

The conclusion drawn from this experiment is similar to that of the last in its main result; spinal fluid brings about a much larger growth of the meningococcus when it is present in a culture medium of agar and amino-acid broth than does nasal secretion extract.

*General summary of the foregoing experiments.*—The main outcome of the foregoing experiments is to show that there is present in normal spinal fluid some substance that greatly increases the rate of growth of the meningococcus on an artificial culture medium. They clearly demonstrate that this power, in the case of human spinal fluid, is relatively greater than that shown by blood or nasal secretion; that volume for volume spinal fluid brings about a much thicker growth of the meningococcus than do the same volumes of blood or nasal secretion.

In a recent paper Miss Jordan Lloyd<sup>3</sup> has drawn attention to the presence in widely different bodies as blood, serum, milk, and other animal and probably vegetable tissues, of certain accessory food factors which materially affect the rate of growth of the meningococcus on various media. It was to be expected therefore that a similar property would be possessed by the spinal fluid. The interest of the above experiments, however, lies not so much in the possession of this property, as in the fact that it is possessed in a relatively greater degree than either blood or nasal secretion, and that this fact may be of some importance in explaining the quick growth of the meningococcus in the cerebro-spinal fluid and its power of rapidly invading the membranes and cavities of the central nervous system.

In a recent paper I have shown<sup>4</sup> (in conjunction with Crowe) that human leucocytes are capable of taking up living meningococci and keeping them alive for considerable periods of time. We suggested that this might be the means by which this organism gains admission to the cerebro-spinal fluid and the meninges. In the light of the above experiments the rapid growth of the cocci would be ensured by the spinal fluid, once the organism had been introduced into it by the leucocytes. The present experiments with spinal fluid therefore afford some additional support of our original experiments as to the mode of infection in cerebro-spinal fever.

## Clinical Notes :

### MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

#### REMOVAL OF SHRAPNEL FROM THE SUBCLAVIAN ARTERY.

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THE interesting features of this case are: 1. The emergency of the operation. 2. The difficulties experienced on account of the depth of the vessel at the high seat of ligature whilst at the same time the hole in the artery had to be plugged by the finger of the left hand of the operator to control the alarming hæmorrhage. 3. The ball-valve action of the fragment of shrapnel in the artery, which undoubtedly saved the patient's life.

No. P/322, Private H. S., 10th Prussian Infantry, prisoner of war, was admitted to hospital on April 26th, 1917, in a collapsed and blanched condition, with signs of severe hæmorrhage from a punctured wound about half an inch below and towards the centre of the right clavicle. The hæmorrhage had, however, ceased for the time being. The patient was treated on general lines and improved. There was also musculo-spiral paralysis of the right arm, fairly well marked, with drop wrist. On the evening of the second day after admission a second and severe hæmorrhage occurred, and simultaneously a soft swelling developed under the clavicle. The patient was removed to the operating hut absolutely collapsed, pallid, with no pulse felt at right radial, and only a very feeble and rapid pulse at left.

Intravenous saline infusion was attempted while patient was being anæsthetised, but owing to the collapsed condition of the veins was impracticable, so subcutaneous was com-

menced. However, during the progress of the operation a vein was struck, and intravenous infusion was continued throughout. An incision was made parallel to, and half an inch below, the clavicle, and both pectorals were divided. A large blood clot, the size of a duck egg, was found. As this was cleared away an alarming fountain of blood burst forth. A finger was plunged deep into the wound which controlled the bleeding. It was found that there was a hole in the subclavian artery at about the juncture of the second and third part of the vessel. A piece of shrapnel about the size of a small haricot bean was felt inside of the artery and partially blocking the opening.

The course of the vessel was exposed under difficulty, as one hand was fully occupied in controlling the hæmorrhage, and a ligature was placed round the subclavian as high up as possible about the beginning of the second part. The piece of shrapnel was removed and the tear in the vessel clearly demonstrated. The pectorals were repaired and the wound stitched except at the outer end, which was drained.

The patient's condition was very grave, and remained so during the night. Saline infusion was kept up at intervals for the next 24 hours. With the exception of slight superficial suppuration of the wound the patient's recovery was rapid and uninterrupted. On the fifth day after the operation the radial pulse was perceptible and gradually increased in volume, and the musculo-spiral paralysis showed signs of improvement later.

The number of days from the time this man was wounded to the day of operation is not known, but as he was operated on at the base, where he arrived as a sitting case, it is probable that many days elapsed.

I am indebted to Lieutenant E. Wragg, R.A.M.C., for his assistance at the operation and for his care in the after-treatment of the case.

#### A CASE OF COMPLETE OBLITERATION OF THE ULNAR ARTERY BY SUPPURATION.

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THIS case is recorded to show the complete disappearance of the ulnar artery for a distance of 8 inches due to suppuration. The patient made a perfect recovery and has the use of his arm, which he can use to manipulate his crutches.

The patient, aged 24, was admitted to the French Hospital on April 30th, 1917, having been wounded six days before; he was suffering from a seemingly superficial flesh wound of the left forearm. He had also had his left femur amputated in the lower third. On admission his temperature was 101° F. and pulse 110.

On May 9th he had considerable swelling of the forearm, which was opened up and pus found in the deep layer of muscles; drainage-tubes were put in reaching from elbow to wrist. At midnight he had an attack of secondary hæmorrhage when the tubes were removed by the house surgeon. This was followed by two more attacks of secondary hæmorrhage at midday and 7 P.M., which were controlled by a tourniquet. At 9 P.M. on the 10th he had a further hæmorrhage, whereupon I had an anæsthetic administered and cut down upon the brachial artery, which was bleeding at the bend of the elbow, but being unable to tie it off a pair of Spencer Wells forceps was left on.

Two days afterwards it was decided to cut down and tie the ulnar artery, but upon opening up the forearm under CHCl<sub>3</sub> it was found that the ulnar artery for the greater part of its length had been destroyed by ulceration, and only the two ends were left, so ligatures were applied—one just below the bifurcation of the brachial artery and the other at the level of the pisiform bone. The arm was treated throughout by means of the Mencièrè solution.

I am indebted to Mr. W. H. Clayton-Greene, senior surgeon of the French Hospital, for permission to publish this case.

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ROYAL VICTORIA HOSPITAL, BELFAST.—The clinical winter session at the Royal Victoria Hospital was opened with an address by Dr. W. Calwell, in which he referred to the fact that five of the full staff of the hospital were at the front, and that all the auxiliary staff were or have been serving. Including former and present members of the medical school, the following honours had been won: 1 V.C., 2 C.B.'s, 3 C.M.G.'s, 1 C.I.E., 4 D.S.O.'s, and 15 M.C.'s, while 21 persons were mentioned in despatches. In conveying a vote of thanks to Dr. Calwell, Sir John Byers, who presided, incidentally referred to the brilliant work done by an old student of the school, Major Robert McCarrison, as shown in his book, "The Thyroid Gland in Health and Disease."

<sup>3</sup> Jordan Lloyd: Jour. Path. and Bact., 1916, xxi., 113.

<sup>4</sup> Shearer and Crowe: Proc. Royal Society, 1917, Ser. B, lxxxix., 422.