

With *B. coli communis* the action is very rapid and complete. Diluted twenty-five times the reaction on typhoid is small, not at all on cholera. Serum from a blister has less effect. March 28th: Action slower than on March 14th."

CASE 2. *Icterus; cirrhosis hepatis*.—"March 15th, 1896. Causes a very evident reaction after one minute with *B. coli communis* and after fifteen minutes with cholera, less with typhoid. After one hour most typhoid in clumps; cholera in large clumps, but plenty still active."

CASE 3. *Bronchitis*.—"March 16th, 1896 With cholera, commencing reaction in two minutes; in twenty minutes nearly all in groups. With typhoid, small reaction, but much loss of movement."

CASE 4. *Enterica*.—"March 22nd, 1896 (eleventh day of disease). Serum, undiluted, gives instantaneous and complete reaction with typhoid, both as regards agglomeration and loss of movement. With cholera, causes rapid agglomeration, but hardly affects movement. (Urine has no action) Diluted 1 to 2, with typhoid, groups formed in one minute; in a quarter of an hour most in large groups and movement partly impaired; after one hour very little movement left. With cholera, groups in five minutes; majority perhaps so in one hour, but still much activity. Diluted 1 to 4, with typhoid, groups in three minutes; in a quarter of an hour many large and small groups, many still isolated, activity as above. With cholera, small groups in twenty minutes, majority not agglomerated; similarly after one hour. Diluted 1 to 8 with typhoid same appearances after five minutes instead of three; at longer intervals no appreciable difference. With cholera, slight effect after one hour. Diluted 1 to 16 with typhoid groups in six minutes; at longer intervals much the same but with less loss of movement. With cholera, no reaction. Diluted 1 to 48, with typhoid, slight reaction after half an hour. Diluted 1 to 96: the same. Diluted 1 to 192: no reaction."

CASE 5. *Icterus*.—"March 25th, 1896. Serum causes groups with typhoid in two minutes, majority thus in ten minutes. Considerable loss of movement in forty minutes. Similarly with cholera. In dilution 1 to 5 all effect practically destroyed on both."

CASE 6. *Meningitis*.—"March 16th, 1896. With typhoid, after fifteen minutes, no action; the same with cholera. After thirty-five minutes, with typhoid, many groups but still much active movement. With cholera a few groups. After three hours, with typhoid, hardly any movement."

CASE 7. *Carcinoma; icterus*.—"With typhoid, good reaction, also when diluted 1 to 4, but not 1 to 16. With cholera, no reaction."

CASE 8. *Parturition (mother and child)*.—"Serum of mother acts strongly with both typhoid and cholera; weakly still when diluted 1 to 8 on both. Serum of child does not act at all on typhoid and very weakly on cholera."

CASE 9. *Enterica*.—"June 25th, 1896 (tenth day of disease). Groups are formed rapidly and become large. June 26th.—Undiluted serum causes marked loss of movement with feeble formation of groups; the latter process is more marked when diluted 1 to 16, but movement less impaired. July 2nd.—Movement of nearly all stopped in a short time with undiluted serum; formation of groups in 30 min. with individual bacilli widely distant. Diluted 1 to 16, 32, and 64, formation of groups in 2 min., but movement hardly impaired. July 8th.—Serum fairly strongly agglutinative undiluted, but not so rapidly as diluted 1 to 16. Acts feebly diluted 1 to 128. July 17th.—Serum undiluted acts instantaneously, strongly agglutinative, but loss of movement is slight and gradual."²

Two interesting facts are illustrated by these cases—viz., the difference between the paralyzing and the agglutinative action and the difference between maternal and foetal blood.

The explanation of this non-coincidence of agglutinating and of paralyzing power is not easy and must necessarily be hypothetical. Since the difference may occur with any kind of human serum, the most probable reason appears to me to be the existence of two substances, one of which causes the inhibition of movement and the other the agglutinating action. The former seems almost the more important, for in many non-enteric cases I could observe active motion still going on among the adherent bacteria, and this occurrence

forms one of the occasional distinguishing marks between the action of typhoid and other serum.

Nor is it easy to see why the agglutinating substances in the mother's blood should not pass into that of the child. In only one case out of four did the child's blood also have a slight action, hence it would appear that these constituents of the blood are usually formed later in life and not inherited. Achard has also since published a case in which the blood of a foetus from a mother in the acute stage of enterica gave no reaction. So far as I know, there are not any statistics which would bear on the question as to whether children of parents who have had enterica enjoy any immunity, although in the light of these differences of hæmic properties the question is of some interest.

