



Treatment of Holospinal Epidural Abscess with Selective Skip Laminectomies and Catheter Irrigation: A Case Report

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Abstract

Case: A 60-year-old male presented with fever, neck pain, and altered mental status. An MRI revealed an extensive epidural abscess running from the cervical to lumbar spine with multiple paraspinal musculature abscesses and a retropharyngeal/prevertebral abscess.

Conclusion: The patient was treated with intravenous broad-spectrum antibiotics and surgical debridement. Skip laminectomies were performed at T4 and T10, and catheters were inserted at these entry points and ran along the length of the spine for irrigation/aspiration. This technique facilitated the reduction of infectious burden while maintaining spinal column stability.

Keywords: Holospinal Epidural Abscess; Laminectomies; Catheter Irrigation

Introduction

Holospinal epidural abscesses (HEAs), spinal epidural abscesses (SEAs) running from the cervical spine through the sacral spine, represent about one in one million hospital admissions, making it an exceedingly rare condition [1,2]. The etiology of HEAs is not always clear; however, postulated to be from hematogenous seeding or direct spread from local abscesses; furthermore, upon invading the spinal epidural space, the infection is free to spread along the length of the spinal canal; however, it is prevented from spreading to within the cranium due to the tethering of the dura mater to the foramen magnum [3-6].

Common symptoms include fever, leukocytosis, elevated C-reactive protein, back pain, sensory impairment, and extremity motor weakness [3-8]. Diagnosis is made via magnetic resonance imaging (MRI); the scans generally reveal fluid in the epidural space and concomitant compression of the spinal cord [3-8]. Many studies in the literature revealed the instigating organisms to be methicillin-resistant *Staphylococcus aureus* (MRSA) and methicillin-sensitive *Staphylococcus aureus* (MSSA) [3,4,6,7].

Regarding treatment, broad-spectrum antibiotics are virtually always indicated upon diagnosis with any SEA. Furthermore, if fulminant neurological impairment presents, emergency decompression of the spine is indicated. Multiple methods of decompression have been described. In some instances, laminectomies of the entire vertebral column were performed to access the epidural space along the entire length of the spine³. Other studies have described skip laminectomies in which laminectomies were performed on only select vertebrae at varying segmental levels; draining tubes were then run through these select laminectomies to reach regions along the length of the canal [4-8]. This procedure has the benefit of avoiding destabilization of the vertebral column, which can occur when laminectomies are performed on all vertebrae. Outcomes varied by case, in which some patients had complete resolution of their neurological deficits, while others retained permanent deficiencies [3-8]. Generally, patients presenting with neurological deficits who are treated with early, aggressive medical care before severe compression can occur tend to achieve the greatest improvements in their symptoms [4,7,9].

The patient consented to have his case published.

Case Report

History and examination

The patient is a 60-year-old male with a past medical history of alcohol and intravenous (IV) drug abuse who was initially admitted to the hospital for fever, neck pain, and altered mental status; he was subsequently diagnosed with bacterial meningitis and MRSA bacteremia. His mental status continued to decline, and he became hypoxic requiring intubation and transfer to the Intensive Care Unit (ICU). Following intubation, an MRI of his cervical, thoracic, and lumbar spine was performed and revealed a HEA as well as multiple paraspinal musculature abscesses and a retropharyngeal/prevertebral abscess (Figure 1). The spine team was consulted after these findings and his intubation; therefore, a reliable motor and sensory neurological exam was limited due to the intubation and sedation. He initially had normal reflexes, negative Hoffman's sign, and 1-2 beats of clonus bilaterally. He was treated with empiric broad-spectrum IV antibiotics. The following morning, his infectious lab markers had worsened, and he now had 5 beats of clonus on exam. Without signs of improvement in his infectious lab reports or a reliable neurological exam to trend, the decision was made for urgent operative debridement of the HEA.

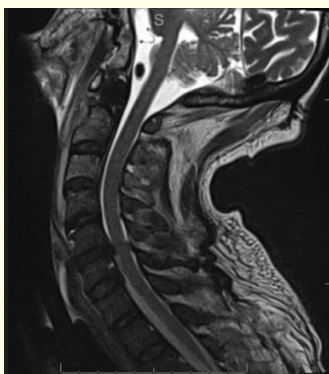


Figure 1A: Shows T2WI sagittal MRI of the cervical spine.



Figure 1B: Shows T1WI sagittal MRI of the cervical spine.

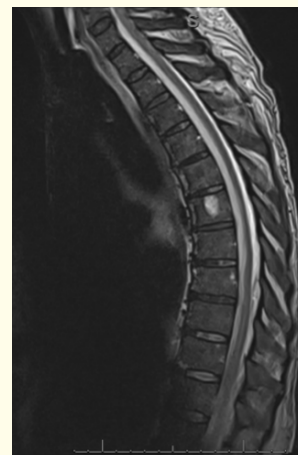


Figure 1C: Shows T2WI sagittal MRI of the thoracic spine.



Figure 1D: Shows T1WI sagittal MRI of the thoracic spine.



Figure 1E: Shows T2WI sagittal MRI of the lumbar spine.



Figure 1F: Shows T1WI sagittal MRI of the lumbar spine.

Figure 1: Contains six MRI scans - both T2WI and T1WI scans of the cervical, thoracic, and lumbar spine. The T2WI scans reveal fluid in the epidural space along the length of the cervical, thoracic, and lumbar regions of the spine.

