 pints (4 litres) of blood was administered. Oliguria and rising blood urea gave cause for anxiety in the puerperium, but she made a good recovery.

Case N.—This patient, a 1-gravida aged 23, was in excellent health. There were no previous operations. At term she delivered herself of a 7½-lb. (3.3-kg.) living infant after a labour lasting 10 hours. The third stage was normal and two sutures were inserted in a perineal laceration. Four hours post partum, she suffered intense vulvo-vaginal pain and became quite shocked. Examination showed, below, a large left vulvo-vaginal haematoma and, above, an extensive effusion into the left broad ligament, which had displaced the recently delivered uterus to the opposite side. A transfusion was set up and the haematoma below was evacuated, with immediate relief of pain. There was a tear in the vaginal cervix on the left side. Her condition improved and she was treated conservatively by the administration of blood, sedatives, and penicillin. Healing of the cervix and vagina and absorption of the effusion above proceeded in a most remarkable manner. One week after delivery the pelvic organs appeared quite normal.

Case N is of interest in that it occurred in a young, healthy, and "undoctored" primigravida. Apparently bleeding occurred both above and below the strong pelvic fascia, whose central pivotal attachment is to the supra-vaginal cervix. The patient has not become pregnant again over a period of five years, although her pelvic organs appear normal.

Case O.—A 1-gravida aged 25 had a spontaneous delivery of a living 7½-lb. (3.3-kg.) foetus with a normal third stage. She collapsed 11 hours later. There was an extensive and expanding haematoma in the broad ligament, extending above the brim of the pelvis. Hysterectomy and transfusion resulted in a good recovery.

It was unfortunate that hysterectomy proved necessary in such a young patient.

Direct Injury to the Pregnant Abdomen

Case P.—A 3-gravida aged 25 was injured in a motor accident and died immediately on admission. There was a complete rupture across the fundus. The dead foetus was free in the peritoneal cavity.

In this group are included occasional cases of rupture and perforation of the pregnant uterus caused by blows, kicks, falls, motor accidents, gunshot and knife wounds, etc.

Other Groups

Congenital Abnormalities of Uterus.—In this category would be included those cases of rupture of the pregnant horn of a bicornuate uterus, or of the pregnant rudimentary horn of a double uterus, giving rise to the signs and symptoms ordinarily associated with the more severe cases of disturbed tubal pregnancy. Fletcher Shaw (1930) described a case in which rupture occurred, presumably as a result of weakness at the site of fusion of the Müllerian ducts.

Angular Implantation and Development of the Ovum.—A few cases of rupture of the uterus from this cause have been described.

Vesicular Mole.—Munro Kerr and Chassar Moir (1949) mention rupture caused by penetrating mole.

Clinical Features

As already noted, if complete rupture of the uterus remains undiagnosed the termination is usually fatal; if it is treated in good time the chances of recovery are very good. Early diagnosis is therefore of great importance. Rupture should be constantly borne in mind, and not infrequently suspected, if it is not to be missed in the occasional case in which it does occur. It is a worthy subject of an obstetrical truism—that is, if a multiparous patient, in pregnancy, in labour, or in the early post-partum period, should develop constitutional or local (abdomino-pelvic) signs and symptoms for which there is no ready explanation, then rupture of the uterus should at least be suspected. To advance a stage further: some years ago cases were recorded of patients who died of puerperal sepsis and in whom necropsy revealed complete rupture, previously unsuspected.