There are certain discrepancies between my results and Widal's which are, I think, worth pointing out, the more so as they concern the accuracy of the test. Widal affirms that he has never seen ordinary serum act in greater dilution than from 3 to 10, and that he has occasionally, in enteric cases, to use a concentration of from 2 to 10. The narrowness of his own margin appears very dangerous and the cases related above show that it is insufficient. Widal himself now admits that in this way an occasional wrong diagnosis in either direction may occur. He also now attributes occasional variations to the causes which I pointed out in my former article; where, too, the caution lately emphasised by Delépine and Sidebotham to see that the emulsion is free from clumps, is contained. These latter authors have also adopted the method of collecting the blood in small glass tubes.

It is certainly possible that some of these differences are partly due to difference in virulence of cultures employed, especially in view of Pfeiffer and Kolle's recent work in this direction with cholera. Possibly a sufficiently attenuated culture would enable us to dispense with the dilution. This would make the test infinitely more convenient of application and avoid the apparent uncertainty which misled Breuer, in his recent examination of this subject, to prefer Widal's macroscopic test requiring 3 to 4 cm³. of blood. I do not think that this quasi-venesection (little as it does, as a matter of fact, injure the patient) would commend the method to clinicians of this country.

University College, Liverpool.

TWO CASES OF RUPTURE OF THE UTERUS.

By C. HUBERT ROBERTS, M.D., M.R.C.P. LOND.,
F.R.C.S. ENG.,

DEMONSTRATOR OF PRACTICAL MIDWIFERY AT ST. BARTHOLOMEW'S
HOSPITAL AND PHYSICIAN TO OUT-PATIENTS AT THE
SAMARITAN HOSPITAL, LONDON.

I VENTURE to report two cases illustrating rupture of the uterus which may possibly be of interest to some of the readers of THE LANCET. They differ completely in their variety and cause and may illustrate a not infrequent occurrence in practice, either hospital or general.

CASE 1.—A woman aged twenty-four years, who had been married four years and had had two children, miscarried at the third month five weeks before she came to me at the Samaritan Hospital with the definite history of this miscarriage. She had lost continuously ever since, but for the last fortnight the flooding had been very severe. She had not shivered. There was no foul discharge. She had fainted several times from loss of blood. She was intensely pallid and looked very ill. She was losing then severely and her clothes were saturated with blood. On examination the uterus was a little bulky and the finger discovered what felt like a decidual mass in the canal of the cervix; it was not foetid. She was admitted the same day, and on the following day under an anæsthetic I removed the decidual mass with the fingers and ovum forceps. On further examination a smaller mass could just be felt higher up; being unable to reach this I gently passed one or two of the larger metal dilators (Duncan's pattern); the third (No. 23) seemed to pass further than the sound I first passed (three and a quarter inches), and on withdrawing it I found that it had passed completely through the fundus. I removed the small decidual mass easily and

² In all the above cases it should be remembered that the dilution refers to the serum only. When mixed with the drop of culture the dilution is actually double. When "no action" is recorded it is, unless otherwise stated, to be understood that no re-action occurred within the time-limit of thirty minutes.

swabbed out the uterus with a 1 in 2000 perchloride solution. I then carefully plugged the rupture and the rest of the uterine cavity lightly with strips of iodoform gauze. No omentum or intestine prolapsed and there was no evident internal or external bleeding and no shock. The patient was put to bed and soon recovered from the anæsthetic. Her general condition was fair, there being no rise of temperature, no pain, and no indication of internal bleeding. Next day she was better, the temperature was normal, and there was no abdominal pain. I removed the gauze in thirty-six hours; it was perfectly sweet. During the following week no rise of temperature took place; there was never any abdominal pain or distension or any evidence of internal bleeding or peritonitis. Douches of iodine (one drachm to one pint) were used after the seventh day. She got up in three weeks and went to a convalescent home. Her anæmia was much improved. There was no further bleeding and the uterus had gone down to its proper size. I have seen her since and she tells me that she is well and again pregnant.

The second case occurred in the practice of a friend of mine in the country and illustrates a completely different variety—namely, rupture of the uterus following obstructed labour with hydrocephalus.

