Orbital infection caused by *Burkholderia pseudomallei*: A mini-review

Pitaks Detporntewan, M.D.,
Chusana Suankratay, M.D., Ph.D.

**ABSTRACT**

Melioidosis is one of the most common tropical infections in Southeast Asia. To our knowledge, there have been a few case reports of patients with orbital infection caused by *Burkholderia pseudomallei*, the causative agent of melioidosis. Antibiotics and surgical debridement, when indicated, are the main therapy. In the present review, we describe the clinical classification of orbital infection and melioidosis, in accompaniment with clinical manifestations and treatment of orbital infection caused by *B. pseudomallei*. *(J Infect Dis Antimicrob Agents 2011;29:99-103.)*

**Note:** This review article had been presented and discussed in the Interhospital Case Conference on Infectious Disease (ICCID), 16 March 2012, Bangkok, Thailand.

Melioidosis is one of the most common tropical infections in Southeast Asia as well as North Australia, and especially in Thailand. The majority of cases present with multifocal infection with septicemia. Localized skin and soft tissue infection is a less common presentation. To our knowledge, there have been a handful of case reports of patients with orbital infection caused by *Burkholderia pseudomallei*, the causative agent of melioidosis. In the present review, we describe the clinical classification of orbital infection and melioidosis, in accompaniment with clinical manifestations and treatment of orbital infection caused by *B. pseudomallei*.

**Microbiology**

*B. pseudomallei* is a small, Gram-negative, motile, aerobic bacillus with a characteristic “safety pin” appearance (bipolar staining). The bacterium is found in the environment especially in soil and water. The mode of transmission in humans includes inhalation, skin inoculation, consumption, and rarely laboratory-acquired infection.

**Classification of melioidosis**

Melioidosis can present with a wide spectrum of clinical manifestations ranging from asymptomatic infection, localized infection, especially pneumonia, either acute or chronic course, and fulminant septicemia.
with or without dissemination to multiple organs. A previous study has recently categorized 345 cases of melioidosis in 4 groups, comprising Group 1: multifocal infection with septicemia (45% of cases, 87% mortality), Group 2: localized infection with septicemia (12% of cases, 17% mortality), Group 3: localized infection (42% of cases, 9% mortality), and Group 4: transient bacteremia (0.3%) (Table 1). In a recent retrospective study in Chonburi Hospital, East Thailand, among 127 patients with culture-proven melioidosis, the lung was the most common site of infection (88%), followed by the liver (77.1%), the spleen (44.6%), and skin and soft tissue (8.4%). There were no patients with orbital infection in this study.

Classification of orbital infection

The route of periorbital and orbital infection is mainly from contiguous organs including the paranasal sinuses (58%), the skin/subcutaneous tissue of face and eye lids (28%), followed by the penetrating orbital injury with or without retained foreign body (11%), and hematogenous spread from remote sites (4%). Most patients present with eye pain, lid edema, erythema, chemosis, or axial proptosis, depending on the severity and site of involvement. Elevation of intraocular pressure accounts for decreasing ocular motility. A rapid loss of vision can occur due to ischemic optic neuropathy caused by the compression of infected material or septic vasculitis. Systemic symptoms including generalized malaise and fever may also be present. To date, the classification proposed by Chandler and colleagues is still applied (Table 2). Orbital infection was classified into 5 categories according to the site of orbital involvement and pathological findings, which includes Group 1: inflammatory edema or preseptal cellulitis and orbital cellulitis, Group 2: diffuse edema of the orbital contents and actual infiltration with inflammatory cells and bacteria without pus formation, Group 3: subperiosteal abscess (SPA) (a collection of pus between the periosteum and the bony wall of the orbit that may displace the globe in a lateral or downward direction and may cause restriction of eye movements and lid edema), Group 4: intraorbital abscess, and Group 5: cavernous sinus thrombosis (severe exophthalmos with chemosis, complete ophthalmoplegia and usually severe vision impairment). Computed tomography (CT) scan and magnetic resonance imaging (MRI) are very useful investigations in patients suspected to have periorbital and orbital infection in order to classify the categories and differentiate this condition from acute inflammatory diseases of the orbit.

Table 1. Classification of melioidosis by clinical assessment.

<table>
<thead>
<tr>
<th>Categories</th>
<th>No. organs involved</th>
<th>Blood culture</th>
<th>Severity of illness</th>
<th>Mortality rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melioidosis with septic shock</td>
<td>Any</td>
<td>Positive</td>
<td>Fulminating sepsis/septic shock</td>
<td>80-95</td>
</tr>
<tr>
<td>Septicemic melioidosis: e.g. lobar pneumonia</td>
<td>1</td>
<td>Positive</td>
<td>Sepsis to severe sepsis</td>
<td>10-40</td>
</tr>
<tr>
<td>Localized melioidosis: e.g. lymphadenitis, prostatitis</td>
<td>1</td>
<td>Negative</td>
<td>Fever to sepsis</td>
<td>0-10</td>
</tr>
<tr>
<td>Bacteremic melioidosis</td>
<td>0</td>
<td>Positive</td>
<td>Nil to fever</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 2. Classification and clinical findings of orbital infection.\textsuperscript{8,9,11}