The clinical picture of rupture is variable because it depends upon several factors, such as the time of occurrence (pregnancy, early or late labour), the cause or the nature of the force which has been applied to the uterus (yielding of an operation scar, version, obstruction, attrition, etc.), the degree of rupture, the position and extent of rupture, the amount of intraperitoneal spill, the size of the blood vessels involved, the complete or partial extrusion of the foetus and placenta, the intensity of retraction of the uterine muscle, the condition of the patient. It may be stated initially, as in the case of ectopic pregnancy, that rupture does not usually strike a patient down suddenly and dramatically. In a general way cases of rupture may be clinically subdivided as follows:

1. *Quiet, silent, or occult rupture*, in which the accident occurs without, at first, the signs and symptoms that are ordinarily associated with rupture of an abdominal organ. Diagnosis may therefore be difficult or unduly delayed, and unless the possibility of rupture is entertained it may be missed. In quiet rupture we visualize the uncomplaining multipara in labour or the patient whose caesarean section scar is stretching and finally yields in either pregnancy or labour. Nothing dramatic happens, but the observant doctor or nurse notices an increase in the pulse rate, pallor, perhaps slight vaginal bleeding, and the patient complains of some pain. Contractions may continue unaltered, but the cervix fails to dilate further. This is an important point.

2. *Ordinary variety of rupture* in which more obvious signs and symptoms develop over a period of a few hours: abdominal pain, vomiting, faintness, vaginal bleeding, pallor, tachycardia, tenderness on palpation, cessation of the foetal heart. These symptoms may have arisen unexpectedly in pregnancy or developed during labour. One of the so-called pathognomonic signs of constriction-ring dystocia is that, despite a painful colicky type of contraction originating and felt in the upper part of the uterus, no impulse of descent or pressure is imparted to the presenting foetal head below. Presumably the wave of contraction is interrupted in its descent at the constriction ring. As already indicated, a somewhat similar phenomenon occasionally occurs in rupture of the lower segment. We have observed a case, not included in the present series, in which the downward contractile impulse was apparently cut off by the gap in the continuity of the muscle fibres at the site of rupture. After rupture the uterus continued to contract above, but the foetal head below remained immobile to the examining finger during a contraction. At laparotomy the endometrium and muscle in a lower-segment scar had undergone recent and wide separation, but the peritoneum had remained intact. At the same time violent rupture of a scar, with retention of the peritoneal covering, may result in a state of immediate and comparative freedom from acute pain and discomfort.

These observations indicate that contractions do not necessarily cease when the uterus ruptures. Of course, with extensive rupture and partial or complete extrusion of the foetus, widespread disorganization of the neuromuscular function of the uterus as a whole would be expected. In yet another case of proved unilateral rupture of the anterior wall of the lower segment, a more or less transversely placed contraction ring, easily visible at the upper limit of the thinning lower segment, changed in appearance at the apparent moment of complete rupture; it sagged downwards on the side of the rupture and was drawn further upwards on the intact side.

3. *Violent variety*, in which it becomes apparent over a period of one hour or less, in pregnancy or in labour, that a serious abdomino-pelvic accident has just occurred. At first there may have been present the signs of threatened rupture with "forcing" pains, expansion of the lower segment, and elevation of Bandl's ring. Then may follow a sensation of something having yielded, a change in the character of the contractions and, possibly, in the contour of the abdominal swelling, ease of palpation of the foetal parts, cessation of the foetal heart, vaginal bleeding, recession of the presenting part, and shock and collapse. Bladder symptoms, including haematuria, may be complained of.

4. *Rupture with Delayed Diagnosis*.—Here the condition is not suspected or diagnosed until the patient has become established upon a slow but progressive downhill post-partum path; until she has suffered from the effects of slight but persistent post-partum bleeding; until a haematoma develops in the broad ligament; or, unfortunately, until necropsy is performed. The rupture which does not cause symptoms until the early post-partum period is of special importance, because bleeding, traumatic in origin, may be attributed to atony of the uterus, and collapse to so-called obstetrical shock. Keeping these circumstances in mind, let us visualize the patient who has been delivered, but whose condition is not satisfactory. She may have actually collapsed from shock or haemorrhage, in which event it will be obvious that all is not well; she may be losing blood in a persistent trickle or ooze; her general condition, as indicated by changes in the pulse, blood pressure, and colour, may show a steady deterioration over a number of hours; she may be suffering from abdominal or vulvovaginal pain. It may even be that she is not quite right and that we are uneasy about her, without just knowing why. The records of the hospitals indicate quite clearly that maternal deaths occur from unsuspected lacerations of the genital tract. Not infrequently these fatalities are attributed to obstetrical shock, but necropsy, if performed, indicates a primary traumatic cause. The lesson to be learned, and remembered, from this is: when in doubt examine the patient vaginally without delay.