CASE 2.—A woman aged thirty-one years had been married thirteen years and had had seven children and two miscarriages. Her last child was born three weeks ago at not quite full time. It was a breech presentation; the labour was severe, lasting twenty hours, but no instruments were used. My friend, who attended her, was suspicious, owing to the length of the labour and the delay in delivery of the after-coming head, that something was wrong, and finally, after the greatest difficulty was experienced in delivery of the head (it was delayed five hours), traction was used and it was then found that it was a well-marked case of hydrocephaly, the head being "as big as two foetal heads." It was a female child, born dead at not quite full time. Perforation was not done or forceps used. The uterus during this was noted as being very firmly contracted and moulded on to the child and that the patient's pulse and temperature were rising rapidly. My friend states that on attempting to express the placenta there was a hard swelling on what he took to be the anterior wall of the uterus and which he thought might be a fibroid. The placenta was found to be "adherent"; chloroform was given and the placenta removed from the upper contracted segment. The lower segment was filled with a mass of soft tissue-like omentum or bowel and the vessels could be distinctly felt pulsating in the omentum. The mass at first taken for a fibroid was now felt to be the contracted upper uterine segment. My friend at once feared that the uterus had been ruptured, and considering the woman's surroundings and very serious condition he carefully swabbed out the vagina and replaced the omentum and intestines with great care; the lower uterine segment and the rent, which was a large one, were packed with antiseptic gauze. The patient, though very collapsed for a few hours, had no further bleeding and recovered from the shock fairly soon and was treated with the utmost care at her own home, a small cottage in the country. The gauze was removed within forty-eight hours. No prolapse of omentum took place, but it was evident that there was a large rent involving the left side of the lower uterine segment and which also extended deeply into the left broad ligament. The patient's temperature was variable, but never above 102.2° F. The lochia were never excessive or foul, and although the abdomen was somewhat distended for eight days she never had signs of general peritonitis. During the second week there seemed to be some swelling above the symphysis pubis on the left side which was not the uterus, and on examination per vaginam there was a large mass of induration felt immediately in contact with the rent in the cervix; it was rather tender and was fixed. During the next few days this increased, but remained all the time very hard. The temperature varied from 100.8° to 101.4°. There was no marked pain. The swelling could now be felt some distance above the brim, especially on the left side, and extended deeply into the pelvis; it was identical with the swelling felt per vaginam. She was sent to the Samaritan Hospital about the end of the third week, where she remained seven weeks, ultimately completely recovering. When I first saw her in the hospital she was rather pallid-looking, but not very ill. The temperature was 102.4° on admission, possibly caused by the journey. The abdomen was distended by a mass rising to within two fingers' breadth of the umbilicus, being most marked on the left side, very hard,

and nearly fixed; the uterus was evidently part of the mass and bowel was adherent around. Most of the swelling extended deeply into the left iliac fossa. Per vaginam the cervix was displaced to the right and fixed; there was a deep laceration of the cervix to the left, and above this and posteriorly a large hole extending into the left parametric tissue for two and a half inches. Around this was a dense mass of induration involving the base of the left broad ligament and extending into Douglas's pouch. The fundus uteri lay above and in front of this. This swelling bimanually was larger than a foetal head and fixed; no part was elastic nor was it very tender. The finger passed into the rent did not enter the peritoneal cavity. My opinion was that the uterus had been extensively ruptured in the lower uterine segment posteriorly and to the left, probably by the hydrocephalic head during its extraction, the condition of obstructed labour predisposing. The swelling was probably parametric, possibly blood forming a hematoma, around which some inflammation had taken place with adhesions. The induration also surrounded the bowel. There was no evidence of any abscess in the pelvis. Several of my colleagues saw the case and agreed in the probable diagnosis. I kept her at absolute rest in bed on light diet, keeping the bowels well open. Her temperature varied for the first week between 101° and 103.6°. Each examination caused a considerable rise. On the ninth day after admission her temperature was normal and remained so till she was discharged from the hospital at the end of seven weeks. She was douched twice a day, at first with iodine (one drachm to one pint). She had very little discharge and no abscess ever burst as far as we knew. The swelling gradually disappeared and was finally completely absorbed except for some thickening which remained on the pelvis, pinning the cervix to the left ischium on vaginal examination. There was no sloughing and never any bowel trouble or any suppurative of the parametric mass. She has since completely recovered. The measurements of her pelvis were as follows: distance between iliac spines, 10 in.; distance between iliac crests, 10½ in.; external conjugate diameter, 7½ in.; and diagonal conjugate diameter, 4½ in. The measurements of the child's head could not be obtained.