Operation

The preoperative plan included skip laminectomies at T4 and T10 due to their proximity to the lumbar and cervical lordotic curves, which are the dependent areas of the spine while lying prone. These levels were also chosen to avoid disrupting the cervicothoracic junction or thoracolumbar junction and to avoid cervical laminectomies which are at higher risk of post-laminectomy kyphosis. The thoracic spine also has less motion and is inherently stable with the added support of the “4th column” of the intact ribs.

The patient was placed prone on a Jackson table with a spine top. Neuromonitoring was used for the procedure. The patient was prepped and draped in standard fashion. Utilizing fluoroscopy and localization techniques, the T4 and T10 levels were identified. A standard midline approach and laminectomies were performed at each level. The lamina and ligamentum flavum were excised and sent for pathologic analysis.

Once the laminectomies were completed, a pediatric feeding tube connected to a 30 mL syringe was directed cranially in the epidural space through the T4 laminectomy site (Figure 2). This tube

was used to gently aspirate purulent material in the cervical spine. This was repeated in a similar fashion in both cranial and caudal directions through both the T4 and T10 laminectomy sites to decompress the entire length of the spinal column. After using gentle aspiration to collect purulent fluid for culture, the 30 mL syringes were filled with debridement antibiotic solution which was used to gently irrigate the spinal canal. In a similar fashion, alternating irrigation and aspiration were performed through the length of the spinal canal until no further purulent material was obtained. The patient was also cycled from Trendelenburg to reverse Trendelenburg throughout the procedure to aid in the evacuation of the purulent material. A layered closure was performed, and no drain was used. The patient was then awakened from anesthesia and kept intubated to be transferred back to the ICU. The estimated blood loss was less than 50 mL and the surgical time from incision to closure was two hours and thirty-six minutes.





Figure 2: Displays the irrigation of the epidural space in both cranial and caudal directions via a laminectomy at T4.

Postoperative course

Due to the maintained stability of the spine with this surgical technique, the patient was allowed to be weight-bearing as tolerated without a brace postoperatively.

He was continued on vancomycin postoperatively for his blood cultures that had been positive for MRSA. His respiratory status improved following surgery and he was extubated two days postoperatively. His mental status improved, and he was transferred out of the ICU four days postoperatively but continued to have intermittent confusion due to alcohol withdrawal. The neurological exam had returned to normal with 5/5 strength in all extremities and there was no clonus or hyperreflexia by postoperative day four. Surgical cultures grew MRSA. His wounds had some superficial breakdown which was noted on postoperative day nine (Figure 3). This was treated with topical betadine wet-to-dry dressings and was completely closed and healed by postoperative day 14. Repeat blood cultures became negative one day postoperatively. He was discharged on postoperative day 22 to a skilled nursing facility for continued IV antibiotics. He had an extended period of hospitalization postoperatively due to continued confusion and dysphagia that required a percutaneous endoscopic gastrostomy (PEG) tube to be placed. The patient received a peripherally inserted central

catheter (PICC) line and was prescribed 6 weeks of IV vancomycin. He had continued elevation of inflammatory markers at the 6-week follow-up with Infectious Disease, so he was prescribed 4 additional weeks of IV vancomycin as well as 4 weeks of doxycycline. He subsequently had resolution of the elevated inflammatory markers. His dysphagia also resolved, and he was able to have his PEG tube removed a few months after discharge.



Figure 3A



Figure 3B

Figure 3: 3A: Displays the upper thoracic Lower thoracic. 3B: Incisions which displayed some superficial breakdown on postoperative day nine.

He followed up in the orthopedic spine clinic for 3 months postoperatively and continued to have no neurologic deficits. He was ambulating without assistance and his wounds had healed completely without signs of continued infection.

Discussion

HEA is an exceedingly rare condition with less than 25 case reports in the literature. It has been reported in patients of all ages and has been associated with many conditions such as rheumatoid arthritis, diabetes, and IV drug use.

Initial workup should include an MRI of the entire neural axis to evaluate the extent of the epidural infection along with concomi-

tant paraspinal infections. Blood cultures are imperative for early pathogen identification to help direct antibiotic therapy. Blood cultures are positive in upwards of 60% of cases [10,11]. Early broad-spectrum IV antibiotics are the gold standard of treatment. There have been case reports of IV antibiotics alone being curative for a HEA. Smith et. al reviewed treatment strategies in the available literature and identified 19 cases of HEA. 4 of the 19 cases were treated with antibiotics alone and all these patients made a full recovery [7]. 15 of 19 cases had neurologic deterioration that required decompressive surgery, and one of these had cardiovascular collapse and died prior to surgery, demonstrating the severity of this infection. Of the 14 cases that underwent surgical intervention, 10 of these were decompressed using selective laminectomies and catheter irrigation. Many patients that develop a HEA have concomitant medical comorbidities that make them non-ideal surgical candidates. These cases as well as the case presented in this report demonstrate the safety and efficacy of this method of minimally invasive decompression.

Conclusion

HEA is a very rare condition but can have significant morbidity or mortality. In addition to broad-spectrum antibiotics, surgical intervention can be beneficial to decompress the infection and improve outcomes. This case provides evidence for the efficacy of selective skip laminectomies with irrigation of the spine in treatment of HEAs. This technique allows for identification of the inciting organism, adequate reduction of the infectious burden, decompression of the neural elements, minimal surgical time and blood loss, and maintained stability of the spinal column without the use of instrumentation.

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