MELIOIDOSIS: AN UNDER-DIAGNOSED ENTITY IN WESTERN COASTAL INDIA: A CLINICO-MICROBIOLOGICAL ANALYSIS

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Abstract

Clinico-microbiological analysis of a series of 25 patients with culture proven melioidosis was done. All patients came from the coastal regions of Kerala and Karnataka and presented between June 2005 to July 2006. They were analysed with respect to clinical presentation, occupation, epidemiology and microbiological features. No single presenting clinical feature was found to be typical of melioidosis. The disease was found to mimic a variety of conditions, including tuberculosis and malignancy. *Burkholderia pseudomallei* was isolated from blood, sputum, pus, urine, synovial, peritoneal and pericardial fluids. Diabetes mellitus was the most common predisposing factor and 80% of the cases presented during the Southwest monsoon (June to September). It is probable that melioidosis is highly prevalent in western coastal India and yet, greatly underestimated. Better awareness, both among clinicians and microbiologists, coupled with improved diagnostic methods to allow early diagnosis and hence early treatment, will significantly reduce the morbidity and mortality associated with this disease.

Key words: *Burkholderia pseudomallei*, diabetes mellitus, melioidosis

Melioidosis is an emerging infection in India. The disease, caused by the soil saprophyte *Burkholderia pseudomallei*, is endemic in Southeast Asia and Northern Australia, where it accounts for 20% of all community acquired septicaemias and causes death in 40% of treated patients in Thailand. Documented reports of melioidosis from India have been few and sporadic, the majority being from Christian Medical College, Vellore, Tamilnadu. Lack of awareness, a low index of suspicion and inability of rural population to access health services probably contribute to the paucity of reports from the Indian subcontinent. During the last 14 months (June 2005 to July 2006), 25 patients with melioidosis were diagnosed at a tertiary care hospital in Mangalore, South India. Therefore, a clinico-microbiological study was conducted to analyse these 25 patients with special reference to clinical, occupational, epidemiological and microbiological aspects.

Materials and Methods

Patient population

Twenty-five patients (15 male, 10 female) who were diagnosed with melioidosis during the period June 2005 to July 2006, were included in the study. *B. pseudomallei* was isolated from various clinical samples including blood, exudates and urine (Table). These 25 patients were analysed with respect to the following aspects - (1) clinical: presenting complaints, duration of illness, underlying predisposing conditions, (2) occupation, (3) antimicrobial susceptibility of isolates and (4) epidemiology.

Identification of isolates

All isolates were identified by standard microbiological techniques. Chief identifying features included the following - (1) gram negative, oxidase positive, motile bacilli showing bipolar staining or “safety-pin” appearance, (2) rough, wrinkled, pink colonies with a metallic sheen on MacConkey’s agar, (3) oxidative utilization of glucose, lactose and maltose, (4) gelatin liquefaction positive and (5) nitrates reduced (6) lysine decarboxylase negative, (7) arginine dihydrolase positive, (8) growth at 42°C positive, (9) resistant to gentamicin and polymixin B (300 units/disc) and (10) growth on Ashdown’s medium positive with formation of rugose colonies resembling cornflower heads, which take up crystal violet dye from the medium. The initial seven isolates were sent to Christian Medical College, Vellore, Tamilnadu, for confirmation by agglutination with polyclonal antiserum raised in rabbits.

Antimicrobial susceptibility testing

Antimicrobial susceptibility testing was done on Mueller Hinton agar plates (Hi-Media, India) by the disc-diffusion method according to CLSI guidelines. Antibiotics tested included (concentration µg/disc) ceftazidime (30), ciprofloxacin (5), trimethoprim-sulfamethoxazole (25), chloramphenicol (30), amoxicillin-clavulanate (10), imipenem (10); ampicillin (10) and gentamicin (10), (Hi-Media, India). The diameter of the zones of inhibition of growth was recorded and interpreted as sensitive, intermediate or resistant, according to the CLSI guidelines.
**Results**

A total of 31 isolates of *B. pseudomallei* were obtained from 25 patients: 13 from blood, six from pus, three from synovial fluid (ankle and knee joints), three from sputum, three from bronchoalveolar lavage and one each from urine, peritoneal and pericardial fluid (Table).

