ANTHRAX MENINGITIS, A RARE CLINICAL ENTITY

Grace Koshi, M. K. Lalitha, Jasper Daniel, Ashok Chacko and Benjamin M. Pulimood

SUMMARY

Anthrax is rare in man in recent years and anthrax meningitis is still rarer. Anthrax meningitis is characterised by its sudden onset, fulminant course and almost 100% mortality. A case of anthrax meningitis in a 63 year old man we encountered in November 1977 is reported here. He died within 3 days of onset of symptoms and 19 hours of admission to the hospital. Anthrax meningitis and septicemia in the patient was confirmed by the isolation of B. anthracis from the haemorrhagic C.S.F. and blood, taken few hours before his death. B. anthracis isolated was pathogenic to mice and guinea pigs. The findings are compared with that reported in literature.

Epidemiological investigations revealed that the deceased kept cattle at home. There were cases of sudden death of goats and cattle suggestive of anthrax in Rangapuram village near Vellore, North Arcot District, where the patient lived. Anthrax, a zoonotic and preventable disease can be eradicated only with the concerted attempt at prophylaxis in animals and health education in man.

INTRODUCTION

Anthrax, primarily a zoonotic disease, occurs rarely in man who becomes an accidental host. Though the disease in cattle is worldwide in distribution, it has been controlled in most parts of the world. The incidence of anthrax in man is rare in recent years and is confined to industrial areas. The cutaneous form of the disease is commoner and inhalation anthrax occurs rarely. Not uncommonly the pulmonary form of the disease can lead on to hemorrhagic mediastinitis and meningitis. Anthrax meningitis was first reported in the year 1874. Anthrax in man is rare in recent years and anthrax meningitis even rarer still, and till 1952, only 95 cases were described in the world literature. We report here a case of anthrax meningitis we encountered in November 1977 at the Christian Medical College and Hospital (CMCH), Vellore.

CASE REPORT

A 63 year old man was admitted with a history of sudden onset of cough and mild fever for 2 days. He had urinary incontinence for one day. He developed dizziness, headache and restlessness on the second day and sustained a fall due to dizziness. He was immediately brought to the C.M.C.H. He had no history of cuts, abrasions or skin lesions, before the onset of the present illness. He was not a known diabetic or hypertensive. He worked in a farm and looked after some cattle.

On admission the patient was restless highly irritable and violent. There was no skin lesions or signs of external injury. There was no neck rigidity. Kernig's sign was equivocal. Cranial nerves were normal and plantars were down-going. Others reflexes were normal on admission and later became slightly exaggerated. He moved all limbs on painful stimuli. Pupils were constricted and sluggishly reacting to light. Due to cataract fundus could not be visualised. He was anaemic, not cyanosed and had no lymphadenopathy. Chest was clear. Liver and spleen were not palpable and there was no ten-
derness. Systolic B.P. on admission was 80 and diastolic could not be recorded. Pulse was 140/min. and was of low volume. He was in a state of shock.

A tentative diagnosis of Gram negative septicaemia with encephalitis was made. A lumbar puncture was done an hour before death. Blood and cerebrospinal fluid (C.S.F.) were sent for various tests. He was given intravenous fluids and was treated with Penicillin, Chloramphenicol and hydrocortisone. His condition deteriorated and expired the same night within 19 hours of admission.

Laboratory Findings

Blood investigations revealed leucocytosis of 23,000/cmm with a differential count of N 80%, L 10% and M 3% and band forms 7%; there was shift to left and marked toxic changes. Blood urea was 88 mg%, creatinine 2.4 mg% and sugar 272 mg%. Cerebrospinal fluid examination showed sugar 60 mg% and protein 326 mg%.

Microbiological Findings

Cerebrospinal fluid was haemorrhagic and turbid. Gram stain smear of C.S.F. showed large number of Gram positive, thick, bacilli in chains with very few pus cells. Methylene blue staining revealed typical reddish purple ranged capsule around the large, thick bacilli in chains, which were suggestive of Bacillus anthracis (Fig. 1). Blood specimens subse-

Fig. 1. C.S.F. smear stained by methylene blue showing the large number of capsulated thick large bacilli, suggestive of B. anthracis (X 1000).

sequently got from clinical pathology laboratory also revealed a few Gram positive, thick bacilli (Fig. 2).

Fig. 2. Blood smear stained by Gram's showing a few Gram positive thick bacilli among cells. Most RBCs are lysed.

