Minimally Invasive Emergent Decompression For Cauda Equina Syndrome

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Citation

P P Jankowski, L C Baird, S Keshavarzi, K H Hansen, W R Taylor. *Minimally Invasive Emergent Decompression For Cauda Equina Syndrome*. The Internet Journal of Spine Surgery. 2013 Volume 8 Number 1.

Abstract

Study Design: Technical case report
Purpose: Acute cauda equina syndrome is a surgical emergency that requires emergent intervention. The current procedure of choice is an open laminectomy leaving the patient with the associated morbidity of an open posterior surgical approach. We investigate a new approach for emergent decompression of the thoracic and lumbar spine using a minimally invasive surgical technique in the treatment of epidural masses.
Methods: Two patients with acute cauda equina syndrome were emergently decompressed via a minimally invasive technique aimed at minimizing blood loss, avoiding destabilization of the spine, minimizing soft tissue injury and reducing recovery time. The clinical and radiographic results were then documented.
Results: Both patients received a full decompression without any complications and experienced immediate improvement in their symptoms. At their three-month follow-up visit they were pain free, without any neurological deficits and had returned to full activity.
Conclusions: Minimally invasive spine techniques are widely used for elective procedures however, they are not usually considered as a primary option for emergent surgical indications. We describe here a method using an established minimally invasive spine access system, METRx, as a safe and effective alternative to emergently decompress the thoracic and lumbar spine.

Key points:
• Emergent decompression of an epidural mass in the thoracic and lumbar spine using the minimally invasive METRx spine access system is safe and effective.
• Full decompression is achievable across one to three vertebral segments in the thoracic and lumbar spine through one 2cm incision.
• This approach is a viable alternative to open surgery affording the patient with the benefits of a minimally invasive procedure.

INTRODUCTION

Acute symptomatic spinal cord compression is a surgical emergency that requires immediate intervention. Generally, the surgical treatment is an open decompression, which may leave a large incision on the back, post-surgical pain due to soft tissue trauma, possible destabilization of the spine, and a longer recovery period [2,5]. We present a minimally invasive technique utilizing the METRx tube system to emergently decompress epidural masses in the thoracic and lumbar spine of two patients. The minimally invasive decompression was successful in both cases.

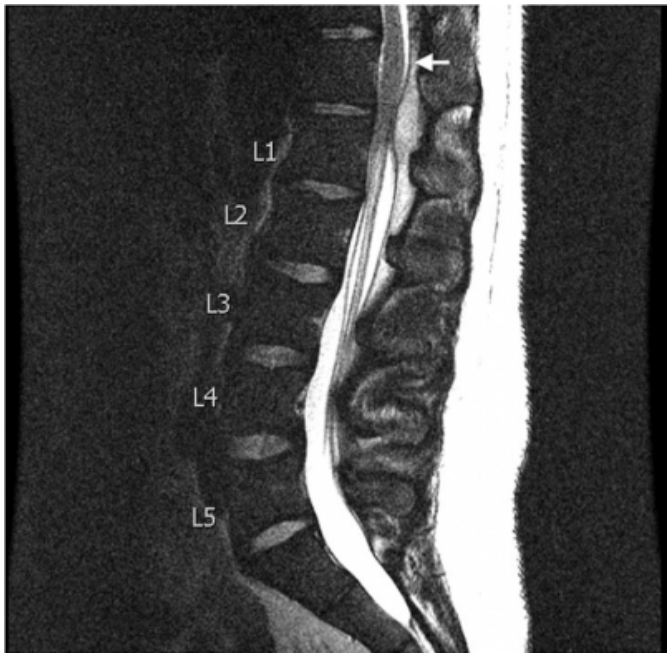
MATERIALS AND METHODS

Case 1:

A 22 year-old male presented to the emergency room with acute low back pain. On exam, he was neurologically intact except for decreased perianal sensation, mild urinary retention, and bilateral positive straight leg raise. MRI of the thoracic and lumbar spine was equivocal for an epidural mass at the thoracolumbar junction (Fig 1).

Figure 1

Pre-operative T2 sagittal MRI demonstrating an epidural mass (arrow) at T12 extending down to L1-2 in patient 1



Case 2:

A 24year-old male was lifting weights when he experienced sudden-onset severe back pain and leg weakness. Neurological exam was intact except for bilateral positive straight leg raise with paresthesia and urinary incontinence. An MRI of the spine was obtained in the emergency room and revealed an L4-L5 epidural mass (Fig 2a).

Figure 2a

Pre-operative T2 sagittal MRI demonstrating an epidural mass (arrow) extending from L3-4 to L5-S1 in patient 2

Surgery

Each patient was positioned prone on a Wilson frame table. C-arm fluoroscopy was used to localize the affected vertebral level in the anteroposterior and lateral planes. The spinous process was palpated to define midline. A 2cm transverse incision was made 2.5-3.5cm lateral to midline. The fascia was penetrated to accommodate the dilating rods over which the METRx tube was fitted. The METRx tube was then positioned onto the lamina (Fig 3) and fixed to the articulating arm, which was connected to the contralateral bedrail. Periosteal dissection was performed to expose the spinous process, the lamina, and the medial third of the facet joint, providing access for the laminectomy and the partial facetectomy. The operative corridor can easily be adjusted either superiorly and inferiorly to access one level rostral and caudal or lateral and medial enabling access to the spinous process, the lamina, and facet joint (Fig 4).