Remarks.—These two cases illustrate perhaps a few points in rupture of the uterus both as to its diagnosis and treatment—the first occurring with the use of dilators so much employed in the present day, and the second being an example of the dangers of obstructed labour with hydrocephalus. Probably very few cases of rupture of the uterus occur apart from obstructed labour, though cases may occur from the use of instruments, sounds, dilators, curettes, &c., or from great violence. My first case, perhaps, shows the possible danger and power of metal dilators, especially in a uterus which, as in this case, was very degenerate after severe hæmorrhage and owing to the retention of decidua masses; in fact, the walls were quite rotten and "putty-like," and the cervix tore in the grasp of the volsellum. Every care was taken in passing the instruments and I felt no resistance whatever when the perforation occurred. Antiseptic measures were used, and as there was no evidence that the contents of the uterus were septic, and no hæmorrhage, internal or external, occurring, the treatment of plugging with aseptic gauze was deemed the safest, especially in a woman already so ill. The case subsequently did perfectly well, but it might not have been so had septic material been introduced into the peritoneum or severe hæmorrhage occurred. It is quite possible that if such had been the case I might have had to remove the uterus completely per vaginam or even the question of abdominal section might have arisen. I fear in this case such severe measures would have been very risky, as she would not have stood the shock. I quote this case because it is more than probable it might happen to others, for in these degenerate uteri after abortion, &c., the walls are exceedingly thin and easily perforated and I warn operators of this danger. Any instrument might do this, dilators or curettes, and curettes must be used with the greatest care. Septic cases are particularly dangerous. It was fortunate in this case, too, that the contents of the uterus were not in this condition.

The second case illustrates by far the commonest cause of rupture of the uterus—viz., obstructed labour, which of course generally arises where the pelvis is too small, the head too large, or mal-position of the child is present. Hydrocephalus, of course, is rare, perhaps occurring about once in 3000 cases. It should always be suspected and may be difficult to diagnose when the child presents by the breech;

its non-recognition leads to serious danger of rupture of the uterus. The mechanism of rupture in obstructed labour need not be gone into here, but the case I quote exhibited well the dangerous thinning of the lower uterine segment with the moulding of the thickened upper segment on to the child. The slightest interference will then lead to rupture; the condition should be foreseen always, and in this case perforation of the hydrocephalic head should have been done early. The question arises next as to the correct treatment of the rupture. Most ruptures in such cases occur in the lower uterine segment or vagina; commonly, I think, the rupture is posteriorly, and may or may not involve the whole thickness of the uterine wall and peritoneum; some may extend deeply into the parametric tissue, as in my second case, with the formation of a large hæmatoma, and in some cases the amount of blood poured out beneath the peritoneum may be very large. If the peritoneum is involved it is most serious, especially if the child escape among the bowels, with possibly severe internal bleeding from the rent and the escape of septic material into the general peritoneal cavity. The diagnosis of obstructed labour in these cases must be made early and treated early. This I need not go further into, it is the prophylactic treatment of uterine rupture. The point of greatest interest appears to me to be, What is to be done if the rupture has occurred? It may be suspected if the pains which have been practically continuous suddenly cease, if great collapse ensue and the presenting part retreats, or the child be felt free in the abdomen. In the latter case the rupture must be complete and the uterus may be felt apart from the child on abdominal palpation. In any event there arise—(1) the question of extracting the child and the contents of the uterus by abdominal section or per vaginam; (2) the question of closing the uterine rent; (3) drainage per vaginam without abdominal section; and (4) antiseptic measures. Generally, there is no doubt that if the child be among the intestines it must be extracted by abdominal section. It is dangerous to pull it back through the uterine rent. If the child is still in the uterus the child's size must be at once lessened by some such operation as perforation, decapitation, &c. In this case quoted the rupture was probably caused by pulling the large head down by traction on the breech. If the placenta be found then in the peritoneal cavity it might be pulled back through the rent by traction on the cord. The great question is the closure of the rent. This, of course, involves abdominal section, and possibly a very serious and prolonged operation, often quite impossible owing to the patient's condition of shock or to want of experience of the operator or to the patient's surroundings—say, in a country practice and without help. The ideal treatment is of course perfect apposition of the ruptured surfaces by deep and superficial sutures, as the text-books describe. This is not always possible, even after the abdomen is opened, owing to the situation of the rent; Porro's modification has been successful. The child always dies when it escapes into the peritoneal cavity. Supposing, then, abdominal section impossible or unnecessary, may not cases recover without? I think so certainly. Of late a good deal of attention has been paid to drainage by gauze, especially in vaginal hysterectomy, and very excellent results have been obtained by this method. Drainage may also be applied to cases of rupture of the uterus. My friend treated his case in that way and I am sure it was the right one. Great care should be taken after the extraction of the child and placenta to get rid of any septic material, if possible also blood-clot, and to get the edges of the rent as clean as possible. If necessary, sterilised water at a temperature of 100° F. may be used to flush out the peritoneum through the rent and the water may be left in the peritoneal cavity without any danger. Next a large glass or rubber drainage-tube can be used, one end in the rent and the other in the vagina or outside the vulva. Better still, I think gauze, either iodoform or plain aseptic absorbent gauze, may be used; it is a most excellent drain. Adhesions soon form around its peritoneal end and the general cavity of the peritoneum is probably shut off in a few hours, and if there is no further infection such cases do excellently. It is rather to this latter point that I would draw attention—viz., the treatment of some cases of uterine rupture by drainage without abdominal section; of course, it is only to some cases that this treatment applies. I am sure that so severe an operation as abdominal section following upon a long and difficult case of obstructed labour and the prolonged and possibly ineffectual attempts to close a wound in the

