

Case Series

Two rare cases of idiopathic spontaneous extra-axial spinal hematoma

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ABSTRACT

Spinal hematoma is a rare condition but can cause significant spinal injury and resultant morbidity. Magnetic resonance imaging (MRI) is the gold standard of radiological investigation and is often an emergency indication for imaging. Early diagnosis is crucial for treatment and better patient outcome. Herein, we report two cases of rare idiopathic spontaneous extra-axial hematoma highlighting the role of MRI in the diagnosis.

Keywords: Extra-axial spinal hematoma, Laminectomy, Spontaneous spinal epidural hematoma, Spontaneous spinal subdural hematoma

INTRODUCTION

Radiologic evaluation is an essential component for the diagnosis of spinal hematomas, which is often a diagnostic dilemma. The spinal hematomas can be classified based on the anatomical location as follows: Epidural, subdural, subarachnoid, and intramedullary (spinal cord) hematomas.^[1] Among these subtypes, spontaneous epidural and subdural spinal hematoma are rare and differentiating them is a diagnostic challenge. Often unique radiologic signs can be used to distinguish these types of spinal hemorrhage. Understanding the imaging anatomy of spinal compartments and imaging characteristics of different stages of spinal compartments is essential for the confident imaging diagnosis of spinal hematomas and to identify the correct location.^[1,2] Magnetic resonance imaging (MRI) is preferred imaging modality of choice to correctly diagnose the location and stages of the hematoma.^[1]

CASE 1

A 59-year-old male presented to emergency room with chief complaints of weakness and numbness in all limbs for the past 3 days. He had a history of fever a week ago following which he developed sudden weakness. There is no history of recent trauma, weight loss, infection, or neck/back pain and any anticoagulant use or significant past/surgical history. He is recently diagnosed with uncontrolled diabetes mellitus (DM). On examination: Cranial nerves - intact; vitals - stable; temperature - afebrile; neurological examination showed sensory loss below T4 dermatome; and motor examination: Bilateral lower limb - 0/5; right biceps - 3/5 and other muscles - 2/5; and left biceps - 2/5 and other muscles - 0/5; deep tendon reflex: Absent. The laboratory examination of the patient was normal, prothrombin time-international normalized

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ratio (PT-INR): 1.07, activated partial thromboplastin time (APTT): 25.5, and platelet count: 2,34,000. The patient was referred to MRI for further evaluation.

Imaging findings

T1-weighted (T1W) and T2-weighted (T2W) sagittal sections of cervical spine show a well-defined hyperintense extra-axial lesion at C4-5 vertebral level [Figure 1]. T2/short-tau inversion recovery hyperintensities noted in cervical spinal cord, suggestive of cord edema [Figure 1]. T1 FAT-SAT (FS) sagittal section of cervical spine shows hyperintense extra-axial lesion of size (0.7 × 0.9 cm) with no demonstrable contrast enhancement on T1FS+c [Figure 1]. T2 gradient axial section shows areas of blooming within the lesion [Figure 1]. From the above imaging findings, the diagnosis of spinal epidural hematoma (SEH) was made. The patient underwent emergency decompression: Laminectomy was done and epidural hematoma was confirmed pre-operatively followed by evacuation.

CASE 2

A 65-year-old male presented with chief complaints of bilateral lower limb weakness and difficulty in walking with pain for 3 days. There is no history of trauma or fever. This is not a known case of DM or hypertension. On examination: Conscious and oriented and cranial nerves – intact, vitals – stable, and temperature - afebrile; neurological examination: Bilateral lower limbs - 3/5 and plantar and extensor reflexes - absent; it is worth to mention that he had a history of bilateral spontaneous intracranial non-traumatic idiopathic subdural hemorrhage for which craniotomy was done, 1 year back. The laboratory examination of the patient was normal, PT-INR: 1.08, APTT: 30.3, platelet count: 3,05,000. The patient was referred to MRI for further evaluation.

Imaging findings

T1W and T2W sagittal sections of whole spine show long segment extra-axial hyperintensity extending from D6 to