Figure 3

The METRx tube positioned on the lamina provides an operative corridor for the laminectomy

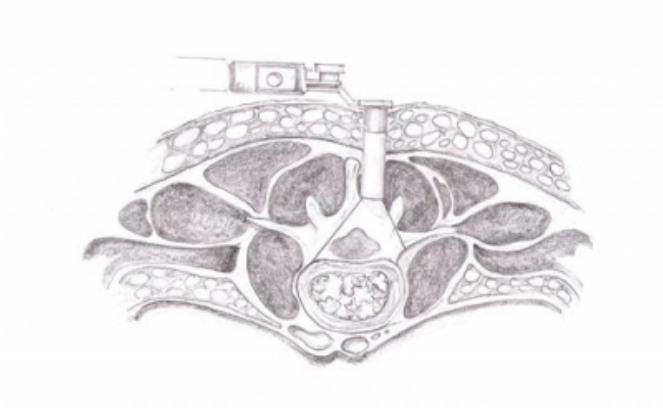
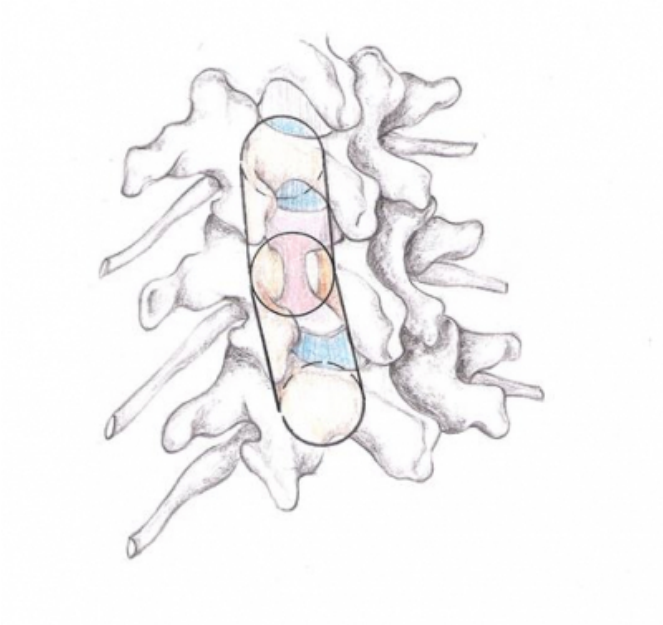


Figure 4

The METRx tube enables visualization of vertebral levels superior and inferior relative to the operative level



RESULTS

In case 1, a laminotomy, partial laminectomy, and medial facetectomy were performed at T12-L1 with drainage of the epidural abscess. In case 2, a hemilaminotomy with a partial laminectomy was performed at L4-L5 with evacuation of the epidural lesion (Fig 2b). Complete decompression was achieved without any complications in both cases. Pathology evaluation confirmed the presence of methicillin-resistant staphylococcus in case 1 and intervertebral disk in case 2. Duration of surgery in case 1 was 45 minutes and there was 25cc estimated blood loss (EBL). Case 2 lasted 1 hour and had 30cc EBL. Post-operatively, the patients were placed on 12 hours of hydromorphone patient-controlled analgesia and later transitioned to oral narcotics.Both patients were ambulating on post-operative day 1 without any lower extremity weakness and were discharged home on the following day. At the three-month follow-up clinic visit, both patients were neurologically intact, without pain, had well-healed 2cm surgical incisions, and had returned to full activity.

Figure 2b

Post-operative T2 sagittal MRI of patient 2 shows evacuation of mass

DISCUSSION

Indications for this procedure include patients with a compressive mass lesion in the thoracic and lumbar spine spanning no more than three vertebral levels. Contraindications for using this technique include a compressive lesion spanning more than three vertebral levels and severe rotatory scoliosis [1,4].

Several advantages of this procedure compared to an open approach are decreased trauma to the paraspinal muscles at the surgical site and preservation of the posterior tension band, thereby avoiding spinal destabilization [2,3,4]. Additionally, the operative time is reduced and up to three vertebral segments can be decompressed from one small 2cm incision.

Certain limitations with this technique are decreased operative visibility, restricted access to the contralateral side, and a smaller operative corridor that makes it difficult to correct potential intra-operative complications such as a CSF leak or extensive bleeding [1,2].

We have found this surgical procedure to be a safe and reliable technique for emergently decompressing epidural masses in the thoracic and lumbar spine. Both of the patients were able to return to their prior level of activity. Follow-up at three months showed a well-healed 2 cm surgical incision without any neurological deficits.

CONCLUSION

Minimally invasive techniques are seldom considered a viable option for emergent decompression of the thoracic and lumbar spine. We describe a minimally invasive approach for emergent epidural mass decompression in the thoracic and lumbar spine as a safe and effective alternative to open surgery. It possesses the benefits of a minimally invasive procedure, with improvements in pain and function scales along with a quicker recovery time without compromising the objectives of the intended surgery. It should be emphasized that we do not recommend using this technique in an emergent situation until the surgeon is comfortable with the method in an elective setting.

References

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