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Case Report

Widespread spontaneous spinal epidural hematoma treated with a combined technique using a flexible neuroendoscope after hemilaminectomy: A case report

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ABSTRACT

Background: One-third of spinal epidural hematomas occur spontaneously, and these may be associated with the acute onset of severe paralysis. Here, we present a case of T4-L4 symptomatic spontaneous spinal epidural hematoma which was successfully removed using a flexible neuroendoscope after hemilaminectomy.

Case Description: Using flexible neuroendoscopy, we successfully treated a T4-L4 spinal epidural hematoma in an 89-year-old Japanese female who spontaneously developed back pain and paraparesis. The hematoma was removed utilizing a hemilaminectomy at three vertebral levels (T11, T12, and L1), while the remaining hematoma debris was completely evacuated with flexible neuroendoscopy. Neurological improvement was observed immediately postsurgery.

Conclusion: Flexible neuroendoscopy provided a less extensive surgical method for removing a T4-L4 spontaneous epidural hematoma.

Keywords: Flexible neuroendoscopy, Hemilaminectomy, Spinal epidural hematoma, Spinal surgery

INTRODUCTION

The incidence of spinal epidural hematomas is 0.1/100,000.[5,9] Known causes include minor trauma, surgery, idiopathic puncture of the epidural space, hypertension, and coagulopathies.[4,6,7] Those with spontaneous spinal epidural hematomas (SSEHs) experiencing back pain alone may be treated conservatively, while those with acute neurological deficits often require emergent spinal decompression. Surgery typically involves decompressive hemilaminectomy/laminectomy that may result in postoperative spinal instability, requiring additional spinal fusion.[4] Here, we utilized a flexible endoscopy after just three focal hemilaminectomies (T11, T12, and L1) to remove/decompress a T4-L4 SSEH.

CASE DESCRIPTION

History and diagnosis

An 89-year-old Japanese female developed the spontaneous onset of back pain and paraparesis (i.e., motor weakness, hyperreflexia, and sensory loss). Magnetic resonance imaging (MRI)

revealed a dorsal epidural hematoma from T4 to L4 [Figure 1].

Surgical strategy and treatment

We performed a hemilaminectomy at the T11, T12, and L1 levels and removed/debrided additional intervening hematoma using a flexible neuroendoscope. The flexible neuroendoscope had an outer diameter of 5 mm [Figure 2]. Before insertion into the epidural space, the length that the device could remove the clot was marked on the endoscope. A continuous irrigating system was connected to the endoscope that was used, with intermittent manual aspiration and a rigid syringe, to remove clots/debris. During irrigation, the hematoma was cleared, the dura mater was visible on the lower side of the scope screen, and the epidural fat was visible on the upper side.

Postoperative course

Immediately after surgery, the patient exhibited some neurological recovery. The postoperative MRI showed no residual hematoma [Figure 3]. The drainage was removed 2 days later. Three weeks postoperatively, she showed only mild residual paresis in the left leg. Four months after surgery, the numbness in the left leg persisted, but she was stable enough to walk.

DISCUSSION

Typically, patients with SSEH require rapid decompression to treat significant spinal cord/cauda equina compression and avert permanent neurological deficits.[2,6,8,10] Conventional procedures typically include multilevel hemilaminectomies/laminectomies increasing the risk of postoperative spinal instability. In the Ali *et al*. series, they successfully removed a T11 to L5 postoperative spinal epidural hematoma that developed immediately following an L3-L4 diskectomy; a drain was blindly inserted into the epidural space from the same surgical field without performing additional intervertebral resection.[1]

A Few Hemilaminectomies and a flexible neuroendoscope to remove extensive SSEH

Here, we performed hemilaminectomies at three spinal levels through which we introduced a flexible neuroendoscope to remove/debride/suction epidural clots [Figure 4]. We found two reports that described the similar use of full endoscopic removal of SSEHs at one vertebral level. We identified several other studies that utilized biportal endoscopic to remove multilevel SSEH[3,6,11] [Table 1]. The advantages of the flexible

Table 1: Summary of the treatment for spinal epidural hematoma with endoscopes.

Author	Year	Age	Sex	Localization level of epidural hematomas	Type of endoscope
Cheng *et al*.[3]	2014	63	Male	L5-S1	Rigid
Wu *et al*.[11]	2016	26	Male	L4	Rigid
Kim and Jung[6]	2019	63	Male	L2-L4	Rigid
Present case		89	Female	T4-L4	Flexible

