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CASE REPORT

Massive Epidural Abscess: Early Less Invasive Surgical Approach

Facundo L Alvarez-Lemos[1*], Nicolás Wolff Benavides[2], Jorge A Garrido Arancibia[3], Juan I Cirillo Totera[3,4] and José G. Fleiderman Valenzuela[3,4]

[1]*AO Spine Fellowship, Clínica Universidad de los Andes, Santiago de Chile, Chile*
[2]*Resident in Orthopedics and Traumatology, Clínica Universidad de los Andes, Santiago de Chile, Chile*
[3]*Spine Surgeon, Clínica Universidad de los Andes, Santiago de Chile, Chile*
[4]*Spine Surgeon, Hospital del trabajador, Santiago de Chile, Chile*

Correspondence should be addressed to Facundo L Alvarez-Lemos, AO Spine Fellowship, Clínica Universidad de los Andes, Santiago de Chile, Chile

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ABSTRACT

BACKGROUND

Epidural abscess (EA) is an unusual pathology, and even more unusual when it is presented in the form of massive and primary EA. Its optimal treatment is still controversial, especially in patients without neurological compromise. We report a case of massive primary pyogenic EA without neurological impairment, and we review the existing literature.

CASE REPORT

A 69-years old female with history of lumbar pain for several days and fever (37.9ºC), and without neurological compromise. Magnetic resonance (MR) of the spine showed a massive primary EA from segment C5 to sacrum, with positive blood cultures for Methicillin-Sensitive Staphylococcus aureus (MSSA). Intravenous antibiotic treatment was started, and early minimally invasive surgery (limited decompression and debridement through probe irrigation) was performed, resulting in a favourable progress without developing complications after one year of follow-up.

CONCLUSION

Based on the reviewed literature, in the presence of certain risk factors (RF), early surgical treatment (ST) would be beneficial, even when there is no formal indication of surgery, due to the high failure rate of the medical treatment (MT).

KEYWORDS

Epidural abscess; Medical treatment; Surgical treatment; Risk factors

INTRODUCTION

Epidural abscess (EA) is an unusual pathology with an incidence of 1 to 2.8 cases per 10.000 individuals per year [1,2] and a mortality rate between 2% and 4% [3,4]. This condition is defined as an infection in the epidural area, usually a monomicrobial infection, by Gram-positive bacteria, with Staphylococcus Aureus being the most frequent agent (63%) [5,6]. EA can compromise only one segment of the spine or, less frequently, multiple segments (holospinal abscess or massive abscess) [7], and it might be primary, in the absence of an adjacent infection, or secondary, as an extension of an infection in the vertebral body, the facet joint and/or the disc [8].

Oftentimes, it is diagnosed belatedly due to its unspecified symptoms, the most frequent reason for consultation being back pain [9-11]. The delay in the diagnosis and its treatment is the main factor that contribute to an unfavourable evolution [12,13], which can result in severe neurological consequences or, in some cases, even death [9,10].

Medical treatment (MT) is described as follows: intravenous administration of antibiotics for 3 weeks to 8 weeks [14], then orally from 6 weeks to 3 months [15], which can be completed or not with a surgical treatment (ST), with the purpose of decompression, debridement, and stabilization (as necessary); however, the selected treatment for this condition remains unclear.

We report a massive, primary and pyogenic case of EA, with an extension from C5 to sacrum, treated with an early less invasive surgical approach.

CASE REPORT

A 69-years old female, with history of high blood pressure, hypothyroidism and pulmonary emphysema due to tobacco dependence. The patient reports a compromised general condition that has been developing for 14 days, with fever (37.9ºC) and generalized pain particularly on the lumbar area, and without neurological compromise (ASIA E).

In the current pandemic situation, the patient is hospitalized as a suspected case of COVID-19. Lab tests show an increase in the inflammatory parameters, evidencing leukocytosis of 13.100/mm^3, erythrocyte sedimentation (ESR) of 60 mm/h and polymerase chain reaction (PCR) >350 mg/L.

The initial study ruled out SARS CoV-2 infection and due to the presence of lumbar pain symptoms and fever, an MRI of the lumbar region was carried out, which was extended to the rest of the spine using contrast medium (Gadolinium), which revealed the presence of primary EA extending from C5 to sacrum (Figure 1A) and, over the course of 24 hours to 48 hours, blood culture results show growth of Methicillin-sensitive Staphylococcus Aureus (MSSA) (Figure 1B).

In conjunction with intravenous (IV) antibiotic (cloxacillin), the patient was entered early to the operating room to undergo a less invasive posterior approach through a left hemi-semi-laminectomy at T8-T9 and L4-L5 segments, which showed purulent material in both decompression areas (Figure 1C). After collecting culture samples, a Nélaton's probe was inserted in the epidural area and saline lavage in combination with diluted vancomycin was carried out (1 g/L of physiological solution), from the distal area to the proximal area and vice

versa, obtaining an appropriate debridement of the abscess, which was confirmed by the connection of both decompression sites through contrast medium (OminpaqueTM) (figure 1D - Figure 1E).