Fever was the chief presenting complaint in 24 (96%) of patients. Duration of presenting complaints ranged from two days to as long as one year. In this series, five (20%) patients had an acute presentation with duration of symptoms one week or less. Localizing signs were found in 19 patients (septic arthritis in three, psoas abscess in two, gluteal abscess in one, scalp abscess in one, pericardial effusion in one, supraclavicular mass in two, pneumonia in nine).

Age of the patients ranged from two years to 75 years (Mean ± SD, 47.9 ±18.5). Predisposing factors were present in all 25 patients, of which the commonest was diabetes mellitus, which was present in 19 (76%) of the patients (Table). The other predisposing conditions in this series included renal disease, steroid therapy and malnutrition in three patients (12%) each; alcohol abuse in two (8%); and chronic lung disease in one (4%). Four of the patients were previously mistakenly treated for tuberculosis on clinical grounds, with no response; five patients were treated for sepsis but did not respond to the usual treatment regimen for gram-negative sepsis; and one patient was thought to have bronchogenic carcinoma.

All 31 isolates of *B. pseudomallei* were found to be sensitive to ceftazidime, trimethoprim-sulfamethoxazole, imipenem and chloramphenicol; and resistant to ampicillin and gentamicin. For amoxicillin-clavulanate, 40% were sensitive, 44% resistant and 16% in the intermediate range. For ciprofloxacin, 92% were sensitive and 8% were resistant. Upon receipt of laboratory reports, patients were treated as per recommendations, with intravenous ceftazidime during the acute phase (2 weeks) and trimethoprim-sulfamethoxazole during the eradication phase (12 weeks). Three (12%) patients died (two with pneumonia; one with pancreatitis). Among those who recovered, the time taken for defervescence varied from 7 to 15 days.

All 25 patients hailed from the western coastal region.

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**Table: Description of cases included in the study**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Duration of illness (Range)</th>
<th>Predisposing factors</th>
<th>B. pseudomallei isolated from</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin and soft tissue infection without septicemia (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic arthritis (2)</td>
<td>2-3 m</td>
<td>DM</td>
<td>Knee joint aspirate</td>
<td>Agriculture/ gardening</td>
</tr>
<tr>
<td>• Supraclavicular mass -(2)</td>
<td>2-4wk</td>
<td>DM</td>
<td>Pus: supraclavicular mass</td>
<td>Agriculture</td>
</tr>
<tr>
<td>• Pericardial effusion(1)</td>
<td>1½ m</td>
<td>DM</td>
<td>Pericardial fluid</td>
<td>Agriculture/ gardening</td>
</tr>
<tr>
<td>• Scalp abscess - (1)</td>
<td>1 yr</td>
<td>DM</td>
<td>Pus: scalp abscess</td>
<td>Records Dept. employee</td>
</tr>
<tr>
<td>• Psoas abscess -(2)</td>
<td>1 wk - 1 yr</td>
<td>DM</td>
<td>Pus: psoas abscess-(2)</td>
<td>Hotel employee-(1); Fisherman-(1).</td>
</tr>
<tr>
<td>• Gluteal abscess(1)</td>
<td>5 d</td>
<td>Steroid therapy, ILD, COPD.</td>
<td>Pus: gluteal abscess</td>
<td>Housewife</td>
</tr>
<tr>
<td>Septicaemia (13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• With pneumonia -(5)</td>
<td>1-4 wk</td>
<td>DM-(4)</td>
<td>Blood-(5)</td>
<td>Student-(1); Clerk-(1); Housewife-(2); Road construction worker-(1)</td>
</tr>
<tr>
<td>• With renal disease-(3)</td>
<td>1-8 wk</td>
<td>DM, Steroids and CRF-(1)</td>
<td>Blood - (3)</td>
<td>Agriculture/ gardening-(2)</td>
</tr>
<tr>
<td>• With acute pancreatitis and pseudocyst of pancreas -(1)</td>
<td>2 d</td>
<td>DM and CRF-(1); NS and Steroids-(1)</td>
<td>Blood</td>
<td>Painter-(1)</td>
</tr>
<tr>
<td>• With pneumonia and septic arthritis -(1)</td>
<td>1 m</td>
<td>DM</td>
<td>Blood, sputum, pus from ankle joint</td>
<td>Agriculture</td>
</tr>
<tr>
<td>• PUO - (3)</td>
<td>1½ m</td>
<td>Malnutrition</td>
<td>Blood</td>
<td>Clerk-(2)</td>
</tr>
<tr>
<td>Pneumonia without septicemia (3)</td>
<td>2-3 wk</td>
<td>DM</td>
<td>Bronchoalveolar lavage</td>
<td>All 3 were children</td>
</tr>
</tbody>
</table>

