




Iatrogenic Acute Spinal Epidural Hematoma in Children

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Abstract

Spinal epidural hematoma (SEH) is a relatively rare spine space occupying lesion with approximated incidence of 0.1 per 100,000. SEH can be acute or chronic, spontaneous, posttraumatic, or iatrogenic following lumbar puncture (LP) or spine surgery. In this study, we present the case of a 12-year-old girl with a history of leukemia who was referred to us with acute progressive paraparesis and urinary retention following LP that was performed for intrathecal chemotherapy injection. Magnetic resonance imaging revealed SEH opposite the T10–T12 level. Emergency laminectomy and hematoma evacuation were performed. SEH can be a potentially devastating lesion that can result in progressive neurological deficits and permanent disability if it is not diagnosed early and treated properly. Immediate surgical decompression and hematoma evacuation can preserve the neurological function and insure favorable clinical recovery.

Keywords

- ▶ children
- ▶ intrathecal chemotherapy
- ▶ lumbar puncture
- ▶ spinal epidural hematoma
- ▶ paraparesis

Introduction

Spinal epidural hematoma (SEH) refers to a collection of blood in the potential space located between the dura and the walls of the vertebral canal. SEH is a relatively rare spinal disorder that can develop spontaneously without recognizable etiology or secondary to trauma, lumbar puncture (LP), or spine surgery.¹

Patients always present with back pain and variable degrees of lower limb weakness up to complete paraplegia. The clinical diagnosis is best confirmed using magnetic resonance imaging (MRI).² Urgent decompression through laminectomy and hematoma evacuation is mandatory to preserve the neurological function.³

Case Report

History and Clinical Data

A 12-year-old girl with a known history of leukemia was admitted to the pediatric department for intrathecal

chemotherapy injection through LP. The patient had a previous history of multiple LP procedures for intrathecal injection. During the last LP procedure, the patient was uncooperative and the procedure was quite difficult where multiple trials with the lumbar needle were attempted.

Within the first hour after LP, the patient developed acute onset of back pain, and radicular lower limb pain with mild lower limb heaviness. The condition was rapidly progressive, and after 4 hours, the patient was unable to walk and was referred to the neurosurgical team for evaluation and management.

Based on the visual analog scale (VAS) score, the severity of pain was 10. Motor power was grade 1 on both lower limbs with urinary retention. All types of sensations were markedly decreased below the level of the umbilicus. This case was categorized as incomplete injury.

Laboratory tests showed the following: hemoglobin% of 10.6 mg/dL, blood sugar was 120 mg/dL, prothrombin time was 12.8 seconds, partial thromboplastin time was 32 seconds, and international normalized ratio was 1.2.

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Imaging

Urgent MRI of the thoracic and lumbar spine was immediately done, which revealed a posterior convex lesion compressing the spinal cord from T10 to T12 (→Fig. 1). The lesion was isointense on T1-weighted sequence and hyperintense on T2-weighted sequence with heterogeneity inside, which was suggestive of an epidural hematoma.

Treatment

A loading dose of methylprednisolone was started. The patient was shifted to the operating room after consent from her father. A midline partial laminectomy from T10 to T12 was performed and the hematoma was evacuated with suction and irrigation (→Fig. 2). There were no active

bleeders. Careful hemostasis was performed, and the wound was closed with subfacial drain.

Postoperative Course

The patient was maintained on corticosteroid therapy. Physical therapy was started on the second postoperative day. Postoperative MRI was done on the second postoperative day, which showed total hematoma evacuation (→Fig. 3). The drain was removed 48 hours after surgery.

Back and lower limb pain was significantly reduced (VAS score of 3) and motor power was slowly improving. On the 10th postoperative day, the motor power reached grade 4 on the left and grade 3 on the right lower limb. Two weeks after surgery, the sutures were removed and she was discharged home in a stage of walking with mild support but was still catheterized.

Follow-Up

The patient had regular visits in the outpatient clinic every 2 weeks. In the first follow-up (1 month after surgery), the pain had completely resolved (VAS score of 0). The patient was walking without support and she was satisfied with the outcome. Examination revealed grade 4+ motor power on both lower limbs. In the last follow-up (2 months after surgery), the patient had regained full motor power in both lower limbs.