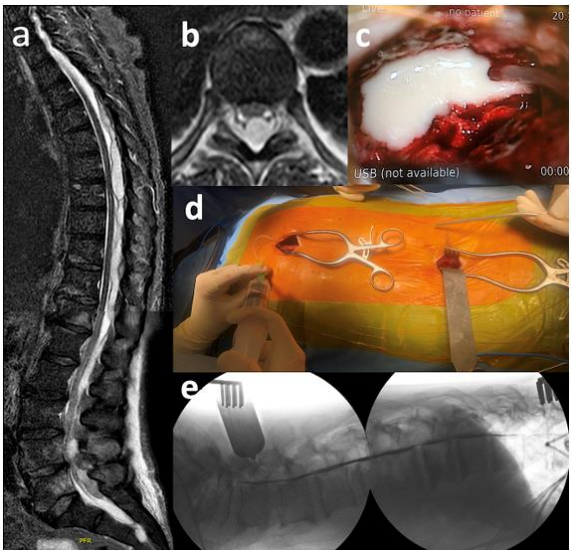

Figure 1: A) MRI sagittal section in STIR sequence of the spine where the extension of the abscess is evidenced. **B)** Axial section in T2 sequence at T8-T9 level, site of maximum cord compression. **C)** Purulent material in decompression sites. **D and E)** Epidural flushing with a catheter through decompression site, answering their communication with contrast medium.

The patient experienced rapid improvement in her general condition. She presented post-operative pain of 5/10 according to the Visual Analogue Scale (VAS), and of 0/10 after 7 days, did not require pain relief medications, did not reported new fever symptoms, and reported a decrease in SV and PCR as from the 3rd day of surgery (Figure 2). Sulfamethoxazole/trimethoprim orally was added after the second week to the IV scheme which was completed after four weeks, presenting at that time surveillance images without evidence of EA (Figure 3A) therefore, the patient was discharged and continues an oral antibiotic scheme with cefadroxil for an additional 8 weeks.

After five months, the patient was asymptomatic, presented normal lab tests parameters (ESR: 7 mm/h, PCR: 1.7 mg/L), and control images at one year of follow-up showed no deformity at the sagittal plane (Figure 3B - Figure 3D).

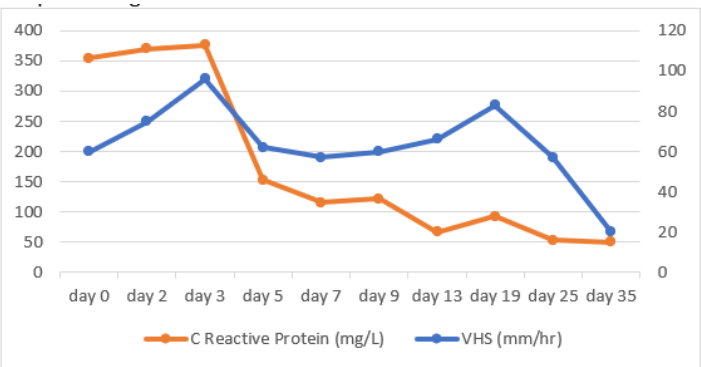

Figure 2: Progression of ESR and PCR.

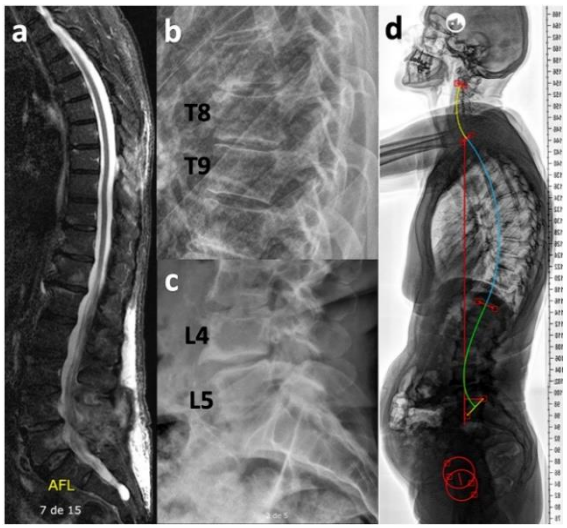

Figure 2: A) MRI sagittal section in STIR sequence of the spine at one month postop, showing the absence of collection in the epidural space. **B and C)** Localized one-year postop X-ray of the operated segments where there is no evidence of instability. **D)** Lateral total spine X-ray one-year postop showing preservation of the patient's sagittal profile without deformity.

