Surgical management of Melioidosis: 10-year retrospective data from a tertiary hospital in India

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ABSTRACT Introduction: Melioidosis is endemic in Southeast Asia. Burkholderia pseudomallei is the causative agent. Abscess formation is the commonest surgical presentation. This usually occurs in the skin and subcutaneous tissues but it has also been reported at unusual sites such as the liver, spleen, lung, brain, prostate, bone and joints, lymph nodes, muscles, and eyes. The mortality of those diagnosed with Melioidosis ranges from 10-25%. Early diagnosis and initiation of early surgical and medical treatment can decrease mortality. Methods: Data were collected over 10 years (2007-2017), from culture-proven patients who were admitted into the emergency department or in the wards. Results: There were 153 patients recruited. 21% of patients were farmers or agricultural workers. The most common risk factor was type 2 Diabetes Mellitus. Patients presented with spleen as the most common organ involved (39%). 10% of those with intra-abdominal abscesses have the involvement of lungs as well. Various interventional radiological procedures such as abscess drainage by ultrasound-guided pig tailing and aspirations are common. Peripheral soft tissue abscess drainage was common and easy to perform. Splenectomy was the least common procedure performed for an abscess. The mortality is 14.7% and is significantly associated with those presenting with bacteremia and sepsis. The surgical intervention had resulted in 92% of patients discharged alive. Conclusions: Early surgical referral and intervention can decrease mortality and morbidity. Further imaging of the abdomen and thorax could decrease the mortality among those with bacteremia and sepsis.

KEYWORDS Melioidosis, Surgical Intervention, Bacteremia, Septic Shock

Introduction
Melioidosis is endemic in Southeast Asia. It has been documented to be prevalent in India. Burkholderia pseudomallei, the causative agent, is a saprophyte found in the soil and surface water.[1,2] Human infection occurs when the organism gains entry through broken skin, by inhalation, and perhaps ingestion. Following an incubation period lasting a few days to many years. Melioidosis may present as an acute, sub-acute or chronic illness. [3] Abscess formation is the commonest surgical presentation. This usually occurs in the skin and subcutaneous tissues but it has also been reported at unusual sites such as the liver, spleen, lung, brain, prostate, bone and joints, lymph nodes, muscles, and eye.[4] The mortality of those diagnosed with Melioidosis ranges from 15-25%.[5] Early diagnosis and initiation of early surgical and medical treatment can decrease mortality.[5]

Methods
All patients from CMC Hospital, Vellore, Tamil Nadu, India, were recruited, either from the outpatient, inpatient departments or from the emergency medicine department. Our hospital is a
referral center for most of the country and other Southeast Asian countries. Hospital numbers from the department of clinical microbiology database were used for data collection.

All data were entered into an Excel format and were analyzed with SPSS 21.

**Results**

There were 153 patients recruited over a period of 10 consecutive years (2007-2017). During this period all diagnosed cases of Melioidosis were included. The age of affected patients ranges from 16 to 80 years. 79% of the patients had medical reasons for hospitalization, and the rest were surgical. 86% (133) were males and 14% (20) were females. 21% of patients were farmers or agricultural workers. The most common risk factor is type 2 Diabetes Mellitus.

There are various presentations of Melioidosis as mentioned below. Most commonly, they present as intra-abdominal abscesses, septic arthritis/osteomyelitis, pneumonia, genitourinary tract infections, intracranial involvement followed by bacteremia without an obvious focus. They are mostly associated with diabetes mellitus. Chronic alcohol abuse and chronic lung disease are relative risk factors. (Table 1) The spleen was the most common organ involved (39%). Splenic involvement was associated with CNS, Septic arthritis, Liver, peripheral soft tissue, Kidney, Prostate and Bone involvement. The involvement of the intra-abdominal organs and lung involvement was up to 10%. Other organs involved were prostate and kidney. Patients presenting with bacteremia and shock were associated with lung/thorax involvement (26%), intra-abdominal abscesses (15%) and septic arthritis or osteomyelitis (10%). (Table 2) There was a 2-10% risk of having abscesses located in the thorax with abscesses initially detected in the abdomen or within the soft tissues.

Septic arthritis/bone involvement was the most common presentation followed by intra-abdominal abscesses and bacteremia with septic shock. (Table 3)

Interventional radiological procedures such as abscess drainage by ultrasound-guided pig tailing and aspirations were common. Peripheral soft tissue abscess drainage was common and simple to perform. This was followed by open drainage for septic arthritis. Splenectomy was the least common procedure performed for an abscess. (Table 4) The mortality is 14.7% (Table 5) and is significantly associated with patients presenting with bacteremia and sepsis. 92% of patients who underwent surgical intervention were discharged alive. (Table 5)

