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Spontaneous Spinal Epidural Hematomas: Case Series with Review of Literature

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ABSTRACT
Spontaneous spinal epidural hematoma (EDH) is a relatively rare condition that requires urgent diagnosis and management. Such patients typically present with acute and severe back pain and spinal cord or caudaequina compression. Risk factors include coagulopathy, anticoagulation, vascular anomalies, inter vertebral disk herniation, Paget disease of bone, Valsalva maneuver and hypertension. Differential diagnosis includes an acute herniated inter vertebral disc, acute ischemia of the spinal cord, epidural tumor or abscess, spondylitis, transverse myelitis, or even a dissecting aortic aneurysm and acute myocardial infarction.An observational study was conducted in the Department of Radiodiagnosis, SKIMS Srinagar to study the clinical features, imaging features and treatment outcomes of spontaneous spinal epidural hematomas.This study shows that MR Imaging is a very sensitive and specific modality for diagnosis of spontaneous epidural hematomas. Also early management in the form of early decompressive laminectomy and hematoma evacuation is helpful in preventing permanent neuro deficit.
Keywords: *Epidural hematoma, MRI, Spinal epidural space.*

INTRODUCTION

Spontaneous spinal epidural hematoma (EDH) is a relatively rare condition that requires urgent diagnosis and management [(1-4)]. Such patients typically present with acute and severe back pain and rapidly developing signs of spinal cord or caudaequina compression [(5)].

Such spontaneous spinal EDHs have been attributed most commonly to a venous source [(5-7)]. Some of the risk factors include coagulopathy, anticoagulation, vascular anomalies, inter vertebral disk herniation, Paget disease of bone, Valsalva maneuver, and, in some cases, hypertension [(1,5,8-13)].

MATERIALS AND METHODS

The study was conducted in the Department of Radiodiagnosis, SKIMS Srinagar. Seven patients were included in the study and MR Imaging was done using Siemens Magnetom Avanto 1.5 Tesla scanner (Siemens Medical Systems, Germany).

Clinical profile

Four of our patients were male and three female (M:F ratio 1.3:1). The age of the patients ranged from 19 to 74 years with a mean age of 49 years. Two of our patients had risk factors for hemorrhage, both were on antiplatelet drugs. Three of our patients had back pain, while four of them presented with weakness (three with paraparesis and two with quadriparesis). One patient presented with an additional complaint of altered sensorium (from a concomitant cerebral SDH). The time that elapsed from symptom onset to imaging varied from 18 hours to 216 hours (9 days), with an average time of 109 hours (4.5 days). Two of our patients had extradural hematomas in cervical region, three in dorsal and one in lumbar region. One patient had a dorsolumbar hematoma. The mass effect of the hematoma in the form cord compression and myelopathy (T2W and STIR hyperintensity) was mild, moderate or severe in two patients each. Two patients were managed conservatively while the rest five underwent laminectomy for decompression and hematoma evacuation. One patient who had a concomitant spontaneous cerebral SDH also underwent burrhole drainage of the same. Post-operative follow up showed improvement in the presenting clinical symptoms of most patients, complete resolution in four, minimal residual weakness in one, moderate residual weakness in one while one patient expired in the immediate post-operative period.

IMAGING FEATURES

The imaging sequences used in our patients were saggital and axial T1W, T2W images of the involved regions. Additional sequences in saggital plane were acquired in selected cases (STIR, Fat suppressed T1W, post contrast T1W FS).

The signal characteristics of the hematomas varied as a function of time from symptom onset to imaging, consistent with the signal characteristics of blood degradation products at different stages.

Hematomas in two patients were characterized as hyperacute based on their isointense signal on T1WI and mixed to hyperintense on T2WI. Both these patients were imaged in less than 24 hours from symptom onset. Two of the patients had early subacute hematomas characterized by hyperintense signal on T1WI and hypointensity on T2WI. The time from symptom onset to imaging varied from 2 to 3 days in these two patients. Three patients had late subacute hematomas which were characterized by hyperintense signal on both T1W and T2W images.