DISCUSSION

Although it seems reasonable to consider providing initial MT in patients without a formal indication of surgery (neurological impairment, instability, intractable pain, sepsis or MT failure [16-28], MT failure rates in conjunction with the uncertainty of whether ST would provide an advantage for patients without neurological compromise represent the major points of discussion. A large proportion of the bibliography is limited to conducting case reports or case series, or else to retrospective studies with low level of evidence, which deliver inconclusive and/or contradictory results.

During bibliographical reviews of Epstein et al. [17] and Suppiah et al. [1], MT failure rates between 10% and 50% were found, which required rescue ST; however, the level of evidence was considered low.

Patel et al. [18] observed the evolution of 128 patients, and compared the MT against the ST, in which 21 out of the 52 patients who received conservative treatment failed and required rescue ST. Although as per ASIA classification the group of patients that underwent surgery frequently had a lower motor level compared to those that received MT (Medical: 97.86 *vs.* Surgical: 80.32), these patients evidenced a significative improvement in the motor score, while patients who received MT presented a decay in the motor score (Surgical: Change of +9.52 *vs.* Medical: -5.92). In addition, the recovery following rescue decompression was significantly lower than in patients who successfully received MT and/or early ST (decompression).

There are common risk factors (RF) associated with poor outcomes. Their presence in people over the age of 70 [1,12,13,14], diabetes mellitus [1,2,18,19] and terminal kidney disease [20] have been associated to worse outcomes.

The highest level of neurological compromise prior to treatment [2,21,22,23], as well as its persistency during a longer period of time [1,28-30] and the location of the lesions at the cervicothoracic level [24,25] are more likely

to obtain worse outcomes. Kim et al. [26] proved a higher probability of MT failure in lesions proximal to conus medullaris and mainly at the cervical level [8]; however, some previously mentioned series do not report any differences [18].

The presence of Methicillin-resistant Staphylococcus aureus (MRSA) was also a strong predictive of poor neurological outcomes [8,19,28,29].

During the review of Patel et al.18, it was found that a PCR >115 mg/L, a white blood cells count >12.5×109/L and a positive blood culture predicted the MT failure. Together with the history of diabetes and these lab tests parameters, they produced a regression model in which patients that presented one, two or three of these RFs were 35.4%, 40.2% and 76.9%, respectively, more likely to fail MT, compared to the patients that did not present any RF that only had a risk of 8.3%. However, during the review of Suppiah et al. [1], white blood cells count and PCR, as well as SV, were not consistent in predicting the outcome. For Kim et al. [26], diabetic patients older than 65 years old with MRSA were 99% more likely to fail their MT.

The decision to carry out early ST over MT could produce some benefits if these RFs are present (Table 1).

Table 1: Summary of risk factors (RF) according to bibliography.

Risk Factor's	Bibliography
Age >70 Years and 65 Years	1-12-13-14 y 26
Mellitus Diabetes	2-18-19-1
End-Stage Kidney Disease	20
Parasia/Plegia	2-21-22-23
Deficit Persistence >36 hours	08-04-2006
Cervicothoracic Lesions	24-25 - 26-8
MRSA	26-19 - 27-8
PCR >115 mg/l	18
White Blood Cells* >12.5 × 10 novena/l	18
Blood Culture (+)	18

The two mostly used surgical techniques are the segmentary laminectomy with catheter irrigation or the radical laminectomy; the latter one allows maximum decompression, but it presents the added risk of segmental spinal instability and subsequent deformity, eventually requiring surgery.

In a sample of 27 patients, Lo hr et al. [30] compared laminectomy (n = 13, average of two levels) against interlaminar decompression (n = 14, average of 1.8 levels) for the ST of EA, and found an appropriate level of decompression with both techniques, but also found that progressive kyphosis developed in two patients of the laminectomy group, only when this was performed in the same segment that presented anterior pillar compromise (spondylodiscitis). This suggests that an interlaminar approach can offer the same (or improved) results than the aggressive laminectomy, especially in patients with spondylodiscitis associated to the abscess in the same segment.

Early ST was considered as treatment for an elderly patient (76.9% failure of TM according to Patel et al. [18]), who presented massive EA, elevated inflammatory parameters and positive blood cultures, which allowed an adequate decompression and total debridement of the abscess at all compromised levels through a less invasive technique, preserving the posterior tension band and preventing iatrogenic instability.

CONCLUSION

EA is an unusual pathology, and massive EA is even more unusual. Although current literature supports early ST in patients with neurological impairment, it does not have as much consistency in cases of patients without neurological compromise.

The reviewed bibliography shows a significant percentage of MT failure along with the presence of RFs of poor prognosis, such as the ones our patient presented. Based on this, we supported the decision of carrying out an early ST through a less invasive approach, which allowed us to get an appropriate neurological decompression and to drain and clean the infected site without producing post-operative instability and achieving a great medical and surgical outcome during our current 1-year follow-up period (figure 2).

Future research might help identify patients with higher risk of MT failure.

CONFLICT OF INTEREST

The authors state that there were no conflicts of interest in performing this work.

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