TWO CASES OF LEPTOSPIROSIS ICTEROHÆMORRHAGICA (WEIL'S DISEASE).

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Weil’s disease was common in the trench warfare of the 1914-1918 war. In civil life it is recognized as an occupational disease in those trades, such as sewer work, canal work and, in Aberdeen, fish-portering, where contact with rats is common. Outbreaks have occurred in this war in the troops in Northern Ireland.

The two cases described came from a Battle Training School in East Anglia. Both soldiers had made frequent use of a swimming pool formed by damming a stream. A mile above the dam the stream passed by a farm which was heavily infested with rats. This was undoubtedly the source of infection. Both men were admitted to a Military Hospital on the same day, September 6, 1942.

Case 1.—Gnr. B., aged 21. On September 5 he was taken ill with a violent attack of diarrhoea and vomiting and cramping pains in the abdomen and limbs. On admission he had fever of 101°F. and a pulse rate of 108. Congested eyes and a furred tongue were the only abnormal appearances. As the fever and vomiting continued the routine for investigation of P.U.O. was instituted. On September 10 (5th day) epistaxis started and a few petechiae appeared on the chest wall. As he had voided no urine for twenty-four hours a catheter was passed but yielded only 2 ounces of dark urine which contained bile pigments but no other abnormal constituent. Intravenous glucose saline was started at once. That evening orange-tinted jaundice of the skin and conjunctiva developed. The liver was not palpable. Blood was taken for a guinea-pig inoculation.

By September 12 (7th day) he was passing urine normally. The jaundice was deeper but the temperature had fallen to normal and his general condition had improved; W.B.C. 12,200 per c.mm.; polymorphs 91 per cent. Blood culture sterile. Agglutinations, T.A.B. positive 1/125.

All went well for three days but on September 15 (10th day) the first of a series of complications developed. He complained of severe abdominal pain, colicky in nature, and bad enough to require morphia. The temperature remained normal but the pulse rose to 110. A few hours later he passed a number of stools, consisting almost entirely of blood, followed by a profuse haematemesis. The tongue became dry and coated with a brownish fur. As the haemoglobin was 45 per cent (Haldane) a drip blood transfusion was started and he was also given 20 c.c. antileptospiral serum intravenously.

Hæmorrhage continued from the bowel and nose for the next four days. He was delirious and obviously gravely ill throughout this period. In addition to blood he was given daily 60 c.c. antileptospiral serum intravenously and 6 c.c. Kapilon (vitamin K) intramuscularly but without any significant improvement in his general condition or in the blood count, as the following figures show:

<table>
<thead>
<tr>
<th>Date</th>
<th>Hb.  (per cent)</th>
<th>R.B.C. (million per c.mm)</th>
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</thead>
<tbody>
<tr>
<td>September 16</td>
<td>36</td>
<td>2.2</td>
</tr>
<tr>
<td>September 19</td>
<td>22</td>
<td>790,000</td>
</tr>
<tr>
<td>September 20</td>
<td>46</td>
<td>1.76</td>
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On September 16 (11th day) leptospires were found in the blood serum.

On September 17 (12th day) the blood urea was 216 mgm.%, but, by the 20th (15th day), it had fallen to 150 mgm.%. Neither at this time nor throughout his illness were casts found in the urine.

On September 19 (14th day) the pulse rose to 120 and a harsh to and fro murmur was heard along the left border of the heart. It suggested pericardial friction but may have been due to the profound anæmia.

On September 21 (16th day) the hæmorrhage stopped, the temperature fell to 100°F. and there was a little improvement in his condition. Hb. 45 per cent, R.B.C. 1,890,000 per c.mm.
The blood transfusion was stopped. On this day leptospiræ were found in the patient's urine. Also the guinea-pig which had been inoculated with his blood died. Post-mortem showed jaundice, haemorrhages in the lungs, congested suprarenals and leptospiræ were found in the peritoneal fluid.