Table. No 1 Clinical features

Case number	Time from symptom onset	Extent	Imaging Features							
			T1W		T2W		Rad stage	Gd+	Others	Cord compression
			Periphery	Centre	Periphery	Centre				
1	3 days	D3-D10	↑	↔	↓	↓	Early subacute	NA	T1WFS↑	+
2	18 hours	C5-C7	↔	↔	↑↓	↑↓	Hyperacute	NA	NA	+++
3	24 hours	D6-D9	↔	↔	↑	↑	Hyperacute	NA	NA	++
4	8 days	D6-L5	↑	↑	↑	↑	Late subacute	No enhancement	Brain SDH+	+
5	2 days	C4-T1	↑	↑	↓	↓	Early subacute	NA	NA	+++
6	9 days	D10-L1	↑	↑	↑	↑	Late subacute	NA	NA	++
7	8 days	L2-L5	↑	↑	↑	↑	Late subacute	NA	NA	-

Table. No 2 Imaging features

Case number	Age/Sex	Risk Factors	Clinical Features	Treatment	Clinical outcome
1	45/F	None	Back pain	Conservative	Pain resolved
2	62/M	None	Quadriparesis	Laminectomy	Minimal residual deficit
3	19/M	None	Back pain, lower limb weakness	Laminectomy	No residual deficit
4	64/M	Coagulopathy	Altered sensorium, Lower limb weakness	Laminectomy+burr hole drainage of cerebral SDH	Expired
5	74/M	None	Quadriparesis	Laminectomy	Moderate residual deficit
6	35/F	None	Paraparesis	Laminectomy	No residual deficit
7	44/F	Coagulopathy	LBA	Conservative	Pain resolved

