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What are we waiting for? An argument for early surgery for spinal epidural abscesses

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Abstract

Background: In the article: Timing and prognosis of surgery for spinal epidural abscess (SEA): A review, Epstein raises one major point; it is imperative that spinal surgeons "take back decision-making" from our medical cohorts and reinstitute early surgery (<24 h) to better treat SEAs.

Methods: Spine surgeons recognize the clinical triad (e.g., fever [50%], spinal pain [92–100%], and neurological deficits [47%]) for establishing the diagnosis of an SEA. We also appreciate the multiple major risk factors for developing SEA; diabetes (15–30%), elevated white blood cell count (>12.5), high C-reactive protein (>115), positive blood cultures, radiographic cord compression, and significant neurological deficits (e.g., 19–45%).

Results: Recognizing these risk factors should prompt early open surgery (<24 h from the onset of a neurological deficit). Open surgery better defines the correct/multiple organisms present, and immediately provides adequate/thorough neurological decompression (with fusion if unstable). Although minimally invasive surgery may suffice in select cases, too often it provides insufficient biopsy/culture/irrigation/decompression. Most critically, nonsurgical options result in unacceptably high failure rates (e.g., 41-42.5-75% requiring delayed surgery), while risking permanent paralysis (up to 22%), and death (up to 25%).

Conclusion: As spine surgeons, we need to "take back decision-making" from our medical cohorts and advocate for early surgery to achieve better outcomes for our patients. Why should anyone accept the >41-42.5 to up to the 75% failure rate that accompanies the nonsurgical treatment of SEA, much less the >25% mortality rate?

Key Words: Avoid medical management, early surgery, high morbidity/mortality, spinal epidural abscesses, spine surgeons

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INTRODUCTION

The article: Timing and prognosis of surgery for spinal epidural abscess (SEA): A review raises one major point; Spine surgeons should perform early surgery for SEA, probably well before the 24 h mark following the onset of a neurological deficit, and should "take back decision-making" from our medical cohorts who too often promote nonsurgical management. Although

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much effort has been expended to identify the major risk factors prompting nonoperative management, such treatment has resulted in unacceptably high failure rates (e.g., 41-42,5 up to 75% requiring delayed surgery with often poor results), severe permanent morbidity (up to 22% risk of paralysis), and high mortality rates (3–25%).[2,6,7,13-15]

AS SPINE SURGEONS READILY RECOGNIZE THE CLINICAL TRIAD AND RISK FACTORS FOR SPINAL EPIDURAL ABSCESS, WHAT ARE WE WAITING FOR?

Spine surgeons certainly acknowledge the clinical triad (e.g., fever [50%], spinal pain [92–100%], and neurological deficits [47%]) required for establishing the diagnosis of a SEA.[1,6,12,14,15] We also appreciate the multiple factors that contribute to the risk of developing a SEA; advanced age (>65 or 80), diabetes (15–30%), cancer, intravenous drug abuse (25%), smoking (23%), elevated white blood cell count (WBC >12.5), high C-reactive protein (CRP >115), positive blood cultures, magnetic resonance imaging (MRI)/computed topographic (CT) documented cord compression, and significant neurological deficits/some degree of paralysis (e.g., 19–45%).[7,9,12-15]

PYOGENIC AND NONPYOGENIC SPINAL INFECTIONS DIAGNOSED WITH DIFFUSION-WEIGHTED MAGNETIC RESONANCE IMAGING: ABSCESSES AND PUS COLLECTIONS

Newer MRI techniques enable us to better diagnose and treat/follow SEA. Moritani *et al*. noted that conventional MRI is typically utilized to diagnose SEA.[11] However, they emphasized that newer diffusion-weighted imaging provides earlier and more accurate detection of abscess and pus collections within the spine along with an excellent means of following the efficacy of treatment.[11]

SPINE SURGEONS SHOULD OPT FOR EARLY OPEN SURGERY: NO EXCUSES

Multiple risk factors should prompt early surgery (e.g., defined as within 24 h of the onset of a neurological deficit) versus late surgery (>24 h).[3,8] Early surgery should immediately establish the diagnosis (define the organism) and provide appropriate/sufficient neurological decompression. Shweikeh *et al*., in their literature review of 40 SEA articles, emphasized the import of early recognition of bacterial SEA as the preoperative neurological status best determined the postoperative outcome.[15] Here, early surgery, defined as within 36–72 h from the onset of neurological deficits, was recommended versus medical treatment alone, as the latter correlated with high failure rates and greater permanent morbidity.

Arko *et al*. noted that in the past SEA had typically (particularly prior to 1999) been managed with emergent surgery/decompression and antibiotic therapy.[4] They emphasized the need to perform MRI studies early in the clinical course. However, it is inexplicable as to why in this study only 59.7% of patients had early surgery versus 40.3% who were treated with antibiotics alone. Again, delaying surgery and choosing nonoperative management proved to be a "slippery slope" as the attendant morbidity and mortality were so unacceptably high.