Two days later (September 23, 18th day) he complained of pain in the right chest. The temperature rose to 101° F. and the respirations to 30. Pleural friction was heard in the right axilla. The next day (September 24), he became intensely dyspnoeic and cyanosed. There were signs of a spontaneous pneumothorax on the right which was confirmed radiologically. 1,200 c.c. air were aspirated from the right pleura with immediate relief. However early on September 25 the symptoms recurred. A diagnosis of valvular rupture of the pleura was made and an under-water drain was inserted into the right pleura. The blood count was still very low (Hb. 38 per cent, R.B.C. 1,340,000 per c.mm.) and a drip transfusion was started. By September 27 (22nd day) he had improved and on September 29 (24th day) he was afebrile, not unduly dyspnoeic and the jaundice was fading. The intrapleural drain was removed. The blood count now was Hb. 40 per cent, R.B.C. 2.2 million per c.mm. Blood urea 144 mgm.%. The improvement was only temporary. On October 2 (27th day) he was very much weaker although the temperature was now normal and the blood urea had fallen to 80 mgm.%. The blood count was unchanged. He was given another blood transfusion and intramuscular injections of Hepatex but again with no significant change in the blood picture.

On the morning of October 7 (32nd day) he became suddenly dyspnoeic and died within a few minutes.

At autopsy the findings were:

1. Severe emaciation and generalized jaundice.
2. Thorax: The right pleura was bulging. When it was opened air escaped. The heart was displaced to the left and the lower lobe of the right lung was completely collapsed. The right upper lobe showed compensatory emphysema and in the region of the apex there were four emphysematous bullæ each about the size of a pea. One of these bullæ showed signs of recent rupture. The lower lobe of the left lung was congested.
3. Heart: There was no evidence of pericarditis. The myocardium was soft and friable and the right auricle and ventricle were dilated. The coronary arteries were normal. There were a few small, firm verrucæ on the mitral valve suggesting an old rheumatic infection but there was no stenosis or incompetence.
4. Liver: The liver weighed 64 ounces. It extended 4 in. below the right costal margin and was rather firm. On section the cut edges everted and the liver surface had a nutmeg appearance. The gall-bladder was dilated and filled with thick bile. The bile ducts were patent as far as the ampulla of Vater.
5. The spleen was enlarged and "septic."
6. The kidneys each weighed 8 ounces. The cortex and columns were jaundiced and the pyramids were congested. The pelves and ureters were normal. The bladder contained jaundiced urine.
7. The suprarenals were congested.
8. The stomach was dilated and contained greyish fluid. There were numerous superficial erosions and haemorrhages on the mucosal surface.

Owing to circumstances beyond our control microscopical sections were not obtained. The immediate cause of death was thought to be a tension pneumothorax following rupture of an emphysematous bullæ.

The course of the disease in brief was as follows:

September 5: Onset with fever, vomiting, diarrhœa and cramp.
5th day: Suppression of urine; epistaxis and petechiae; jaundice.
7th day: Afebrile.
10th day: Hæmorrhage from the bowel and nose.
11th day: Recurrence of fever; leptospiræ found in the blood.
12th day: Blood urea 216 mgm. %.
16th day: Leptospiræ found in the urine; hæmorrhage ceased but anæmia persists.
19th day: Spontaneous pneumothorax.
Two Cases of Leptospirosis Icterohæmorrhagica (Weil's Disease)

22nd day: Jaundice starting to fade.
32nd day: Death.

For treatment he was given glucose and alkalies by mouth. He also received 12 pints of glucose saline intravenously, 12 pints of whole blood, 240 c.c. of antileptospiral serum, 16 c.c. of Kapilon, iron by mouth and injections of Hepatex.

Case 2.—L/Bdr. R., aged 20. Onset September 4, 1942, with headache, vomiting and cramps in the limbs. On admission (September 6th) he had fever of 102·6° F. and a pulse rate of 98. Apart from congested eyes and enlarged inguinal glands there were no abnormal findings. Epistaxis started and a few petechiae appeared on September 9 (5th day), jaundice and bile in the urine developed on September 11 (7th day). As in the first case the jaundice was of a bright orange tint. The pyrexia continued until October 7 (33rd day) terminating by lysis. The jaundice had faded completely by October 5. By October 20 he was fit enough to go to a convalescent home. The illness throughout was less severe than in the first case and never gave cause for anxiety.