uterus might prove fatal to a case where the simpler method of drainage might have been employed. Much, too, depends on experience and surroundings. We cannot all work in well-appointed hospitals with every convenience at hand, and the practitioner in the country, perhaps alone and in some humble cottage, is certainly not in a position to perform an operation so complicated and dangerous at a moment's notice, and I fancy that, as this case shows, excellent results can be obtained by a simpler method.

Welbeck-street, W.

POST-PARTUM HÆMORRHAGE AND ITS TREATMENT.

By THOMAS LAIRD, M.B., C.M. GLASG.

IN his recent paper on Post-Partum Hæmorrhage and its Treatment¹ Mr. E. Stanmore Bishop suggests that compression of the aorta is in more use by country practitioners than might be supposed from the literature of the subject. As a country practitioner I should like to have an opportunity of remarking that the arrest of post-partum hæmorrhage seems to be a physical question more than anything else—simply a matter of applying a little pressure. If the uterine fibre could only exert a little contractile force it could easily overcome the pressure inside the bloodvessels and bring about the desired result. If the pressure could be lessened inside the bloodvessels well and good, and if not with a little increase on the outer side all would be well. Obviously in compressing the aorta at a point above the origin of the ovarian arteries we shut off so many important vessels that it is practically stopping the blood-supply to half of the human frame, besides which there would always be the unpleasant reflection that regurgitation might be going on from the vena cava. Why not then apply pressure on the vessels which supply the uterus near the point where they enter that viscus? In Leishman's treatise on midwifery the application of pressure outside the vessels by plugging the uterus is only spoken of to be condemned. Others have condemned it because there would be no counter-pressure as the uterine walls would relax, but if this is the only cause of failure why not apply a little counter-pressure, thereby giving a little assistance to the uterine wall, and why not at the same time apply pressure to the uterine and ovarian arteries and so also close the corresponding veins, thus meeting the great question of regurgitation? The application of external pressure by the use of styptics is spoken of by Leishman as of the greatest value; but also as of great danger, and only to be tried when other means fail.

The method which I adopt in cases of hæmorrhage is to pass the right hand into the womb in the usual way after being carefully disinfected, and, if there are no clots or any other obstacle which should be removed, to close it, and with the left hand compress the uterine and ovarian arteries against it on either side, the fingers grasping the left side and the thumb the right side. After remaining thus for a few minutes, should bleeding not then be fully controlled, the work can be done more completely by introducing a powerful styptic on cotton wool or sponge held in the palm of the hand and occasionally squeezing it, sending the liquid through the fingers, &c., and turning the hand slightly round in either direction or both, causing it to come really against and smearing the uterine tissue. Supposing a quantity great enough cannot be introduced in this manner the object may be gained by introducing the nozzle of an ordinary syringe as before in the palm of the hand, when an assistant can from time to time inject a fresh quantity of the required liquid, which can be applied as above. All this may be done without ever removing to any appreciable degree the pressure of the hand from the outside of the bloodvessels, provided of course the sponge or syringe is introduced at first. The pressure on the arteries may be applied probably with better effect by pressing the vessels of the right side against the pelvic wall with the closed fist inside the uterus, thus setting the whole of the left hand free to compress those of the left side against the closed hand. Should the operation be prolonged the left hand will become tired and will require

¹ THE LANCET, Oct. 31st, 1896, p. 1215.