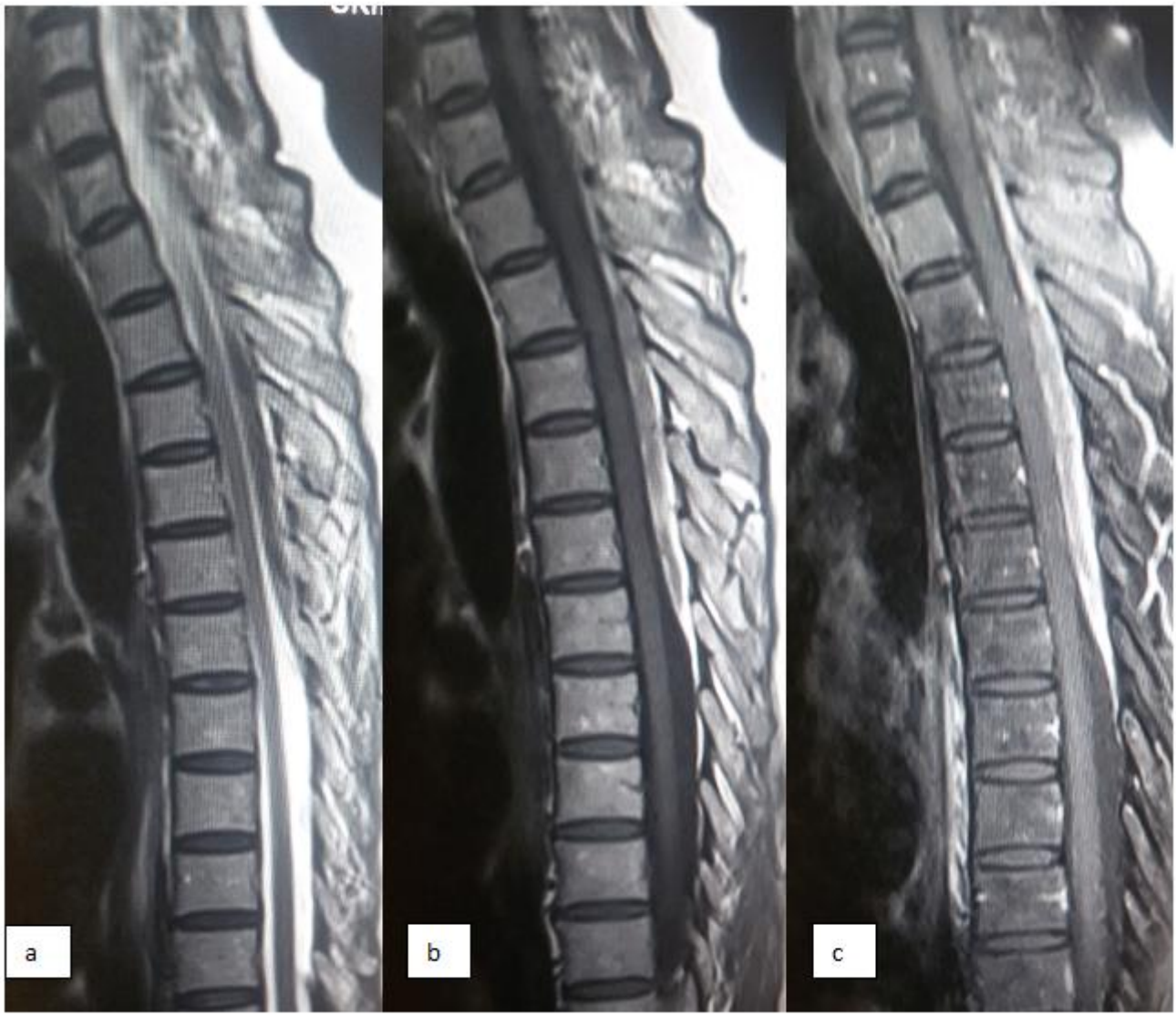

Figure 1: Sagittal T2-weighted (a), T1-weighted (b) and fat saturated T1-weighted (c) MR Images in a patient with spontaneous spinal epidural hematoma involving the dorsal epidural space. No significant cord compression is seen.

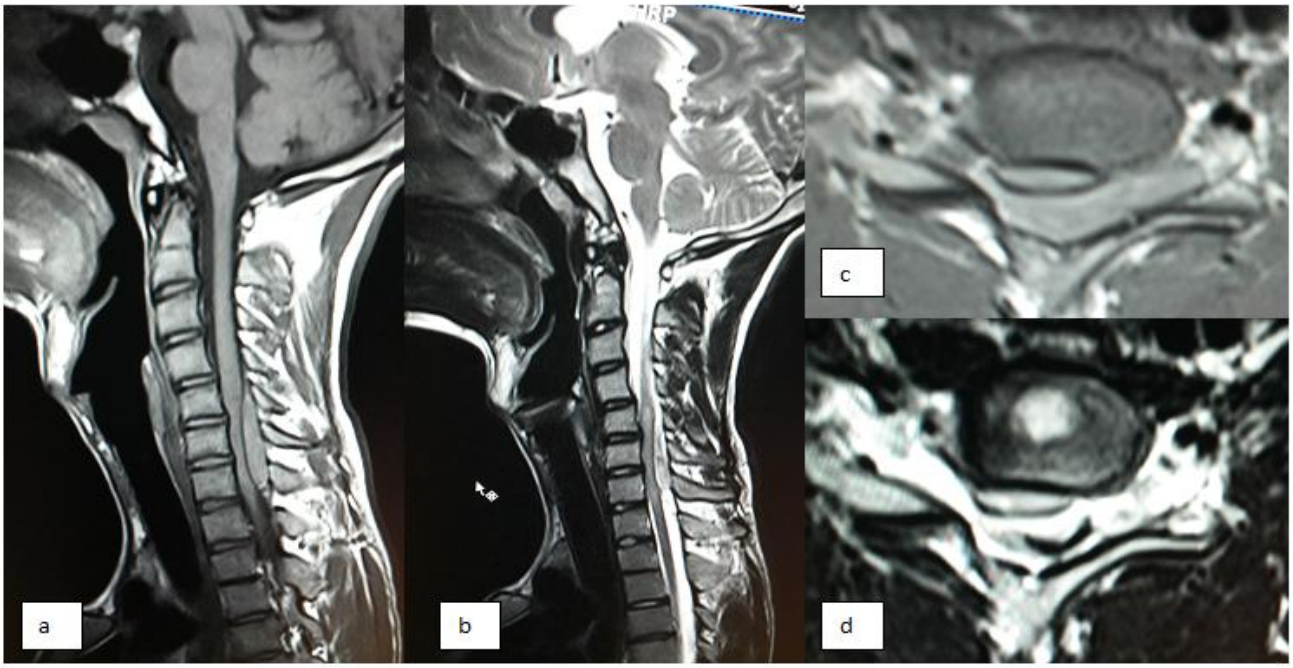

Figure 2: SaggitalT1-weighted (a), T2-weighted (b), axial T1-weighted (c) and axial T2-weighted (d) images show a small cervical epidural hematoma causing moderate cord compression and T2-weighted cord hyperintensity suggestive of cord edema.