Another example of high nonsurgical failure rates for treating SEA comes from Kim *et al*. study in which 127 of 355 patients with SEA were managed nonsurgically; 54 (42.5%) failed nonoperative management requiring delayed surgery.[10] Notably, they pointed out the risk factors failure that included; preoperative incomplete or complete spinal cord deficits, age over 65, diabetes, and methicillin-resistant *Staphylococcus aureus* (MRSA). However, this is not much help for those left with permanent neurological sequelae. Furthermore, even though they state that without such risk factors, patients can be considered for nonoperative therapy for SEA as long as there is "close monitoring" they and many other authors point out that once a deficit is noted, the decline is often precipitous and irreversible. Therefore, again, why should the surgeon or patient risk the sequelae of delayed surgery for SEA?

In Patel *et al*., 127 consecutive patients with spontaneous SEA presented with the classic triad of pain (100%), fevers (50%), and weakness (47%); lesions were located ventrally (36%), dorsally (41%), or circumferentially (23%).[12] Major comorbidities included; intravenous drug abuse (39.1%), and diabetes mellitus (21.9%). The major organisms included methicillin-sensitive *S. aureus* (MSSA) (40%) and MRSA (30%). Although primary surgery/antibiotics were offered in 77 patients, 21 (41%) of 51 treated nonoperatively failed medical management (e.g., demonstrated progressive motor deficit or increased pain and required delayed surgery). Nonoperative failures correlated with four laboratory-based risk factors; diabetes, CRP >115, WBC of over 12.5, and positive blood cultures (bacteremia). As spine surgeons, we can certainly use the combination of these comorbidities and risk factors to convince our colleagues (e.g., the internists, infectious disease consultants, or neurologists) and ourselves that early surgery is essential for treating SEA.

Alton *et al*. evaluated the risks factors and neurological outcomes for 62 patients with cervical SEA treated with antibiotics alone (e.g., neurological deterioration) versus early surgery.[3] Of the 24 initially treated medically, 18 (75%) failed and required delayed surgery an average of 7.02 days later; they subsequently demonstrated poorer outcomes.

FOR SPINAL EPIDURAL ABSCESS, EFFICACY OF MINIMALLY INVASIVE SURGERY VERSUS OPEN PROCEDURES

Results of minimally invasive surgical procedures for spinal epidural abscess: Percutaneous endoscopy dilute betadine solution irrigation and percutaneous endoscopic lavage and drainage

The results of minimally invasive surgery (MIS) for SEA vary. Yang *et al*. evaluated the efficacy of percutaneous endoscopic epidural debridement of spondylodiscitis/SEA in 32 patients using "percutaneous endoscopy dilute betadine solution irrigation (PEDI)" (2005 to July 2010).[17] Positive cultures were found in 28 (87.5%) of biopsy specimens, and 26 (81.3%) recovered with antibiotics alone. In their other study, to avoid open surgery, Yang *et al*. also utilized percutaneous endoscopic lavage and drainage to treat 21 patients' with infectious spondylitis; notably, they excluded patients with significant neurological deficits/instability.[16] Although they successfully controlled the infection with antibiotics (no open procedure) in 86% of cases, they did note that 2 patients sustained new postprocedure neurological root injuries.

Greater efficacy of open decompressions

Although MIS procedures suffice in select cases, too often, they provide insufficient biopsy/culture/irrigation/decompression when compared with the open surgery.[7,9]

SIGNIFICANT RISK OF PERMANENT NEUROLOGICAL DEFICITS WITH SPINAL EPIDURAL ABSCESS

The frequency of permanent neurological deficits with/without surgery for SEA remains high. Doutchi *et al*. noted a 22% incidence of permanent neurological deficits following SEA treated surgically or nonsurgically; deficits were greater where there was cervical involvement.[7] In Avanali *et al*. series, of 23 patients undergoing delayed treatment of SEA, at follow-up, 2 patients were normal, 10 experienced some improvement in function, while 11 were plegic.[5]

MOST COMMON ORGANISM METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS*

The most common offending organism for SEA is MRSA, typically followed by MSSA. Early surgery is critical to avert sepsis which remains the leading causes of death. In Doutchi *et al*. series, the cause of osteomyelitis in 66% of cases was due to postoperative (18%) or hematogenous (48%) spread of organisms. Notably, just one organism was present in 92% of cases; Gram-positive bacteria (76% of cases), and Gram-negative bacilli in most of the remaining cases.[7] Establishing the correct pathogen remains critical, and therefore, open versus MIS procedures should be considered to confirm the organism rather than simply relying on blood culture results. In the future, various catheter infusion techniques, delivering localized antibiotics may become a greater consideration for treating SEA lesions.

SUMMARY

As spinal surgeons, we need to "take back our surgical prerogative" and re-educate ourselves and our medical colleagues that SEA is a true neurosurgical emergency. We and our patients cannot afford the high failure rates attributed to the initial nonoperative management of SEA (e.g., a 41-42.5-75% failure rate) or the high mortality rates ranging up to 25%. As spine surgeons, we need to promptly diagnose and treat SEA before precipitous, unpredictable neurological decline/paralysis, and death occurs.

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