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Tropical pyomyositis of erector spinae complicated with spinal epidural abscess

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ABSTRACT

Study design: This is a retrospective case series.
Objective: Tropical pyomyositis of erector spinae muscle (ESPM) is a rare muscular infection which may extend into the intraspinal canal to become spinal epidural abscess (ESPM-SEA). If left untreated, it may cause catatrophic spinal cord dysfunction and lead to irreversible paralysis. A series of eight such cases is presented, in order to provide proper surgical options and clarify the prognostic factors of the disease.
Summary of background data: Merely six sporadic case reports had been found in the literature. Surgical debridement and laminectomy to drain the intraspinal abscess combined with systemic antibiotics were the choice of treatment to treat the disease with good therapeutic effect.
Methods: Inpatient charts of the patients were reviewed. The therapeutic effect and functional neurological recovery are correlated with the demographic characteristics of the patients, neurological deficits before drainage, and the different procedures of drainage.
Results: Old age, long ESPM-SEA (>6.5 vertebral segments), spinal cord dysfunction as well as complete paralysis before the interventional procedures are significantly correlated with poor functional neurological recovery (Sperman's coefficient correlation, all $p < 0.05$). Pig-tail drainage of ESPM combined with adequate systemic antibiotics could cure if infection presents with lumbar radiculopathy only, but it failed to rescue the spinal cord dysfunction in two patients present with complete paralysis. Surgical drainage of ESPM with mini-laminotomy to drain ESPM-SEA combined with systemic antibiotics provided good functional recovery of patients, despite of prolonged pre-operative complete paralysis.
Conclusion: Early drainage of the ESPM and related epidural abscess combined with systemic antibiotics can provide excellent therapeutic effect of ESPM-SEA. Open drainage with mini-laminotomy is superior to pig-tail drainage when spinal cord dysfunction occurred associated with ESPM-SEA.

1. Introduction

Tropical pyomyositis (PM) is an infectious disease of the skeletal muscles that presents with pain in the involved area and is accompanied by abscess formation [1]. PM is usually more predominant in males and involves the large muscles of the pelvic girdle and lower extremities [2]. During the early invasive stage of PM, an infectious myositis without purulent abscess usually mimics regional myofascial pain which is difficult to diagnose. The invasive stage of PM can last for several weeks and progresses to the second, purulent stage when necrosis of the infection focus within the involved muscle occurs. The usual clinical presentation is during the purulent stage, best diagnosed by contrast enhanced computed tomography (CT) or with magnetic resonance image (MRI) when suspecting epidural involvement. Intramuscular abscess formation can be confirmed through needle aspiration of the abscess. In the final, septic stage of PM, general reactions to sepsis such as fever, leucocytosis, tachycardia, and hypotension may occur [3]. Emergency surgical drainage of the PM is indicated in life threatening septic shock. Although repeated minor trauma of the muscle and immunodeficiency have been postulated to precede PM, the real etiology remains unknown [4,5]. PM involving the posterior spinal muscle: erector spinae (ESPM) is rarely reported in the

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Table 1
American Spinal Injury Association (ASIA) impairment score (AIS).

AIS	Summary of paralysis	Description
A	Motor and sensory complete	No sensory or motor function is preserved in the sacral segments S4–S5.
B	Motor complete and sensory incomplete	Sensory function is preserved below the neurological level of injury (NLI) including the sacral segments S4–S5, but no motor function is preserved more than three levels below the NLI on either side of the body.
C	Motor incomplete Major	Motor function is preserved below the neurological level, and more than half of key muscle functions below the NLI have a muscle grade less than 3 (active movement with full range of motion against gravity).
D	Motor incomplete Minor	Motor function is preserved below the neurological level, and at least half (half or more) of key muscle functions below the NLI have a muscle grade >3.
E	Normal	The sensation and motor function as tested to be normal in all segments below the NLI.

English literature because the muscle, surrounded by tight fascia, is resistant to the invasion of blood born microorganisms [6]. Even more rarely will the ESMP extend into the spinal canal to cause an epidural abscess (SEA) [5,7–10]. Due to the rarity of ESPM-SEA, the authors present a case series detailing their treatment experiences and compare those results with the currently available literature in order to clarify the clinical presentation, pathogenesis, and proper treatment strategies for this rare infectious disorder.