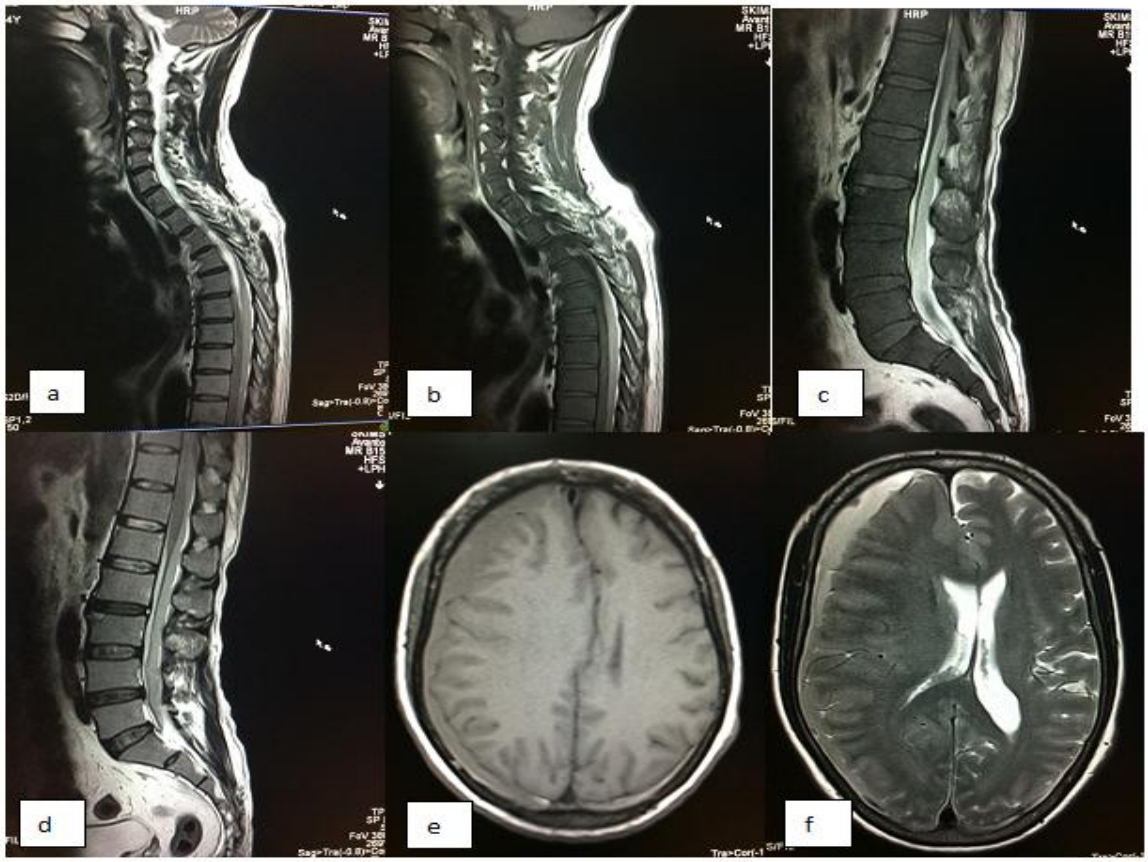

Figure 3: Spontaneous spinal EDH in a patient with coagulopathy. Sagittal T2-weighted (a), T1-weighted (b) images of the cervical spine and saggital T2-weighted (c) and T1-weighted (d) images of lumbar spine show an extensive subacute hematoma in dorsolumbar region. The patient also had a spontaneous concomitant brain SDH as seen on T2W (e) and T1W (f) axial images of brain.

DISCUSSION

Spontaneous spinal epidural hematoma (SSEH) is a relatively rare disease. Its incidence as estimated by Holtas et al was 0.1 per 100,000 people [14].

Epidemiology

Spontaneous spinal epidural hematomas are most frequent in the fourth or fifth decade of life [15]. Its occurrence has been noted in all age groups, however it is a very rarely encountered in children. There are only about 30 pediatric cases of SSEH documented in the medical literature. The male/female ratio is 1.4 : 17 [16,17].

Etiology

Many known precipitating factors, include systemic therapeutic anticoagulant for a variety of diseases, thrombolysis for acute myocardial infarction, vascular malformation, hemophilia B, factor XI deficiency, long-term antiplatelet drug use [18, 19].