DM - Diabetes mellitus, CRF - Chronic renal failure, COPD - Chronic obstructive pulmonary disease, ILD - Interstitial lung disease, NS - Nephrotic syndrome, m-months, d-Days, wk-Weeks, yr-Years, PUO - Pyrexia of unknown origin, Numbers in brackets indicate the number of patients
of Kerala and Karnataka. Ten (40%) patients had a history of heavy exposure to wet soil/surface water in the form of agriculture, gardening, fishing and road construction. Twenty (80%) patients presented during the months June to September of both years (2005 to 2006), which corresponds to the monsoon season in Mangalore.

Discussion

Reports of melioidosis from India have hitherto been uncommon, the majority being from CMC, Vellore.3 Sporadic cases have also been reported from Maharashtra, Kerala, Karnataka and Pondicherry.2,9 During a span of 14 months from June 2005 to July 2006, we had a cluster of 25 cases of melioidosis, which were included in the study.

No single presenting clinical feature was found to be typical of melioidosis, though fever was present in 96% of patients. Melioidosis is known to present as a febrile illness, ranging from an acute fulminant septicemia to a chronic, debilitating localized infection and is characterized by abscess formation. There is usually no obvious infected wound or evidence of recent trauma.1 As shown in Table, it can affect almost any system in the body. Previous workers have rightly referred to it by various names such as “the remarkable imitator”10 and the “mimicker of maladies”,9 since the disease can mimic pyogenic bacterial infections, Gram negative septicemia or cryptic tuberculosis.

In endemic areas, a high percentage (16%-30%) of patients present with acute, fulminating septicemia and the reported mortality rate in endemic areas is high, ranging from 19% to 68%.2 Three of our patients (12%) succumbed to the infection. Two of them presented with pneumonia and one with acute pancreatitis.

Fifteen patients were males; the male to female ratio in this study was 3:2. This is consistent with reports from endemic areas, where males outnumber females; 72.5% patients were males in an Australian study.11 This may be due to the increased exposure of men to farming-related activities.

Reported endemic areas (Thailand and Northern Australia) lie between the tropical latitudes 20° N and 20° S. B. pseudomallei has been isolated from environmental samples including wet soil, mud and pooled surface water, in endemic areas, especially from rice paddies. Infection is acquired by inoculation (through skin abrasions) or by inhalation, which explains the higher incidence of infection among agricultural workers. The disease is reported to be highly seasonal with 75%-85% of cases presenting during the rainy season, presumably because this is when exposure to the organism in the environment is greatest.2,12

The findings of our study are consistent with the above reports. 80% of patients in this study presented during the monsoon season (June to September of both years). Ten (40%) patients had occupations which involved heavy exposure to wet soil/surface water in the form of agriculture, gardening, fishing and road construction. Coconut/arecanut farming is the predominant form of agriculture in the western coastal region of India. Manuring of coconut/arecanut plantations and planting of seedlings are done during the monsoon, without any protective clothing and hence, minor skin trauma is extremely common.

Even among people who are exposed to soil and surface waters in endemic areas, active infection mainly occurs in people who have underlying predisposing conditions like diabetes mellitus, renal disease, alcoholism, cirrhosis, chronic lung disease, thalassemia, malnutrition or immunosuppression due to disease or drug therapy.1 All 25 patients in this study had at least one predisposing factor (Table), of which diabetes mellitus was the most common (76%). A high incidence of melioidosis has been reported in diabetic patients; the estimated relative risk of melioidosis for diabetic patients was 13.1 in Australia.17

The western coast of South India lies between 20° N and the equator and receives heavy rainfall of approximately 250-300 cm between the months of June and September, during the South-West monsoon. It has been shown that heavy monsoon rain and winds are an independent risk factor for pneumonia, septic shock and death due to melioidosis.12 With over 35 million diabetic subjects, India is reported to have the largest diabetic pool in the world.13,14 With the existing geographical and climatic conditions and a susceptible population, the western coast of South India seems to be an ideal setting for endemcity of this disease. Studies on the environmental distribution of B. pseudomallei as well as seroprevalence studies would help in investigating the possibility of the disease being endemic in this area.

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References

5. Ashdown LR. An improved screening technique for isolation of


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