Now place nine small test tubes in a row on another plasticene tray. With a teat and test pipette fill in the left tube with 3 volumes of saline and 1 volume of appropriately diluted normal serum containing two units of complement. The remaining eight tubes are filled in with 2 volumes of the dilutions of extract, in order from left to right, 1 volume of saline, and 1 volume of complement. All ingredients must be filled into tube 2, then tube 3, and so on. Incubate in water-bath for twenty minutes, add 2 volumes of 5 per cent. sensitized corpuscle suspension, mix, and incubate a further twenty minutes.

The left-hand tube is a control, and should show complete haemolysis. The rest are examined from left to right until the tube is found giving complete inhibition of haemolysis—that is, a precipitate of corpuscles and a colourless supernatant fluid. One-third of the strength of extract in this tube is the strength to be used for the tests—for example, if 25 per cent. extract completely inhibits haemolysis, 8 per cent. is the strength to use in the tests. This 8 per cent. dilution is made fresh for each batch of tests from the stock undiluted extract.

C. The Actual Test.

The materials required having been prepared and standardized, the following procedure is convenient:

1. Prepare the 5 per cent. sensitized suspension of sheep's corpuscles.

2. Titrate complement and incubate.

3. Dilute extract to required strength for use.

4. Examine result of complement titration and dilute so that each volume contains 2 units of complement.

Place in a plasticene tray three rows of two small test-tubes for controls, and one row for each patient's blood to be tested. Put an extra tube to each row to dilute serums in, and as each serum is tested dilute it 2 volumes to 3 volumes of saline (2-5 dilution). Between filling in each row the pipette must be rinsed with distilled water and dried in a cool Bunsen flame and allowed to cool. The tubes are filled in as shown in Table I.

TABLE I.

	Left Tube.	Right Tube.
1st pair: No serum.	4 vols. saline.	2 vols. saline 2 vols. extract
2nd pair: Normal serum; negative control.	2 vols. saline 1 vol. heated serum (2-5 dilution) 1 vol. complement (2 units).	2 vols. extract 1 vol. heated serum (2-5 dilution) 1 vol. complement (2 units).
3rd pair: Syphilitic serum; positive control.	2 vols. saline 1 vol. heated syphilitic serum (2-5) 1 vol. complement (2 units).	2 vols. extract 1 vol. heated syphilitic serum (2-5) 1 vol. complement (2 units).
4th pair: First patient's serum.	Ditto, using first patient's serum heated and diluted (2-5).	Ditto, using first patient's serum heated and diluted (2-5).

Incubate in the water-bath for twenty minutes, add to each tube two volumes of the 5 per cent. sensitized suspension of sheep's corpuscles, mixing well first the right and then the left tube of each pair (to avoid carrying over complement), and just rinsing the test pipette with saline between each pair of tubes, but not drying it in the flame. Incubate a further twenty minutes, and read off the results as soon as the supernatant fluid can be seen in the tubes with no haemolysis. The result should be as in Table II.

TABLE II.

	Left Tube.	Right Tube.
1st pair ...	No haemolysis	No haemolysis.
2nd pair ...	Complete haemolysis	Complete haemolysis.
3rd pair ...	Complete haemolysis	No haemolysis.
4th pair (patient)	Complete haemolysis	Haemolysis complete = "negative." Haemolysis nil = "positive."

The method may be made quantitative by adding four extra tubes to each "patient's" pair and "titrating" one volume of the serum (2-5) through these four extra

tubes as for titration of complement, and adding extract and complement as for the other right hand tubes.

In explanation of the number of volumes taken, it may be added that the calculations have been made so that the total bulk of six volumes, with corpuscles, corresponds to a total of $1\frac{1}{2}$ c.cm. in the larger techniques, each volume being the equivalent of $\frac{1}{2}$ c.cm. The dilution of serums to be tested and the quantities are the equivalent of 0.1 c.cm. used in the ordinary techniques, and in the quantitative method the amounts of serum in the tubes containing extract are equivalent, from left to right, of 0.1, 0.05, 0.02, 0.01, and 0.006 c.cm. of the heated serum.

D. Some Occasional Difficulties.

The most common cause of difficulty is to be found in the sheep's corpuscles. Occasionally a sample will either not haemolyze at all, or only in very slight degree. Some few samples may haemolyze too readily, especially if not kept in the ice-chest, or if used when too old. The only remedy, if two extra washings make no difference, is to obtain a fresh sample. Serums when septic may lead to complete inhibition of haemolysis in both tubes. Frequently the serums will react satisfactorily if centrifugalized and then reheated for an hour at 56° to 58° C. If this has no effect, a fresh sample must be obtained. An extract inefficiently pounded, or carelessly diluted for use, is another source of trouble.