Treatment

The patient with threatened rupture should be examined gently but thoroughly, under an anaesthetic, by a person experienced enough to carry out whichever method of treatment may be indicated. The actual treatment to be adopted will depend upon the circumstances of the case and will include such an operation as craniotomy, aspiration of a hydrocephalic head, decapitation, symphysiotomy, or caesarean section. Intrauterine examinations and manipulations should be carried out with great care, and version is contraindicated.

If rupture is strongly suspected or diagnosed before delivery, the abdomen is usually opened as for the rupture of any abdominal viscus. The procedure then depends upon the conditions present. If the rupture is large the foetus and placenta are removed and hysterectomy is performed. If the rupture is less extensive, if the case is a "clean" one, and if it should be desirable to retain the uterus, the rent may be sutured. In an anterior rupture of the lower segment the bladder should always be inspected. The safety of the ureters should be provided for. Blood transfusion is of great value and has improved the prognosis. Anaesthesia should

be of the best available quality. In an occasional case of rupture the foetus may be removed per vaginam, provided this can be done without difficulty. Manual examination of the genital canal is then carried out and laparotomy performed if considered necessary.

If rupture is not diagnosed until after delivery the method of treatment is determined by the extent of the laceration—that is, whether it is complete or partial. In complete rupture laparotomy is indicated; in partial rupture a cautious trial of treatment by plugging from below may be employed.

Rupture of the vaginal vault with extension into the paracervical tissues or into the base of the broad ligament presents a special problem, because transfusion with suturing or packing of the rent per vaginam may suffice to restore the patient and to control the bleeding. The patient should, however, be carefully observed and abdominal operation performed if progress is not satisfactory.

In a case of obvious complete and extensive rupture with extrusion of the foetus into the peritoneal cavity and with vaginal bleeding, ergometrine may be administered as an emergency measure in order to control bleeding from the rent and from the placental site while preparations for hysterectomy are being made.

Summary and Conclusions

The clinical details of 45 cases of rupture and perforation of the uterus in association with pregnancy are described. There were seven maternal deaths, a mortality of 15.5%. Of the seven deaths, it is considered that a fatal termination might have been avoided in six. In these six cases the following errors were made: misdiagnosis within the hospital of quiet rupture as subacute bacterial endocarditis; performance of difficult version with tight uterus outside the hospital; "failed forceps" and the administration of a large dose of oxytocin outside the hospital; delayed diagnosis within the hospital in two cases; long transport after a motor accident. The fate of 46 fetuses in the 45 cases was as follows: 20 survived, 22 died, 3 abortions, 1 miscarriage.

Classical caesarean section is no longer performed in the two hospitals mentioned, but patients bearing classical scars occasionally return for repeat section or, more rarely, with a view to vaginal delivery. The classical scar should always be regarded with suspicion. The lower-segment scar may also be imperfect. All women bearing scars of previous uterine operations should receive special care in pregnancy and in labour, if the latter is permitted. Although scars must always cause some concern, we do not subscribe to the belief "once a caesarean, always a caesarean." When vaginal delivery after previous section is contemplated, certain strict precautions should be adopted.

Two cases of combined rupture of the uterus and bladder are summarized.

A combination of events conducive to rupture may develop quickly in neglected shoulder presentation.

Internal version should not be attempted unless the conditions for its safe performance are present. A bad failure of forceps delivery may cause serious trauma. Abortions should be cleared out under direct vision. The soft subinvolved puerperal uterus is easily perforated.

Hydrocephalus is a potentially dangerous complication because minor and moderate degrees of the abnormality, sufficient to cause serious difficulty in labour, are easily missed. Diagnosis, both clinical and radiological, is not as easy as the textbooks indicate.