2. Materials and methods

This is a retrospective chart review study. Demographic characteristics, clinical manifestations, location of the ESPM and extension of the ESPM-SEA, related neurological deficits, therapeutic strategies, results from bacterial cultures, and treatment outcomes were reviewed and analyzed. For patients that received therapy for multiple stages, the initial therapeutic plan and the supplemental procedures in response to the ineffectiveness of the initial treatment were documented as primary and secondary treatments. The neurological status before and after the treatment was recorded by American Spinal Injury Association (ASIA) impairment scores [11]. The summary and description of ASIA impairment scores (AIS) are listed in Table 1. A modified Nurick scale was used to assess the functional outcome of the patients [12]. Table 2 displays the modified Nurick classification scale with grade 6 representing disease-related in-hospital mortality. The lower the Nurick grade, the better the functional outcome. Spearman's correlation coefficient was used to correlate the final Nurick grade with the disease characteristics and the therapeutic procedure. Nonparametric and Fisher's exact tests were used to compare the final functional neurological grades for ordinal and binary prognostic factors, respectively.

Table 2
Nurick grades with a modified grade 6 implying disease related in-hospital mortality.

Grade	Description
1	Normal walking with possible clinical spinal irritation
2	Slight difficulties in walking with normal domestic and working life
3	Functional disability limiting normal work and domestic activities
4	Significant weakness making walking impossible without help
5	Bedridden or wheelchair-bound
6	Disease related in hospital mortality

3. Results

3.1. Demographic characteristics of the patients

During 2007–2013, eight patients with confirmed ESPM-SEAs were identified from the medical database of our institute. All of them were male. Table 3 describes the demographic characteristics, treatment procedures, and outcomes for all 8 patients with ESPM-SEA. The median age for the patients was 56.5 years old (range: 13–72) with an interquartile range (IQR) of 20.5 years old. Six patients (75%) recalled a mild injury to the back or neck prior to the painful onset of the disease. Two patients had chronic C-viral hepatitis, two had chronic alcoholism associated with liver function impairment, two had diabetes mellitus (DM), and two patients had no medical diseases that would impact immunocompetence. The duration from the first incident of painful attack caused by ESPM to confirmed verified diagnosis of ESPM ranged from 3 to 25 days with a median of 8 days (IQR = 11.75). The ESPM-SEA presented in this series involved multiple vertebral segments ranging from 2 to 23 segments with a median segment length of 6.5 (IQR = 11.5). Seven patients had leukocytosis with a white blood cell count higher than 10,000/dL. All patients had elevated C-reactive protein (CRP) ranging from 24.63 to 380 mg/L (median = 136.49 and IQR = 130.9) which progressively decreased after treatment with systemic antibiotics with or without drainage. Bacteriological study of the pus from the PM revealed one oxacillin-resistant *Staphylococcus aureus* (ORSA), six oxacillin-sensitive *Staphylococcus aureus* (OSSA), and one *Streptococcus anginosus*. Seven patients had an ESPM-SEA involving the vertebral region containing the spinal cord with four suffering from myelopathy (50%) prior to either CT-guided pig-tail drainage or surgical debridement. The period between onset and diagnosis in these four myelopathy patients ranged from 3 to 19 days with a median of 6.5 days (IQR = 12.25). Two patients (patients 1 and 2 in Table 3) whose ESPM involved the cervical region, developed AIS-A cervical myelopathy with respiratory failure and cardiac arrest. Patient 1 underwent surgical drainage of the ESPM as well as a partial C1 laminotomy to drain the ESPM-SEA three days after successful resuscitation (Fig. 1). Patient 1 made a slow recovery from the cervical myelopathy and could ambulate without assistance 15 months after the surgical treatment of the ESPM-SEA (Nurick-2 and AIS-D). Patient 2 underwent a CT-guided needle aspiration of the cervical ESPM but not the SEA due to persisting poor cognitive functioning after resuscitation (Fig. 2). Patient 2 suffered from persistent quadriplegia and died of uncontrolled sepsis three months after AIS-A cervical myelopathy developed. Both patients received three months of systemic antibiotics after the drainage procedures. Patient 3 suffered from thoracic ESPM and developed a C3 to T8 SEA associated with an AIS-A thoracic myelopathy lasting for three days prior to being transferred to our hospital. He underwent CT-guided pig-tail drainage of the ESPM with systemic antibiotics. Although the infection was controlled by systemic antibiotics and the CRP level returned to normal 3 months later, the neurological deficits remained at AIS-A and the patient was wheel chair bound (Nurick-5) after 12 months of follow up. Patient 4 had alcoholic liver disease and suffered from right thoracolumbar ESPM and developed an AIS-D lumbar (L1) myelopathy with ESPM-SEA extending from C7 to L4-5 where asymptomatic grade 2 spondylolithesis could be identified (Fig. 3). Although the ESPM-SEA involved the whole spinal canal, he underwent surgical debridement to drain the ESPM and right L1 mini-laminotomy to drainage the purulent abscess. Combined with post-operative antibiotics for 3 months, the patient recovered to AIS-D and Nurick-1 with some parasthesia bilaterally in the distal lower limbs. Four patients suffered from unilateral lumbar radiculopathy limited to the lumbar region where the ESPM entered the spinal canal through the intervertebral neuroforamen (Fig. 4). In these four patients, one