character, namely a viscous, straw-coloured liquid, slightly turbid, which clotted on standing. No micro-organisms were found by direct examination of smears from the clot, or by culture.

Agglutination tests were made by Dreyer's macroscopic method with the standard types of dysentery bacilli, using both the blood serum and joint fluid. The details are given in Table VI.

In Cases 7 and 8 practically the same degree of agglutination was obtained both with the joint fluid and the blood serum. In the latter case, examined nine days later, the agglutinin content of the joint fluid had increased, whilst the blood serum remained at the same titre.

In Case 6 neither the joint fluid nor blood serum showed any agglutinins. In this patient no dysentery bacilli had been found in the stools.

In Case 5, the joint fluid was examined a few days after the blood serum and showed a higher agglutination than the latter with B. dysenteriae Flexner.

The examinations of joint fluid and blood serum, both bacteriological and serological, were made in the laboratory of No. 25 Stationary Hospital, by Captain P. Hartley, R.A.M.C.(T.), to whom the writer's thanks are due.

TABLE VI.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Blood serum</th>
<th>Joint fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18.8.18</td>
<td>22.8.18</td>
</tr>
<tr>
<td>3</td>
<td>36 units (Shiga)</td>
<td>Agglutinins not determined</td>
</tr>
<tr>
<td>5</td>
<td>22.9.18</td>
<td>24.9.18</td>
</tr>
<tr>
<td></td>
<td>18, (Flexner)</td>
<td>More than 50 units (Flexner)</td>
</tr>
<tr>
<td>7</td>
<td>10.10.18</td>
<td>10.10.18</td>
</tr>
<tr>
<td></td>
<td>More than 50 units (Shiga)</td>
<td>More than 50</td>
</tr>
<tr>
<td>8</td>
<td>23.10.18</td>
<td>23.10.18</td>
</tr>
<tr>
<td></td>
<td>48 units (Shiga)</td>
<td>24 units (Shiga)</td>
</tr>
<tr>
<td>1.11.18</td>
<td>50</td>
<td>1.11.18</td>
</tr>
<tr>
<td></td>
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<td>50</td>
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</tbody>
</table>

REFERENCES.


CASE OF A FRAGMENT OF SHELL IN THE ARTERIAL CIRCULATION.

BY CAPTAIN C. S. O'NEILL.

Royal Army Medical Corps.
Officer Commanding No. — Mobile X-ray Unit.

The following interesting case is put on record owing to the great rarity of the condition and its great interest from a radiological point of view. Cases of foreign bodies in the circulation have been described by French observers, but as far as the author knows this condition has not been described before, confirmed by autopsy, in English literature.

Serjt. P. was wounded at 7 p.m. on August 7, 1917, and was admitted to a
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casualty clearing station on the morning of the 8th, in a very collapsed condition, with a running pulse of 128 per minute, with wounds in the left posterior axillary line, fifth interspace, left lumbar region and left thigh. On admission the patient was too ill for a thorough clinical examination of the chest, but it was found that the heart was not displaced and that there was well-marked pericardial friction.