The following investigations were performed:

- September 12: W.B.C. 11,600 per c.mm. Polymorphs 71 per cent. Blood culture sterile. Agglutinations, T.A.B. and Br. abortus negative.
- September 14: Icterus index 31.
- September 16 (12th day): Leptospiræ found in blood serum. Hb. 78 per cent. R.B.C. 3,500,000 per c.mm.
- September 22 (18th day): Leptospiræ found in urine. Post-mortem on guinea-pig inoculated with the patient's blood showed hæmorrhages in the lungs and slight jaundice.
- October 9: Hb. 89 per cent. Blood urea 56 mgm. %.

Symptomatic treatment alone was given.

DISCUSSION.

No attempt will be made to summarize the very extensive literature. Two recent papers by White and Prevost (1941) and Graham and Nelson (1941) contain useful information. An excellent account is also given in the War Office Memoranda on Tropical Diseases (1942) and the treatment is described in the Army Medical Directorate Bulletin No. 11 (1942).

The course of the disease falls into three stages: the febrile, usually lasting eight to ten days, the icteric and the convalescent. Common symptoms and signs at the onset are conjunctivitis, gastro-intestinal disturbance, headache and myalgia. All these were present in the two cases described and the conjunctivitis was particularly pronounced although its significance was not recognized at the time. Enlargement of the lymphatic glands sometimes occurs as in Case 2: White and Prevost found pruritus a constant, severe and distressing symptom in the American cases. The War Office Memorandum states that it is uncommon and it was absent in both of these patients.

Hæmorrhagic cases, such as these two, are always severe but are fortunately rare. It was probably the reason for the unduly prolonged pyrexia. The first patient was doubly unfortunate in having an associated bullous emphysema, rupture of one of the bullæ leading to the tension pneumothorax which was the immediate cause of death. However, it is doubtful if recovery would have occurred apart from this, as the liver was grossly damaged and the anæmia had proved resistant to all forms of treatment. It is interesting that although in both patients the blood urea was raised yet casts were never found in the urine. This was not due to insufficient search as the urine was examined daily both for leptospiræ and casts.

Diagnosis rests finally on recovering the leptospiræ either directly from the patient's blood or, more usually, after the inoculation of blood or urine into a guinea-pig. Graham and Nelson state that an alkaline urine is essential for success if the latter is used. White and Prevost advise the following technique for finding the leptospiræ in the blood:

A 10 c.c. glass capillary tube is filled with blood and one end is sealed. It is then centrifuged with the sealed end downwards for five to ten minutes. The tube is removed and broken off just on the serum side of the cellular deposit. The clear serum is now expressed with a
vaccinator bulb on to a coverslip and examined in the routine way. They have found the organism in the blood up to the 61st day and in the urine from the 10th to the 60th day. In these two cases leptospiรฉre were found in the blood on the 11th and in the urine on the 16th day.

The agglutination test according to White and Prevost is positive after the 10th day but it is not entirely reliable owing to the antigenic variations of leptospiรฉre. It was negative in both cases.

Treatment is well described in the A.M.D. Bulletin. Specific treatment, to be effective, must be started early and in full doses (60 c.c. daily). It was not given until the 10th day in Case 1 and proved of very doubtful efficacy. Kapilon also proved disappointing in arresting the hæmorrhage. White and Prevost advise liver for the resultant anæmia. The very severe anæmia in Case 1 was equally resistant to blood transfusion, iron and liver.

SUMMARY.

Two cases of Leptospirosis icterohæmorrhagica are described. Both were hæmorrhagic. In one, the more severe of the two, it was associated with bullous emphysema and tension pneumothorax, causing death. An autopsy was performed.

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