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Spinal epidural abscesses: risk factors, medical versus surgical management, a retrospective review of 128 cases

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Abstract

BACKGROUND CONTEXT: Spinal epidural abscess (SEA) is a rare, serious and increasingly frequent diagnosis. Ideal management (medical vs. surgical) remains controversial.

PURPOSE: The purpose of this study is to assess the impact of risk factors, organisms, location and extent of SEA on neurologic outcome after medical management or surgery in combination with medical management.

STUDY DESIGN: Retrospective electronic medical record (EMR) review.

PATIENT SAMPLE: We included 128 consecutive, spontaneous SEA from a single tertiary medical center, from January 2005 to September 11. There were 79 male and 49 female with a mean age of 52.9 years (range, 22–83).

OUTCOME MEASURES: Patient demographics, presenting complaints, radiographic features, pre/post-treatment neurologic status (ASIA motor score [MS] 0–100), treatment (medical vs. surgical) and clinical follow-up were recorded. Neurologic status was determined before treatment and at last available clinical encounter. Imaging studies reviewed location/extent of pathology.

METHODS: Inclusion criteria were a diagnosis of a bacterial SEA based on radiographs and/or intraoperative findings, age greater than 18 years, and adequate EMR. Exclusion criteria were post-interventional infections, Pott's disease, isolated discitis/osteomyelitis, treatment initiated at an outside facility, and imaging suggestive of a SEA but negative intraoperative findings/cultures.

RESULTS: The mean follow-up was 241 days. The presenting chief complaint was site-specific pain (100%), subjective fevers (50%), and weakness (47%). In this cohort, 54.7% had lumbar, 39.1% thoracic, 35.9% cervical, and 23.4% sacral involvement spanning an average of 3.85 disc levels. There were 36% ventral, 41% dorsal, and 23% circumferential infections. Risk factors included a history of IV drug abuse (39.1%), diabetes mellitus (21.9%), and no risk factors (22.7%). Pathogens were methicillin-sensitive *Staphylococcus aureus* (40%) and methicillin-resistance *S aureus* (30%). Location, SEA extent, and pathogen did not impact MS recovery. Fifty-one patients were treated with antibiotics alone (group 1), 77 with surgery and antibiotics (group 2). Within group 1, 21 patients (41%) failed medical management (progressive MS loss or worsening pain) requiring delayed surgery (group 3). Irrespective of treatment, MS improved by 3.37 points. Thirty patients had successful medical management (MS: pretreatment, 96.5; post-treatment, 96.8). Twenty-one patients failed medical therapy (41%; MS: pretreatment, 99.86, decreasing to 76.2 [mean change, –23.67 points], postoperative improvement to 85.0; net deterioration, –14.86 points). This is significantly worse than the mean improvement of immediate surgery (group 2; MS: pretreatment, 80.32; post-treatment, 89.84; recovery, 9.52 points). Diabetes

FDA device/drug status: Not applicable.

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mellitus, C-reactive protein greater than 115, white blood count greater than 12.5, and positive blood cultures predict medical failure: None of four parameters, 8.3% failure; one parameter, 35.4% failure; two parameters, 40.2% failure; and three or more parameters, 76.9% failure.

CONCLUSION: Early surgery improves neurologic outcomes compared with surgical treatment delayed by a trial of medical management. More than 41% of patients treated medically failed management and required surgical decompression. Diabetes, C-reactive protein greater than 115, white blood count greater than 12.5, and bacteremia predict failure of medical management. If a SEA is to be treated medically, great caution and vigilance must be maintained. Otherwise, early surgical decompression, irrigation, and debridement should be the mainstay of treatment. © 2014 Elsevier Inc. All rights reserved.

Keywords: Epidural abscess; Medical; Surgical; Motor score; Outcomes; Risk factors; Management

Introduction

Spinal epidural abscess (SEA) is a rare condition with potentially devastating consequences. Historical rates of SEA range from 0.2 to 1.2 cases per 10,000 hospital admissions [1]. Rates are expectedly higher at referral centers, 12.5 cases per 10,000 [2], and are increasing, having doubled in the past 20 years [3]. Approximately 50% of patients are initially misdiagnosed at time of presentation (range, 11%–75%) [4,5].

Spinal epidural abscess results from purulent material collecting between the spinal dural covering and osseous-ligamentous structures of the spine. This condition was first described by Morgagni in 1761 [6] and clearly defined by Bergamaschi in 1820 [7]. Barth performed the first known surgical intervention for SEA in 1901 [1] and most of the early reported cases were fatal [2].

Bacteria gain entrance to the epidural space via hematogenous spread (half of cases), contiguous spread (one third of cases), and no identifiable source in the rest [3]. The primary reason for spinal cord injury is unknown. Leading theories include ischemia from direct compression or disruption of vascular supply from septic thrombophlebitis [3]. Clinical improvement after decompression and various animal studies supports the direct compression model [8], whereas others have shown the combination of direct compression and septic thrombophlebitis to be synergistically worse for outcomes [3].

Although urgent/emergent surgical decompression and IV antibiotic therapy is the cornerstone of therapy for SEA, ideal management of this condition remains controversial. Neurologic function at the time of presentation is a key predictor of clinical outcome, but it is difficult to predict who will experience neurologic deterioration, leading many groups to endorse early operative decompression combined with IV antibiotics therapy as the treatment of choice [4,9–11]. Still others have reported similar outcomes for those treated with surgery and IV antibiotics and those with IV antibiotics alone [12–15], supporting the notion that some SEA may be managed successfully medically [16]. Thus, the literature is plagued with contradictory arguments stemming from small studies.

In 2005, 52 cases of medically managed SEA were reported. All patients were neurologically intact at presentation

with three patients crossing over to surgery after their neurologic function declined. This group proposed that medical management is reasonable in neurologically intact patients with SEA, but requires close monitoring and urgent surgical decompression when neurologic changes occur [12]. In 1992, 37 cases from 1970 to 1990 of medically managed SEA were reviewed [17]. All SEA successfully managed medically presented without neurologic dysfunction [12,13], with smaller abscess size [14] and required closed monitoring for neurologic deterioration [5,18]. Failed medical management of SEA has been reported in with minimal explanation for the failures [9,13,17,19,20].

Although it is largely accepted that decline in neurologic function is an indication for surgical decompression of epidural abscess, the majority of clinical decisions for medical versus surgical management of this condition are based on anecdotal evidence. Risk factors have been identified for development of SEA (elevated erythrocyte sedimentation rate, leukocytosis, intravenous drug use, diabetes mellitus, prior spine surgery) but the prognostic value of these risk factors is unknown [2,21–23]. It is not known which patient will respond favorably to medical management and who will require surgical intervention. Owing to the occurrence of severe neurologic deficits after failed medical management of SEA, it is unethical to perform randomized controlled trials to determine the best treatment for this condition [3].

Hypothesis

By studying the demographics, motor scores, and medical comorbidities of patients at our institution with SEA, we can identify risk factors to predict who will acquire SEA and prognosticate regarding the therapeutic efficacy of medical versus surgical management.

Materials and methods

We retrospectively reviewed the records of patients diagnosed with spontaneous SEA from a single quaternary referral medical center composed of two major hospitals from January 2005 to December 2011. The electronic medical record was accessed to obtain patient demographics,

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