The origin of these SEDHs has been a point of debate. Most investigators suggest that SSEHs originate from the epidural venous plexus in the spinal epidural space because of the absence of venous valves. Therefore the fluctuating pressure from the thoracic and abdominal cavities can influence it directly [15,20,21]. Few authors have suggested that spinal epidural arteries may be a source of hemorrhage [19].

Clinical features

The two most frequent locations of a spontaneous spinal epidural hematoma is the cervicothoracic region, followed by thoracolumbar region [15, 22].

Usually, patients present with sudden onset and stabbing neck or back pain which leads to paraparesis or quadriparesis, depending on the level of the hematoma [23]. Symptoms in children may include s of irritability, and occasionally urinary retention [16]. In high cervical region, SSEHs could represent a potentially fatal condition from spinal shock [14].

Imaging

At present, MRI is considered as the imaging modality of choice for SSEH as has been documented by many authors [28-32]. The advantages include information about the extent and nature of the hematoma, degree of cord compression. It is also very helpful in guiding treatment, because of its non-invasive nature and lack of ionizing radiation and examinations can be repeated often in those being managed conservatively [1].

Characteristic features at MR imaging is a biconvex hematomas in the epidural space showing well-defined borders that taper superiorly and inferiorly. Subacute hematomas show characteristic high signal intensity on T1-weighted images [33]. A CT scan should be obtained if MRI is unavailable [21].

Gundry and Heithoff[10] in a series of 18 surgically confirmed cases of lumbar EDH, described the signal characteristics of spinal EDH after an average of 169 days on T2WI but did not discuss T1-weighted imaging signal characteristics. Subacute and chronic spinal EDH have usually been described as hyperintense[1, 11, 12, 30, 31, 34, 35, 36, 37], and less often as isointense[1, 31, 34], to the spinal cord on T1-weighted images.

In a series of three cases of spontaneous spinal EDH within 48 and 72 hours, Rothfus et al [31] described the MR signal characteristics. Findings on T1-weighted images were described as hyperintense in one, isointense in one, and heterogeneous in one.

Holtas et al [1] studied 13 patients of spinal EDH at 0.3 and 1.5 T and reported their signal characteristics as isointense on T1- weighted images in only two of six cases imaged within 2 days after symptoms onset. The authors suggested that T1 weighted MR images were most valuable because of the signal shift from isointensity with the cord in the early period to hyperintensity in the intermediate stage.

Fukui et al reported the signal characteristics of acute spinal EDH. They observed focal hypointense foci within the primarily hyperintense extra axial collection on T2- weighted spin-echo or gradient-echo images. These could represent deoxyhem-oglobin or the fibrous septa attaching the dura to the bony spinal canal. They concluded that T2-weighted pulse sequences added important diagnostic information at the time of presentation of spinal EDH when characteristic hyperintensity is usually lacking on T1-weighted images [38].

Differential diagnosis

The differential diagnosis of spontaneous spinal epidural hematoma includes an acute herniated intervertebral disc, acute ischemia of the spinal cord, epidural tumor or abscess, spondylitis, transverse myelitis, or even a dissecting aortic aneurysm and acute myocardial infarction [39].

Management

Early surgical treatment is usual for spontaneous spinal epidural hematomas[40]. Decompressive laminectomy and hematoma removal is usually done. The dura should be opened to exclude a subdural hematoma in case the exact location of the hematoma is uncertain on imaging. It is recommended that the surgery should be performed within 48 hours of the onset of the initial symptoms if the neurodeficit is incomplete. If neuro deficit is complete, the surgery should be performed within 36 hours [20]. It has been recommended by many authors that early decompressive surgery should be performed before interference with blood supply to the cord occurs and in such cases the prognosis is favorable [2-4]. There are increasing reports describing the resolution of spinal EDH with nonoperative management [1,9,30,35,41,42,43]. Conservative treatment has been employed only when neurological deficits improved in the early phase or with the coexistence of coagulopathy [17]. In patients with coagulopathy, multilevel epidural hematomas are difficult to treat surgically [27]. These patients may not make a complete functional recovery, but there are no associated surgical risks [17].

CONCLUSIONS

This study shows that MR Imaging is a very sensitive and specific modality for diagnosis of spontaneous epidural hematomas. Also early management in the form of early decompressive laminectomy and hematoma evacuation is helpful in preventing permanent neuro deficit.

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