Before delivery, posterior pituitary extract should be used with great care. Certain criteria for the relatively safe employment of this substance are indicated.

High multiparity provides certain problems, one of which is the possibility of spontaneous rupture of the uterus. The causes of dystocia in the multipara are summarized.

Brow presentation should always be considered when the foetal head fails to descend in the second stage of labour, especially in the multipara.

Precipitate labour may cause serious trauma to mother and foetus.

Women who have had plastic cervical and vaginal operations should be delivered in hospital.

Spontaneous rupture of the vaginal and supravaginal cervix with extension into the broad ligament is described, with illustrative cases.

Four clinical varieties of rupture are described. The "quiet" and "delayed" varieties are easily missed. Stress is laid upon early diagnosis.

Treatment is summarized. The value of transfusion is stressed.

The incidence of rupture and perforation of the uterus in association with pregnancy was 1 in 1,200 of all deliveries in the service of the two hospitals.

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ACQUIRED HAEMOLYTIC ANAEMIA CLINICAL AND SEROLOGICAL OBSERVATIONS OF TWO CASES

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The clinical and serological picture of cases of acquired haemolytic anaemia (A.H.A.) has been the subject of many recent publications. In spite of the clarification of some problems, it would appear that we are still some way from a full understanding of this condition, and in all likelihood different clinical and pathological entities are still summarized under the one heading. There is no doubt that further observations and accurate recording of laboratory findings will help to distinguish clinical and pathological entities within this syndrome and will in the long run give us a better understanding of the many problems as yet unsolved. With this in view, we are reporting the clinical, haematological, and haemato-serological findings in two patients treated more or less simultaneously in two different hospitals. Both were diagnosed as cases of acute haemolytic anaemia, but they presented different clinical and haemato-serological pictures.

The disease under discussion has been given different names by different authors. The name "acquired haemolytic anaemia" (A.H.A.) is used throughout this paper.

Case 1

A man aged 47, who worked in a granary, was admitted to hospital on May 17, 1954. He gave a history of auricular fibrillation of unknown aetiology since 1941, and of dyspnoea, fatigue, pallor, and giddiness for nine weeks. He had had some nausea but no vomiting and had been sweating excessively. There was a history of pains and swelling of the joints at the age of 15, although he had not been admitted to hospital. He had had whooping-cough in 1948 and influenza in 1950. He was not old enough to serve in the first world war, and at the beginning of the second was rejected for military service on account of his heart condition. There was no family history of anaemia or jaundice.

On examination the skin showed café-au-lait colour with slight conjunctival icterus; heart apex rate 108, with complete irregularity. Apical systolic and diastolic murmurs were audible, the latter only after exercise. There was slight clubbing of the fingers. Breath sounds were harsh in the left midzone. The spleen was one fingerbreadth below the costal margin. The provisional diagnosis was subacute bacterial endocarditis complicating mitral disease.

Investigations.—Repeated blood cultures were sterile. Urine: no red cells. Chest x-ray examination: patchy infiltration in left upper lobe suggestive of pneumonia or tuberculosis. Blood: Hb, 8 g./100 ml. (54%); haematocrit, 25%; white cells, 9,200 (metamyelocytes 180 (2%), polymorphs 6,990 (76%), lymphocytes 1,470 (16%), monocytes 550 (6%)); reticulocytes, 0.5%. Biochemistry: serum bilirubin, 2.5 mg./100 ml.; direct van den Bergh reaction, negative; serum proteins, 7.39 g. (albumin 4.24 g., globulin 3.15 g.); thymol turbidity, 5 units; E.S.R., 20 mm. an hour. Mantoux: positive 1/100, negative 1/1,000 and 1/10,000. No cold agglutinins or heterophil antibodies. Bacteriological and viral serological studies: negative for *Br. abortus*, enteric group, influenza, psittacosis, lymphogranuloma