**Discussion**

Once the diagnosis of Melioidosis is confirmed through culture, the following algorithm (Table 6) can be followed based on our experience. Radiological imaging has been advised if the association is more than 10%. Risk factors, mortality and effectiveness of surgical procedures to the outcomes were considered in designing the flow chart. The worldwide mortality ranges from 15-25%.[5] In our review, we had a 15% mortality rate. In view of such a high mortality rate, early diagnosis and intervention are important. In our series, nearly 50% of patients underwent surgical intervention. The outcomes following a surgical intervention are good. In those diagnosed with bacteremia and sepsis, the mortality rates were significant, and also it is the same group that has the least surgical interventions are performed. In spite of a high incidence of association with intra-abdominal abscesses, septic arthritis/osteomyelitis, and lung involvement, the surgical interventions performed are the least. This could be due to various reasons, either patient in ICU on a ventilator, with inotropic supports or delayed diagnosis. Various hospitals have implemented an upfront CT abdomen and thorax. [5] Following surgical management treatment usually consisted of an intensive phase (at least 14 days) of IV antibiotics—primarily cefazidime but, more recently, meropenem or imipenem for critically ill patients. This was followed by an eradication phase of oral antibiotics, which usually consisted of monotherapy with doxycycline (adult dosage, 200 mg/day) or TMP-SMZ (adult dosage, 320 mg of TMP b.i.d. and 1600 mg of SMZ b.i.d.) for at least 3 months.[2,7]

**Conclusion**

Early surgical consultation would be ideal. Early surgical intervention could reduce mortality. Further studies can be done to follow up on patients with bacteremia and sepsis who undergo a surgical procedure. Melioidosis mimics various common

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**Table 1 Risk Factors.**

| Risk factor          | Number of cases | Percentage |
|----------------------|-----------------|------------|
| Diabetes mellitus    | 107             | 68.6       |
| Hazardous alcohol use| 14              | 9.6        |

**Table 6**


Table 2 Percentage of presentation of illness requiring surgical procedures.

| Presentation of illness                  | N (%) | Surgical Intervention | No Surgical intervention | Total |
|------------------------------------------|-------|-----------------------|--------------------------|-------|
|                                          | N (%) | N (%)                 | N (%)                    |       |
| Pneumonia                                | 12(7.7) | 2(18.2)               | 9(81.8)                  | 11    |
| Genitourinary                            | 11(7.1) | 6(55)                 | 5(45)                    | 11    |
| Bacteremia without focus                 | 5(3.2)  | 0                     | 5(100)                   | 5     |
| Septic arthritis/osteomyelitis           | 29(18.6)| 23(79)                | 6(21)                    | 29    |
| CNS                                      | 5(3.2)  | 4(80)                 | 1(20)                    | 5     |
| Bacteremia with septic shock             | 17(10.9)| 2(12.5)               | 14(87.5)                 | 16    |
| Abdominal Abscess                        | 24(15.4)| 17(71)                | 7(29)                    | 24    |
| Peripheral Soft tissue abscess           | 13(8.3) | 7(54)                 | 6(46)                    | 13    |
| Miscellaneous                            | 35(22.4)| 14(40)                | 21(60)                   | 35    |
| TOTAL                                    | 75(50.3)| 74(49.7)              | 149                      |       |

Table 3 The other location of abscesses was subdivided into subsites.

|                  | Frequency | Associated with lung |
|------------------|-----------|---------------------|
| Spleen           | 15        | 1                   |
| Spleen & liver   | 16        | 1                   |
| Spleen & peripheral soft tissue | 13     | 2                   |
| Soft tissue      | 31        | 4                   |
| Bone             | 17        |                     |
| Others           | 21        | 1                   |
| Only lung        | 2         |                     |
| Total            | 115       |                     |

Table 4 Surgical intervention.

|                  | Frequency | Percentage |
|------------------|-----------|------------|
| Splenectomy      | 4         | 5.2        |
| Incision and drainage | 24     | 31.2       |
| Interventional radiology | 25   | 32.5       |
| Orthopaedic procedures | 16   | 20.8       |
| Other            | 8         | 10.4       |
| Total            | 77        |            |
| Others – DJ stenting, extra ventricular drainage, etc. | | |

Table 5 Patient outcomes with or without surgical intervention.

| Patient outcome | Surgical intervention | No surgical intervention | Total |
|-----------------|-----------------------|--------------------------|-------|
| Alive (76.3%)   | 69 (92%)              | 49 (64.5%)               | 118   |
| Dead (14.7%)    | 5 (6.7%)              | 17 (22.4%)               | 22    |
| DAMA (1.3%)     | 1 (1.3%)              | 7 (9.2%)                 | 8     |

Chi square test: p=0.0024

pathogens and should be considered high on the differential diagnosis to obtain an early diagnosis and appropriate treatment.

Conflict of interest
The authors declare no conflict of interest.

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Ethics committee approval
I hereby declare that this article has full compliance with consent committee. The approval was taken before submission of the manuscript.

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