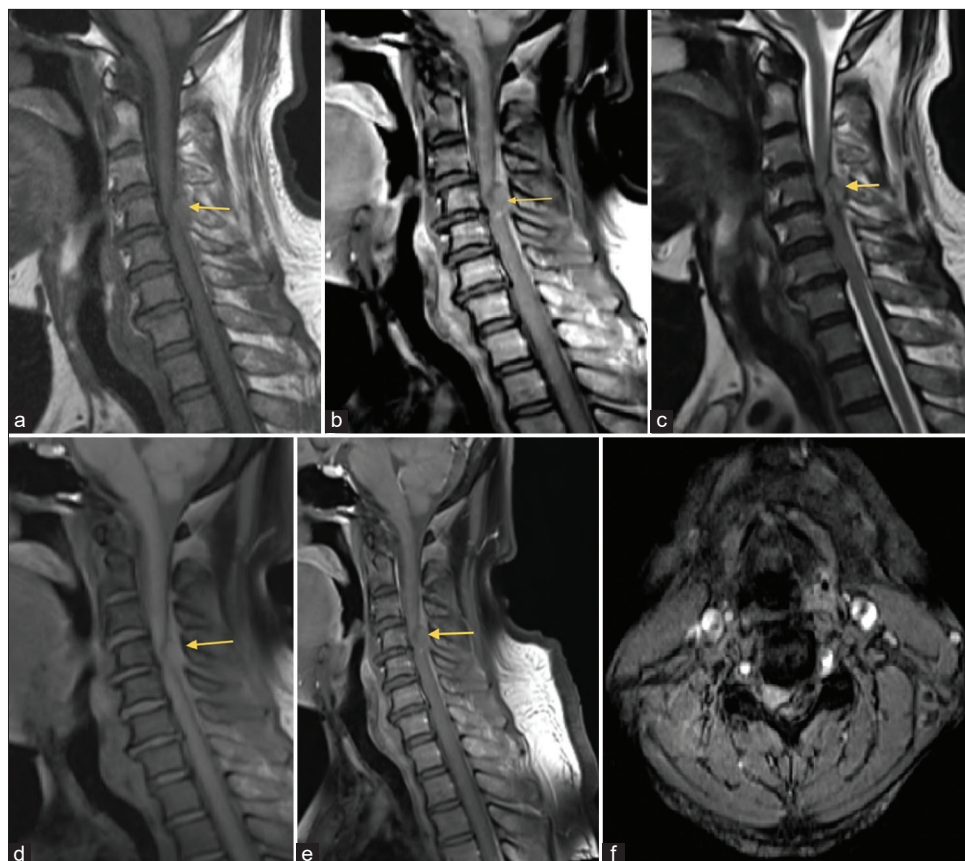


Figure 1: T1-weighted (T1W) (a) and T2-weighted (T2W) (b) sagittal sections of cervical spine show a well-defined hyperintense extra-axial lesion at C4-5 vertebral level. T2W (c) sagittal section shows hyperintensities in cervical spinal cord suggestive of cord edema. T1 FAT-SAT (d) sagittal section of cervical spine shows hyperintense extra-axial lesion of size (0.7 × 0.9 cm). T1FS+c (e) shows no demonstrable post contrast enhancement. T2 gradient (f) axial shows areas of blooming within the lesion.

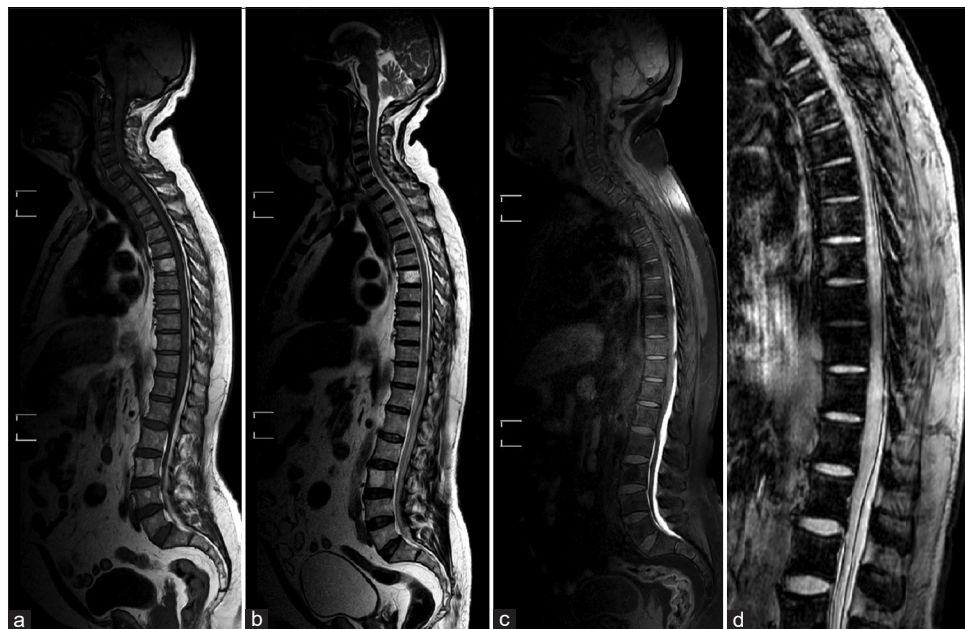


Figure 2: T1-weighted (a) and T2-weighted (b) sagittal sections of whole spine show long segment extra-axial hyperintensity extending from D6 to L5 vertebral levels. T1 FAT-SAT (c) sagittal section of whole spine shows no demonstrable signal suppression. T2 gradient (d) sagittal section shows peripheral hypointense hemosiderin rim.