Discussion

SEH is a relatively rare spinal space occupying lesion that can be acute or chronic, spontaneous, posttraumatic, or iatrogenic.⁴ Spontaneous SEH usually has unclear pathogenesis; bleeding may have a venous origin because of the lack of valves in the epidural network; however, other theories suggest arterial bleeding. Spontaneous SEH can arise secondary to rupture of the epidural vein, epidural artery, or vascular malformation.^{5,6}

Iatrogenic SEH is a serious complication following spine surgery with an estimated incidence of 0.1 to 3.0%.^{7,8} LP is a quite common medical procedure done for various indications. However, direct trauma caused by LP needle may result in serious complications such as spinal hematomas and cerebrospinal fluid leak.¹

Following LP, hemorrhage may develop at the site of needle insertion or at a site slightly distal and less frequently anywhere in the epidural, subdural, or subarachnoid spaces.^{9,10} Coagulopathy may have a significant correlation with poor neurological outcome following LP.¹¹ Svelato et al³ stated that SEH must always be taken into consideration as a complication of epidural anesthesia whenever neurological symptoms develop.

SEH is a potentially reversible pressure lesion compressing both the spinal cord and nerve roots. Thus, it requires early diagnosis and prompt treatment.⁴ The most common presentation of SEH is acute onset pain and radicular symptoms.¹² Neurological deficits including weakness, paresis, bladder dysfunction, and sensory deficit

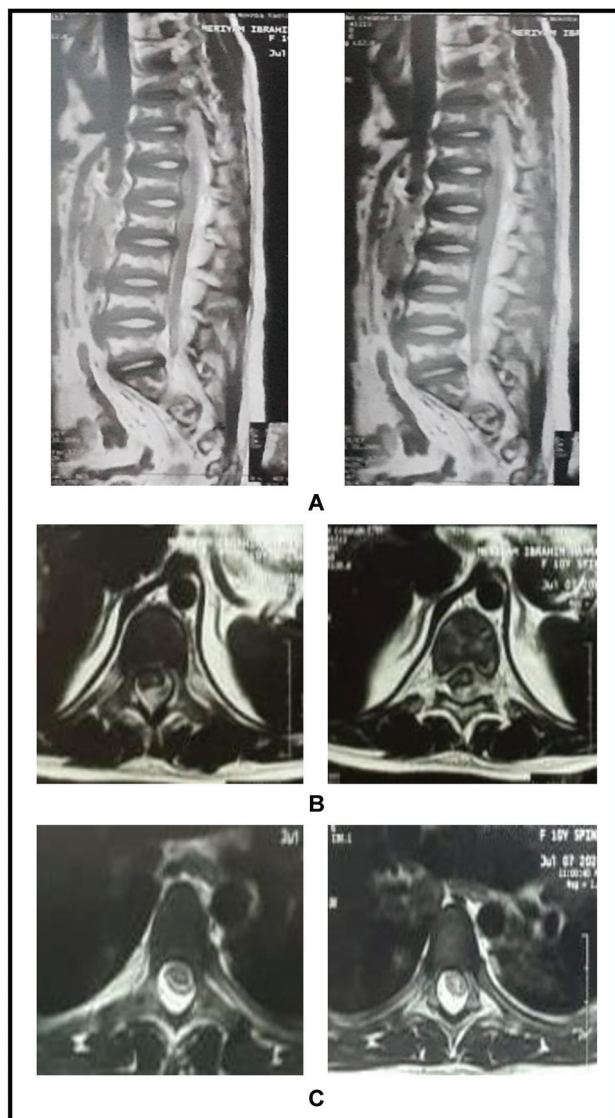


Fig. 1 Preoperative magnetic resonance imaging (MRI) of the thoracic and lumbar spine. (A) Sagittal T2-weighted MRI of the thoracic and lumbar spine demonstrating a posterior convex lesion (spinal epidural hematoma) compressing the spinal cord from T10 to T12. (B) Axial T1-weighted sequence showing that the lesion was isointense. (C) Axial T2-weighted sequence showing that the lesion is hyperintense with heterogeneity inside.