It will, however, seldom be necessary to repeat the tests owing to a "bad result" if the directions given above are carefully noted and followed, and if each step is carefully performed before going on to the next. The "no serum," "negative," and "positive" controls will show immediately if anything is wrong; if these controls are in order, the result shown in the "patient's" tubes may be trusted implicitly.

The Wassermann is an extremely important test, and the results given far-reaching. No stage of the working should ever be left to an unskilled worker, or undertaken otherwise than seriously.

ARTERIO-VENOUS ANEURYSM OF FEMORAL ARTERY SUCCESSFULLY TREATED BY OPERATION.

By G. GORE GILLON, F.R.C.S.E.,

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THE following case of arterio-venous aneurysm of the left femoral artery, due to bullet wound, came under my care at the Queen Alexandra Military Hospital, Grosvenor Road, London, and I report it as there are very few cases on record of successful operation for arterio-venous aneurysm in this particular region. Sir William Osler urged me to publish the case as statistics are required to aid military surgeons in the choice of operations for this lesion.

Private G. (cavalry), aged 25, received a bullet wound through the left thigh at Zellebeke on November 15th, 1914. He was sent to the Duchess of Westminster's Hospital in France for fourteen days, and then to the South Devon and Cornwall Hospital, Plymouth, for another fourteen days. He went home for twenty-eight days, and was then attached to another cavalry regiment. He was put to work in the cook-house. He felt all right and had no pain in the thigh until April 15th, 1915, when he was put on mounted parade for six hours. The action of riding brought on pain, and an arterio-venous aneurysm formed at once. The bullet evidently injured the femoral artery and vein at about the level of 10 in. above the knee-cap.

He was admitted to the Queen Alexandra Military Hospital on April 16th. When examined on April 18th there was a swelling on the inner aspect of the thigh, and a "purring" sensation felt over the swelling, and for a long way up and down the thigh. Varicosity of veins was developing in lower leg daily, and he complained of slight aching; he was kept in bed. With low diet and rest the "purring" sensation and swelling were on April 21st very much less.

On April 23rd there was the slightest purring sensation over the femoral artery in front in an area about 2 in. square. It was then hoped that with low diet and absolute rest the aneurysm would consolidate.

On April 27th the purring sensation was felt over a slightly larger area.

Sir William Osler saw the case with me on this day, and made the following note:

"Swelling and visible pulsation in Scarpa's space and along the line of Hunter's canal and in the region of bullet wound. Veins of thigh not varicose; a few on the calf behind are increased in size. Marked visible pulsation at and above Poupart's ligament, but not more than on other side. Pulsation and other characteristic 'purr' over swelling and along femoral artery, but not in the popliteal. Pulsation felt in popliteal feebly; not felt in dorsalis pedis, but in posterior tibial. The characteristic murmur is heard from the common iliac to popliteal artery. On standing up the left foot gets much more congested and the veins of leg more prominent. Esmarch's bandage was applied and the femoral artery compressed at the groin. When the bandage was removed there was not much change in the appearance of the foot; the whole leg and foot remained dusky at the end of three minutes. The right leg bandaged with Esmarch's bandage, the right femoral artery was compressed at the groin. The bandage was removed after three minutes. This leg behaved like the other, showing that the collateral circulation was pretty good in the left leg. He has phlebo-sclerosis in both veins of both calves."

Operation.

I operated at 11 a.m. on May 12th. An Esmarch bandage was put on from foot to groin and a tight rubber band round the hip and groin and the bandage removed. Both bandage and band had been sterilized previously.

An incision was made in the line of the artery, beginning at the apex of Scarpa's triangle and extending down 5 in. along the site of Hunter's canal. I pushed the sartorius muscle to one side, and then met with two large veins, running parallel; these were held out of my way, and then I got down to Hunter's canal, separated the fascia and nerves and another vein, and came across the femoral artery, which was not enlarged in any way. The femoral vein lay to the outer side of the femoral artery, and was nearly the size of the vena cava. I found the aneurysmal connexion between vein and artery to be $\frac{1}{2}$ in. in length. There was no sac, as the aneurysm was so recent, and the enlargement was entirely on the venous side of the connexion.

I tied the artery 2 in. above and 2 in. below the lesion, firmly, with stout silk. I lifted the tied off portion up out of its bed and found that there was a small artery arising from it, and passing to a muscle. This I divided between catgut ligatures and removed half an inch of it.