L5 vertebral levels [Figure 2]. T1 FS sagittal section of whole spine shows no demonstrable signal suppression [Figure 2]. T2 gradient sagittal section shows peripheral hypointense hemosiderin rim [Figure 2]. There is no suspicious lesion or abnormal signal intensity in spinal cord. The diagnosis of spinal extra-axial subdural hematoma was made. The patient underwent emergency decompressive surgery: Laminectomy and durotomy were done with evacuation of the subdural hematoma.

DISCUSSION

The spinal cord is covered by three layers of meninges and the extra-axial anatomical spaces are divided into subarachnoid, subdural, and epidural compartments.^[1] The three layers of meninges are pia, arachnoid, and dura from inner to outer aspect of spinal cord.^[1] There are no bridging veins in subdural space unlike epidural space, and hence, hemorrhage in the later compartment is more common and it is the reversal in case of brain.^[1]

Spontaneous SEH is a rare condition (0.1/100,000 patients/year) and spinal subdural hematoma (SSH) is still more uncommon.^[2,3] The first case of epidural hematoma was reported in 1869 by Jackson, and he termed it as a “case of spinal apoplexy.” Although various causes of SEH include, anticoagulant therapy, coagulopathies, vascular malformations, tumors, pregnancy, and Paget’s disease; more than 40–50% cases are idiopathic and commonly seen at cervicothoracic region.^[3]

Spontaneous SSH is extremely rare, representing only ~4.1% of all intraspinal hematomas.^[4] Most cases are idiopathic like SEH and more common in lower thoracic region.^[4] The clinical manifestation is common for either condition, which is progressive motor weakness. In addition, 50% of patients will refer an intense spear-like pain in SSH at the site of hemorrhage.^[4] MRI is the imaging modality of choice in the diagnosis of spinal hematomas.^[2,4]

Ageing of hematoma can be classified as follows: Hyper acute (<12 h), acute (12–72 h), subacute (3 days–2 weeks), and chronic (>2 weeks).^[4] Accordingly, the signal intensity varies in MRI with respect to different stages of hematoma.^[4-6] At hyper-acute stage, the hematoma is isointense on T1- and hyperintense on T2-weighted images (T2-WI), compared to spinal cord. In acute early subacute stages, the hematoma shows heterogeneous signal intensity with hyperintense areas on T1- and T2-WI. At late subacute stage, the hemorrhage is hyperintense on both T1- and T2-WI. In chronic phase, the hematoma is hypointense on both T1- and T2-WI.^[5]

In addition, MR can localize the compartment of the hemorrhage by identification of the dura.^[7-9] The “inverted Mercedes-Benz sign” is a very useful sign, if present, to differentiate SSH from SEH. It is seen on the axial image at the level of the denticulate ligaments, with a pair of denticulate ligaments and the dorsal septum constitutes the three radiating spikes of the sign, while the SSH

expands and fills the three loculations in-between.^[8,9] The SEH causes ventral displacement of dura, which is seen as hypointense curvilinear rim on sagittal T1- and T2-WI. The “cup sign” caused by epidural fat displacement is another characteristic finding, useful in differentiating SEH from SSH.^[10]

DIFFERENTIATING FEATURES

Subdural vs epidural spinal hematoma - Differentiating features [Table 1].

Epidural spinal hematoma	Subdural spinal hematoma
Relatively more common (0.1/100,000 patients per year)	Extremely rare (4.1% of all intraspinal hematomas)
Site: Occurs outside the dura with inward displacement of dura	Site: Occurs within the dura with outward displacement of dura
The inner contour of epidural hematoma is usually smooth	The inner contour of a subdural hematoma is irregular
Epidural fat displacement	Epidural fat is preserved
Cup sign	Inverted Mercedes-Benz sign

CONCLUSION

Early decompressive surgery results in favorable prognosis. The neurologic recovery after surgery varies with the severity of the pre-operative impairment and the interval between presentation and operation. Hence, the accurate diagnosis and timely intervention are crucial.^[11] Laminectomy with evacuation of hematoma would be sufficient in epidural hematoma, while additional durotomy is required in subdural hemorrhage.

TEACHING POINTS

1. MRI plays an important role in the diagnosis and differentiation of extra-axial spinal hematoma.
2. Early diagnosis is crucial as it requires immediate surgical intervention to avoid permanent neurological deficits.

MCQs

1. Cup sign is present in which of the spinal hematoma's
 - a. Epidural hematoma
 - b. Subdural hematoma
 - c. Subarachnoid hematoma
 - d. None of the above

Answer Key: a

2. Inverted Mercedes-Benz sign is present in which of the spinal hematoma's

- a. Epidural hematoma
- b. Subdural hematoma
- c. Subarachnoid hematoma
- d. None of the above

Answer Key: b

3. All are features of epidural spinal hematoma except
 - a. Outward displacement of dura
 - b. Smooth inner contour
 - c. Cup sign
 - d. Preserved epidural fat

Answer Key: d

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Declaration of patient consent

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Conflicts of interest

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

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