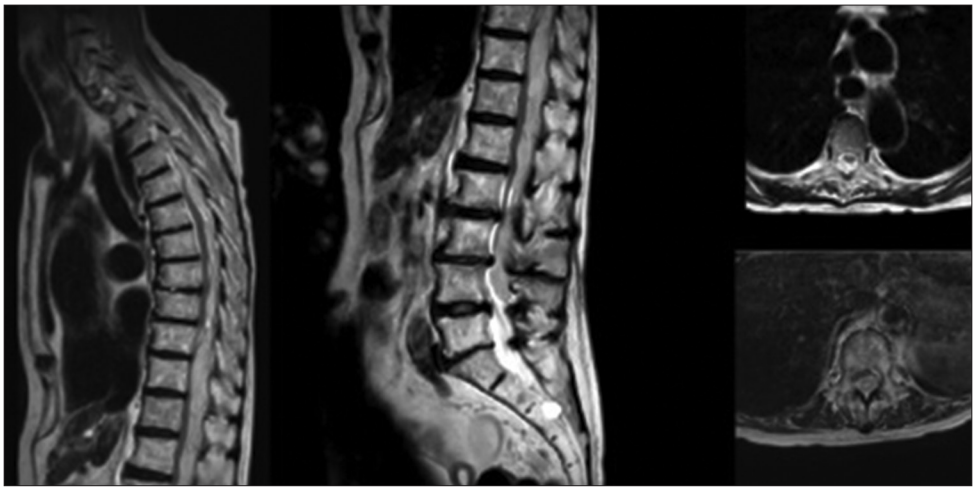

Figure 1: T2-weighted magnetic resonance imaging of the thoracolumbar spine with epidural hematoma from T4 to L4 vertebrae. The hematoma was the thickest at the T12 level (12 mm). Contrast-enhanced computed tomography detected no source of bleeding. This was a symptomatic multi-vertebral spinal epidural hematoma requiring emergency surgery. This was explained to the patient who provided informed consent for surgery.

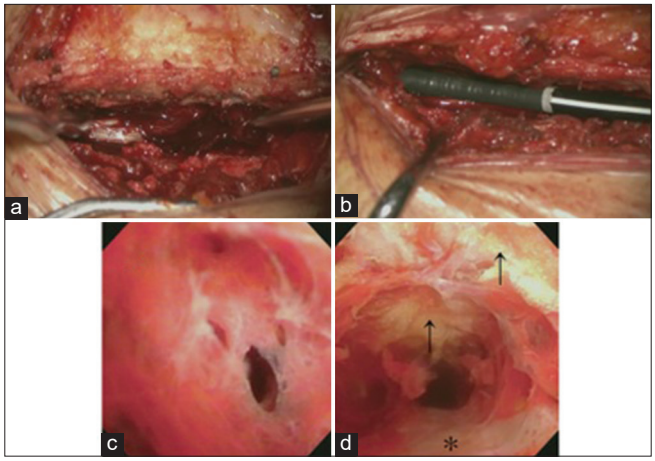

Figure 2: Intraoperative views (a) After left hemilaminectomy, the epidural hematoma is suctioned, and the dura mater is located. (b) A flexible neuroendoscope is inserted from the hematoma removal cavity. (c) A hematoma is present in front of the neuroendoscope. (d) After removal of the hematoma, the hematoma is cleared, the dura mater (asterisk) is visible on the lower side of the scope's screen, and the epidural fat (black arrow) is visible on the upper side.

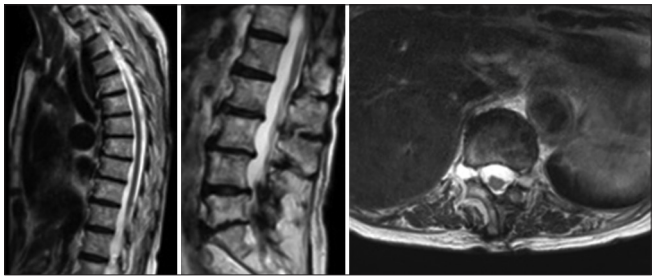

Figure 3: T2-weighted magnetic resonance imaging at 1 week postoperatively.

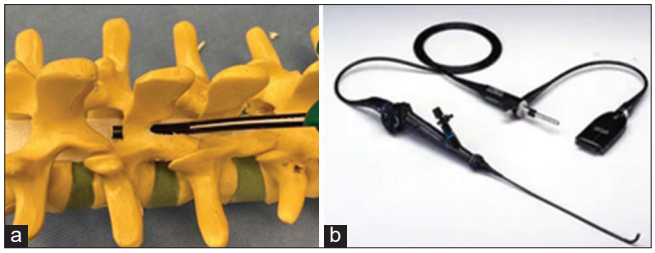

Figure 4: Simulation using a model and a neuroendoscope. (a) The method of a flexible neuroendoscope surgery using a real scale model of the spine. (b) A flexible neuroendoscope (VEF-V; Olympus Corporation, Tokyo, Japan).

neuroendoscope included that it was safer and easier to manipulate in the epidural space, particularly when threaded between multiple levels, and helped minimize the risks of inadvertently compressing the spinal cord (i.e., this pressure potentially increases if the hematoma is thicker than 5 mm). This approach could reduce surgical invasiveness compared to conventional procedures, proving particularly useful for widespread hematoma. Given that a flexible endoscope can reach narrow areas and allow continuous irrigation from its tip, it could allow effective cleaning and removal of both epidural abscesses and epidural hematomas.

CONCLUSION

We describe the successful removal of a spontaneous T4-L4 epidural hematoma utilizing a three-level hemilaminectomy (T11, T12, and L1), through which we could introduce a flexible neuroendoscope.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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