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preseptal cellulitis (Inflammatory edema)</td>
<td>Eyelid swelling and erythema</td>
</tr>
<tr>
<td>Orbital cellulitis</td>
<td>Eyelid swelling and erythema associated with edema of the orbital contents, proptosis, chemosis, and decreased extraocular movement</td>
</tr>
<tr>
<td></td>
<td>Visual loss (unusual)</td>
</tr>
<tr>
<td>Subperiosteal abscess (SPA)</td>
<td>A collection of pus between the periorbita and the involved sinus</td>
</tr>
<tr>
<td></td>
<td>Globe proptotic and displaced by the abscess</td>
</tr>
<tr>
<td></td>
<td>Visual loss with progression of the disease</td>
</tr>
<tr>
<td>Orbital abscess</td>
<td>Marked proptosis, ophthalmoplegia, and visual loss associated with abscess formation within the orbital fat</td>
</tr>
<tr>
<td>Cavernous sinus thrombosis</td>
<td>Proptosis and ophthalmoplegia with development of similar signs on the contralateral side, associated with cranial nerve palsies (III, IV, V, VI) and visual loss</td>
</tr>
</tbody>
</table>

\textit{Streptococcus milleri, Streptococcus pyogenes, Streptococcus pneumoniae, Staphylococcus aureus,} and \textit{Haemophilus influenzae} (type b), particularly in patients under 4 years, are the most common pathogenic organisms. Unusual organisms including \textit{Pseudomonas} spp., \textit{Enterococcus faecalis}, and \textit{Eikenella corrodens}, can be isolated.\textsuperscript{6,7,9,12} \textit{B. pseudomallei} is a rare causative pathogen of orbital infection.

\textbf{Case reports of orbital infection caused by }\textit{B. pseudomallei}

To our knowledge, there are only a handful of cases of orbital infection caused by \textit{B. pseudomallei}. In 1996, Wong and colleagues reported the first case of preseptal abscess caused by \textit{B. pseudomallei} in a 42-year-old Singapore man who presented with acute fever and left eye swelling.\textsuperscript{13} The orbital infection is thought to be secondary from hematogenous spread. He had been treated with a combination of ceftazidime and chloramphenicol, but unfortunately he died from hospital-acquired pneumonia. Another fatal case occurred in a Malaysian patient who presented with left orbital infection complicated with subdural abscess.\textsuperscript{14} A recent report described a 55-year-old Malaysian man who presented with left periorbital cellulitis, and was successfully treated with a 2-month course of a combination of ceftazidime and cotrimoxazole.\textsuperscript{15} The last case was an 18-year-old Thai man who presented with left orbital apex and parotid gland abscesses complicated with cavernous sinus syndrome, and was successfully treated with intravenous antibiotics and surgical debridement.\textsuperscript{16}

\textbf{Treatment}

The standard treatment of melioidosis is composed of acute and maintenance phases. A recent study in Thailand showed that there was no statistical difference of acute mortality rate between the patients treated with a combination of ceftazidime and cotrimoxazole in comparison with ceftazidime alone in the acute phase treatment of severe melioidosis.\textsuperscript{17}
However, the small sample size is the limitation of this study. In addition, a very recent study in Thailand which was presented at the sixth World Melioidosis Congress 2010, Australia, Chetchotisakd and colleagues showed that the addition of doxycycline to cotrimoxazole during the maintenance phase did not reduce the recurrent rate of melioidosis.\(^\text{18}\) Hence, ceftazidime with or without cotrimoxazole is considered the first-line agent for treatment in the acute phase, and cotrimoxazole is recommended in the maintenance phase treatment of melioidosis.

Surgical treatment of an orbital abscess is still the subject of controversy. In a non-comparative case series with the most citation, Garcia and colleagues proposed that children of less than 9 years old who presented with SPA (group III) can be conservatively treated without surgery.\(^\text{19}\) In addition, several previous studies have recommended that orbital abscess should be treated with intravenous antibiotics with a close observation of visual status. Surgical debridement is indicated when no improvement at 24-48 hours of medical treatment is observed or there is the visual compromise at any time.\(^\text{19}\) A recent retrospective case series in 2001 has shown that the combined sinus and SPA drainage for the abscesses larger than 2 cm was associated with the absence of abscess reaccumulation and shorter hospital stay.\(^\text{20}\)

Conclusions
Orbital abscess is a rare presentation of melioidosis, and is probably associated with bacteremia. Ceftazidime with, without or followed by cotrimoxazole is the treatment of first choice in acute and maintenance phase, respectively. Surgical drainage is recommended in patients 1: who fail to improve within 48 hours, 2: who have visual compromise, or 3: who have subperiosteal abscess larger than 2 cm.

References