The C.S.F. and blood were cultured on nutrient agar, nutrient broth and blood agar media. Overnight cultures revealed the presence of nonhemolytic, large, rough, ground-glass-like colonies typical of B. anthracis. Detailed characteristics of the isolated organisms are given in Table I. Pathogenicity tests were done with

<table>
<thead>
<tr>
<th>Motility</th>
<th>Catalase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsule</td>
<td>+ Indol</td>
</tr>
<tr>
<td>Growth in long chain</td>
<td>+ Urease</td>
</tr>
<tr>
<td>Hemolysis on BA</td>
<td>Weak Glucose</td>
</tr>
<tr>
<td>Gelatin liquefaction</td>
<td>Slow Sucrose</td>
</tr>
<tr>
<td>Lecithinase</td>
<td>Weak Lactose</td>
</tr>
<tr>
<td>Casein hydrolysis</td>
<td>+ Arabinose</td>
</tr>
<tr>
<td>Salicin</td>
<td>Slow Maltose</td>
</tr>
<tr>
<td>Litmus milk</td>
<td>Acid &amp; Clot</td>
</tr>
<tr>
<td>Nitrate</td>
<td>+ Xylose</td>
</tr>
<tr>
<td>V P</td>
<td>+ Starch</td>
</tr>
</tbody>
</table>

Mouse Guinea pig Pathogenicity +

0.05 ml of C.S.F. subcutaneously in mice and 0.15 ml in guinea pigs. The mice died in 18 to 24 hours and the guinea pigs in 48 hours. At autopsy typical B. anthracis were seen in smears made from the heart blood, peritoneum, liver and spleen of mice and guinea pigs. B. anthra-
Anthrax meningitis is a rare disease characterised by its sudden onset. The commonest portal of entry is skin (52.8%), then lungs (22.9%), and about 11.5% "primary anthrax meningitis" according to a review of 70 cases by Haight. Septicemia occurs in 70%. In our patient there were no external signs of injury or lesions and the sudden onset of cough and fever might point to a respiratory entry. In our patient septicemia was proved by organism isolation from blood. Clinical presentation with sudden onset of malaise, intense headache, dizziness and cerebral irritation preceding death is not uncommon. Death may occur in 24 to 36 hours. In all properly documented cases, cerebral irritation preceded death by a few hours and most cases have been confirmed at postmortem. Case fatality in anthrax meningitis is about 100% and there are only very few successfully treated cases reported. In the case reported here, the patient presented septicemia and cerebral irritation and died on the third day of onset, within few hours of admission, inspite of treatment with Penicillin, Chloramphenicol, hydrocortisone and fluid correction.

Though cutaneous anthrax can often be diagnosed by bacteriological methods early in the disease, other forms of the disease, particularly meningitis can rarely be diagnosed till late. Anthrax meningitis was suspected in our patient by the smear examination of C.S.F. collected before death and was later confirmed by cultural isolation of B. anthracis. Septicemia, characteristic of all fatal forms of the disease was confirmed in our patient both by smear and culture of the blood. B. anthracis isolated from C.S.F. and blood of the patient gave all the typical morphological, cultural and biochemical reac-
tions as well as pathogenicity of *B. anthracis*.

Penicillin is the drug of choice in cutaneous anthrax, but is ineffective in established systemic cases. Our patient died within 19 hours of admission inspite of immediate therapy with Penicillin and Chloramphenicol.

Until recent years there was great confusion concerning the pathogenesis of anthrax infections. Because of the large number of organisms demonstrable in the blood of animals dying of the infection, it was long assumed that death was due to blockage of capillaries, the so called "log-jam theory". There is little doubt now that the exotoxin plays a major role in the pathogenesis of the disease. The possibility that there might be a direct toxic effect on cardiac muscle or on cells of the central nervous system also exists though not proved.

An epidemiological investigation revealed that the deceased looked after cattle at home. All family members of the patient were well after one month, and no other death due to anthrax occurred in the village Rangapuram near Vellore, in North Arcot District, where the patient lived. There were, however, cases of sudden death among goats and then among cattle. The local veterinary authorities were put on the alert, who had confirmed the disease in animals and had immunized a large number of cattle and goats. Inspite of intensive prophylactic measures undertaken for many decades there are many pockets of endemic anthrax in animals in Tamil Nadu, particularly, in some foci in North Arcot District. It is disheartening that inspite of good vaccine production and latest methods of prophylaxis, the disease lingers in animals, because of the ignorance and poverty of people who would rather sell his diseased animal in nearby villages than get them killed and disposed off. This is what happened during the epidemic reported here at about the time of detection of anthrax meningitis in a man.

REFERENCES