PNEUMONIC PLAGUE - AUTOPSY FINDINGS (A Case Report)

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Introduction

Plague is an infection of wild rodents by *Yersinia pestis*. Humans acquire it by contact with rodents or fleas from a plague endemic area. Pneumonic plague is a rare epidemic. In India's recent history not a single laboratory-confirmed case of human plague had been reported since 1966 [1] till a pneumonic plague epidemic occurred in the western part of India in September 1994. Even the Armed Forces did not remain free of the disease.

The death rate from plague may be anything from 60 to 90 per cent of those attacked. The toxin of *Yersinia pestis* causes vascular damage and leakage of fluid into the tissues with haemoconcentration and shock [2]. Autopsy findings in a previously healthy soldier who succumbed to pneumonic plague are presented.

Case Report

A 20-year-old soldier was admitted to a service hospital in Sep 94 with complaints of headache, myalgia, hacking and painful cough with scanty expectoration (not blood tinged) of 3 days duration. He had fever and breathlessness since one day. On examination he was found to be averagely built and nourished. He had fever (39°C), respiratory rate was 32/min, pulse rate was 144/min and blood pressure was 110/80 mmHg. On systemic examination lungs showed fine crepitations over right mammary and apical regions and coarse crepitations in the basal region of the left lung. Cardiovascular examination did not reveal any murmur, cardiomegaly or pericardial effusion. Abdominal examination did not show any abnormality. Investigations revealed Hb 12.5 g/dL, TLC 6000/cumm, DLC - normal. All relevant biochemical investigations were within normal limits. Blood cultures were sterile. Sputum culture grew only commensals. Chest radiograph showed patches of pneumonic

consolidation in the left lower zone, right upper zone and right middle zone. A clinical diagnosis of bronchopneumonia with adult respiratory distress syndrome was made and patient treated with cefotaxime, cloxacillin, gentamicin and metronidazole in standard doses. He gradually developed non-homogenous opacities of all zones of lungs. His condition deteriorated and he died 3 days after admission with the cause of death presumed to be acute respiratory distress syndrome.

Postmortem external examination of the body was unremarkable. On internal examination of the body there was generalized ecchymoses in muscles, serous membranes, intestines, gallbladder and kidneys. There was no lymphadenopathy. Both tonsils were ulcerated. Lungs were heavy and congested (right lung 1000 g, left lung 1100 g). Cut sections of the lungs showed general consolidation with many microabscesses, 2-8 mm in diameter showing necrotic centres and hyperaemic borders (Fig 1). There were haemorrhages beneath both layers of the pleura and pleural cavities contained fibrinous exudate. Liver and spleen weighted 1500 g and 180 g respectively. The spleen and liver were enlarged, dark red in colour and contained areas of focal necrosis. The brain weighed 1250 g, and was oedematous, congested and showed few minute haemorrhagic spots. However other organs like heart, kidneys, thyroid, adrenals, and pancreas appeared normal.

On microscopic examination, lungs showed lobar pneumonia with patchy heavy collections of neutrophils and necrotic areas, and interspersed colonies of Gram-positive coccobacilli (Fig 2). Most of the alveoli were filled with a haemorrhagic acute inflammatory exudate. Brain capillaries were congested and at places had fibrin plugs. Some areas of brain showed minute haemorrhagic spots. Liver and spleen showed necrotic parenchymal cells and polymorphs. Immediate postmortem blood sample examination revealed plague serum antibodies in titre 1/135 by passive haemagglutination test. The diagnosis was subsequently confirmed by polymerase chain reaction (PCR) done on tissues. No organism could be cultured probably due to large doses of antibiotics administered and late attempt to isolate bacteria. The cause of death in this case appeared to be toxemia due to pneumonic plague.

In view of the acute clinical presentation, rapid downhill course, typical postmortem findings and strongly positive serol-

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Fig. 1 : Cut surface of basal portion of left lung showing consolidation and multiple small abscesses.

ogy, a diagnosis of pneumonic plague was made. It was eventually confirmed by PCR.

Discussion

Plague, an ancient scourge of mankind, was familiar to the ancient civilizations of Asia. It has never been an important disease in the Armed forces. Only 11 cases of plague have been recorded since 1946 [3] and the case now reported appears to be the 12th. Pneumonic plague occurs frequently in an epidemic form as happened in India in September 1994. The mortality in this outbreak was only 54 [4], although media reports put the number affected at about 3000. Controversy exists about the very nature of the bacteria causing this epidemic. The report of Ramalingaswami committee has confirmed this epidemic to be plague but doubts have been raised about its reliability by others [5,6]. Pneumonic plague is especially dangerous to the patient's attendants and visitors because of the multitude of bacilli which are scattered about in the patient's expectoration. The clinical symptoms are unlike those of typical plague and are apt to be mistaken for some ordinary form of lung disease. Surprisingly in our case there no history of the deceased leaving the town during the preceding month and this was the first confirmed positive case of plague in this region. The cause of infection remained an enigma. Although the deceased was staying in barracks no other case occurred. This may be due to prompt preventive measures. No rat fall was noted how-

Fig. 2 : Abscess area of lung, showing heavy acute inflammatory infiltrate and clumps of colonies (shown by arrow marks) of plague bacilli (HE, 400x).

ever, since this was the only isolated case of plague, so no rat fall was expected. The patient might have acquired infection from a visitor passing through this area. Primary plague pneumonia is a fulminant pneumonitis often with bloody, frothy sputum, sepsis and is usually fatal unless specific treatment is started within a few hours after onset [7]. However in our patient there was no bloody sputum. The plague bacilli in the sputum were missed during the ante-mortem examination. Postmortem direct sputum smear showed bipolar stained cocco-bacilli, however culture was negative for plague bacilli probably because of non-viable bacteria present. In plague the white blood cell is elevated to levels often above 20,000/cumm with predominance of polymorphonuclear leukocytes. In this case TLC was 6000/cumm and the reasons for this are not known. This case was treated with drugs, details of which are unknown, before admission. Steroids are known to suppress leukocytic response. In plague the whole vascular system is often seriously involved. Endotoxin affects the vascular endothelium of all organs causing haemorrhage and necrosis [8]. This is what exactly happened in our patient and histopathological findings were classically as described earlier [2,8].

REFERENCES

1. Plague. In: Park JE, Park K, editors. Textbook of Preventive and Social Medicine. 13th ed. Jabalpur: Banarsidas Bhanot, 1991; 198-202.
2. Plague. In: Manson-Bahr PEC, Bell DR, editors. Manson's Tropical Diseases. 19th ed. London: Bailliere Tindall, 1991; 586-602.

3. Director General Armed Forces Medical Services. Manual of Health for the Armed Forces. New Delhi: Controller of Publications, Government of India, 1968; 595-9.
4. Datta KK. Plague. *Natl Med J India*. 1995; 8: 51-3.
5. John TJ. India: Is it plague? *Lancet*. 1994; 344: 359-60.
6. Nagoba BS, Deshpande JJ. Plague in India. *Lancet*. 1995; 345: 259.
7. Crook LD, Tempest B. Plague: A Review of 27 cases. *Arch Intern Med* 1992; 152: 1253-5.
8. Plague. In: Edington GM, Gilles HM, editors. *Pathology in the Tropics*. 2nd ed. London: Edward Arnold, 1976; 334-5.