I then tried to put Crile's forceps on each side of the big vein, but found the blades too short to occlude the whole width of the vein.*

My intention had been to cut off the venous circulation and sew up the opening from the arterial aspect, but I did not think it wise to stop the venous flow by other means, and did not want to interfere with the bed of the big vein; therefore I decided, somewhat reluctantly, to do no more, especially as my colleagues assisting me advised no further manipulation of the dilated vein, as the danger of thrombosis loomed large. All purring ceased before I closed the wound.

On May 20th the stitches were removed; the patient felt quite well. The beating of the dorsalis pedis and posterior tibial arteries could be felt faintly.

On May 28th the patient was doing well. A venous hum was audible up as far as the external iliac vein, and could be heard slightly 1 in. below the seat of the lesion,

* Down Brothers are making an improved arteriorrhaphy forceps, half an inch longer in the blade, for me.

but not nearer the knee; this "venous hum" is due to the large vein and the dilated iliac vein, and was similar to the "hum" heard over a jugular vein. There was no sign of aneurysmal bruit or "purring thrill." The aneurysm is cured.

On June 3rd the patient was directed to lie in bed quietly for three weeks more, and was told he could then return home.

Cases of this kind should be operated on early to prevent the far-reaching effects of venous dilatation.

My thanks are due to Sir William Osler, Lieutenant-Colonel Pilcher, Lieutenants Northcote, Hort, and Randle, R.A.M.C., and Civil Surgeon E. H. Scott (anaesthetist); and also to the sisters in Queen Alexandra ward for their aid.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

RECOGNITION OF EPIDEMIC CEREBRO-SPINAL FEVER.

It might be of help to Dr. G. P. C. Claridge, and of some interest to others, if I relate the histories of three cases coming under my notice.

There had been a few cases of "spotted fever" in my district, which awakened my interest in the condition, though I had not had a case myself. As I had held the idea that cerebro-spinal fever occurred without spinal or meningeal symptoms, I was on the look-out for likely cases, and in the three referred to I found them.

CASE I.—Miss M. M., aged 7, became ill on a Monday night, with severe cold in the head, pains in joints of arms and legs, and frontal headache. The temperature was 103°, the pulse 90. There were no neck signs, no Kernig's sign, and no *tache cérébrale*. The patient looked really ill—far more so than one would expect to find in an ordinary "influenzal cold." I took swabs from the posterior nares and found Gram-negative cocci which refused to grow on agar but which grew on human blood agar. In every respect they resembled the meningococcus. The patient was treated with antiseptic nasal spray, formalin lozenges, and aceto-salicylic acid, and recovered completely in a week. None other of the family of six contracted it.

CASE II.—Mrs. B., aged 26, became ill on a Friday with frontal headache, pains all over, and severe coryza. She had some nausea, with slight vomiting. The temperature was 104°, and the pulse 110. There were no neck signs, no Kernig's sign, no *tache cérébrale*. Swabs from the posterior nares showed the same micro-organisms as in Case I. The treatment was the same. This case was much slower in recovery, but ultimately got quite well.

CASE III.—Master B., aged 3, son of Case II, presented the same symptoms, but not so severe, and in four days was quite well; from this case the same micro-organism was obtained.

From work that I have recently done on cerebro-spinal cases under the care of Dr. H. S. Murphy, Medical Officer, Lisburn Union Hospital, I am convinced that these three cases were examples of the catarrhal stage in cerebro-spinal fever.

I got these three cases before Dr. Lundie and his co-workers published their first paper, so I was very glad to read their paper, for it confirmed my imperfect surmises.

Lisburn.

J. L. RENTON, M.B.

P.S.—Since writing I have attended another case which showed meningococci in the sputum. The patient, a girl aged 5 years, was brought to me by her mother. The history was: "Three weeks ago the child had a very severe cold in the head; the headache was intense." Since then the child had a severe cough, with much sputum. On examining the sputum the organism found was the meningococcus.

A CASE OF ABSCESS OF THE OMENTUM STRANGULATED IN A HERNIAL SAC.

S. L., aged 16, an Indian native, was admitted to the Zanzibar Government Hospital suffering from a swelling in the left inguinal region and left side of the scrotum. The swelling was not a large one; it gave the impression that the region had become tightly filled up without great increase in size. There was acute local pain and tenderness, also some diffuse abdominal pain. Percussion gave a dull note, and there was no impulse on coughing. Temperature was 101.2° F. and pulse 96. He gave the history that the swelling had suddenly appeared for the first time three days before, when he was lifting a heavy weight. There was some pain at first, but it was not