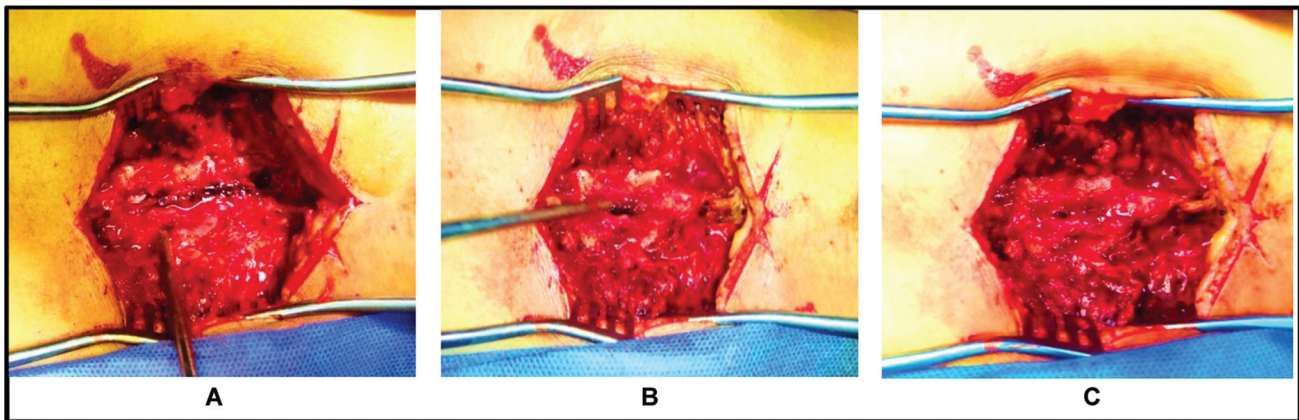


Fig. 2 Intraoperative photographs. (A) Limited laminectomy was performed extending from T10 to T12. The epidural hematoma was exposed where it was compressing the spinal cord. (B) Evacuation of the hematoma using suction and irrigation. (C) Total removal of the hematoma with decompressed spinal cord.

depend on the level and size of the hematoma.¹³ MRI scan can demonstrate a biconvex hematoma in the epidural space with well-defined borders tapering up and down.¹⁴

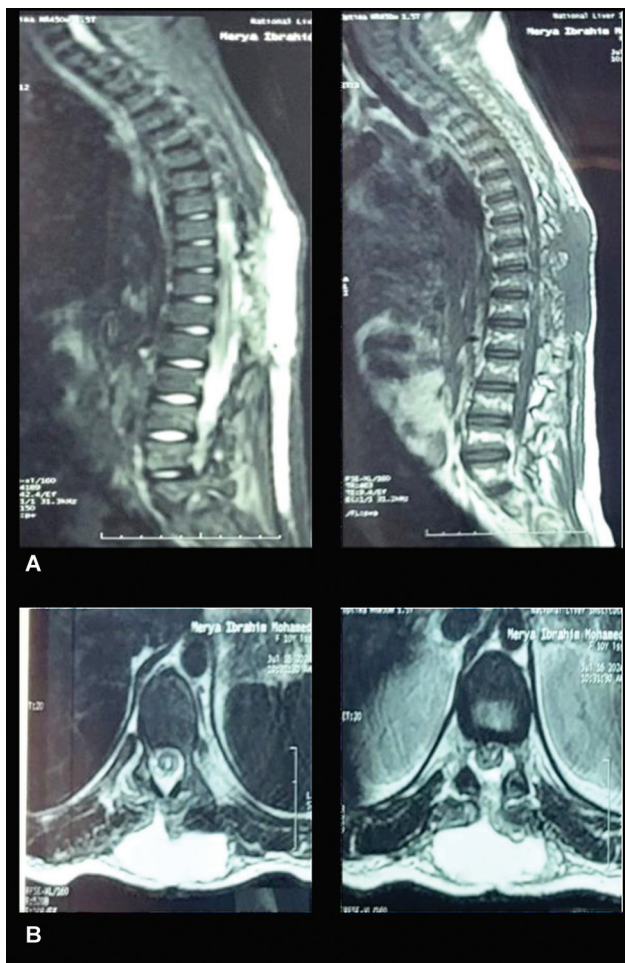


Fig. 3 Postoperative magnetic resonance imaging of the thoracic and lumbar spine. (A) Sagittal T1- and T2-weighted images and (B) axial T2-weighted images showing complete evacuation of the hematoma. There was a small seromatous collection that was gradually subsided without intervention.

Notably, spontaneous recovery without surgical intervention was reported in some cases with spontaneous SEH. Nonsurgical treatment can be offered only in the cases showing early improvement in their neurologic deficits or in those with significant coagulopathy disorder.¹⁵

Surgical decompression is the predominant treatment in the cases with sizable hematoma and in those with progressive neurological deficits.¹⁴ The duration from LP to onset of symptoms and that from symptom onset to treatment can be considered the main predictive factors for functional recovery.¹¹ Cases diagnosed later than the first 72 hours rarely exhibit clinical improvement.⁶

Conclusion

Despite being a rare complication following LP, SEH can be a potentially devastating lesion that can result in progressive neurological deficits and permanent disability if it is not diagnosed early and treated properly. Urgent MRI scan should be performed in patients who develop neurologic symptoms following LP. Immediate surgical decompression and hematoma evacuation can preserve the neurological function and insure favorable clinical recovery.

Patients' Consent

Informed consent was taken from the patient's father who agreed for participation and publication.

Funding

None.

Conflict of Interest

None declared.

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