On the 10th the patient was moved to the X-ray room and screened. It was then found that the shadow over the left chest was uniformly obscure and dense, that there was practically no movement seen in the left diaphragm, which was depressed and flattened to an obtuse angle. The right chest and diaphragm were normal in appearance. The most striking picture was seen in the cardiac region. The shadow of the heart was much to the right of the mid line, which would be expected with a large haemothorax which gives the picture of a combination of great obscurity of the chest, depression and fixation of the diaphragm on the affected side, with dislocation of the heart shadow to the unaffected side. However, in this instance, not only was the heart shadow more to the right than normal, but it was increased in breadth, and was globular in shape. The cardiohepatic angle was obtuse and the muscle of the right side of the heart could be differentiated from the extreme edge of the heart shadow, and the diagnosis of pericardial effusion was made. About 1 inch above the base of the heart and 2 inches from the right border and 2½ inches deep, a foreign body was made out within the heart shadow with an extraordinary movement. The black shadow of the foreign body, some two centimetres long, with a maximum breadth of 0·6 centimetre, could not be separated from the heart shadow whatever the incidence of the X-rays. The movements seen were a downward movement with the mediastinal respiratory movement, a lateral movement with systole to the right, and a flail-like movement, with the base of the flail to the right side. These movements were synchronous with the heart beats, giving a curious rotary effect. The diagnosis was then made that the foreign body was within a chamber of the heart, probably within the left ventricle, and had one end of it fixed under a valve flap. Half an hour after returning to the ward from this examination, patient called attention to his left leg, which was found to be blue in colour and cold from above the knee to the foot. One hour later the leg appeared to be normal again. On the 11th the wounds in the left lumbar region and left thigh demanded urgent surgical interference owing to the development of signs of gas gangrene, and on his way to the operating theatre, patient was again screened with a view to more accurate localization of the fragments of the thigh and lumbar region. His chest was also screened, and although otherwise the picture was identical, no trace of the foreign body in the heart could be seen, and on rapid examination of the course of his thoracic and abdominal aorta it was found that the missile must have passed through the aortic valve and was lying in the abdominal cavity 2½ inches deep from the anterior abdominal wall, 1 inch below and 1 inch to the left of the umbilicus. No movement was seen, and the foreign body was apparently within the aorta at its bifurcation. On the morning of August 12, the patient's condition did not seem the worse for the operations on his thigh and loin under gas and oxygen, and the aspiration of six ounces of blood from the left pleural cavity. Pericardial friction was well marked, no increase of cardiac dullness could be made out, there was resonance in the left
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axilla, and the breath sounds were generally harsh on the left side. He died at 6.25 p.m. this day.

Autopsy.—Surgical emphysema of face, neck and thorax. Left chest contains small amount of blood. Entrance wound in left posterior axillary line. Pericardium contains small amount of blood and small tear on the posterior inferior aspect. There was an exudate of fibrin over the anterior and left lateral walls.

Heart.—A small hole, surrounded by haemorrhage into the myocardium, on the posterior wall of the left ventricle. The interior of the left ventricle was clear except that there was a ragged tear on the septal wall, and the cordae tendinae of the aortic valve were also torn. The heart muscle was very pale and full of gas.

The liver and spleen were very congested and full of gas. In the left lung there was a small haemorrhagic infarct with fragments of indworn rib; the right lung was normal.

The foreign body was found at the bifurcation of the left common iliac artery surrounded by dark red clot, the intima was apparently undamaged. There was no tear of the intima at the aortic bifurcation.

Since the second time of screening on the 11th, the missile must have moved down the left common iliac artery and became lodged at the bifurcation. At the time of the second screening there was no difference noted in the femoral pulses, but the missile most probably moved down the aorta, passing through the aortic valve, within half an hour of the first screening, when the phenomena in the left leg were noted. The patient died of general gas gangrene after having lived five days with a piece of shell free in his arterial circulation.

A METHOD OF INCREASING THE YIELD OF MENINGOCOCCUS AGGLUTINATING SERUM FROM THE RABBIT.

By MAJOR A. S. GORDON-BELL.

Royal Army Medical Corps.
Of the Central Cerebrospinal Fever Laboratory.

AND

Miss I. M. HARPER.

Of Girton College, Cambridge,
and of the Central Cerebrospinal Fever Laboratory.

In October last it became evident that the necessary supply of rabbits for the production of diagnostic meningococcal serum was going to be difficult to keep up, more especially in view of the increasing demand for these products.

Up to that date the method elaborated by Major T. G. M. Hine was followed and no change has been made in the method of the preliminary injections.

Under the system then in vogue, 2·5 cubic centimetres of serum was produced per 100 grammes rabbit weight.

The death-rate of rabbits is high, partly on account of the toxicity of the organism, partly from the necessity of using only young animals (from 1,000 to 1,400 grammes), these alone producing a satisfactory quantity of agglutinins.

As up to nearly half a litre of serum is issued per month, it was felt to