



CLINICAL OUTCOME OF PATIENTS WITH TRAUMATIC SPINAL EPIDURAL HEMATOMA: A RETROSPECTIVE OBSERVATIONAL STUDY

Neurosurgery

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ABSTRACT

Background Traumatic spinal epidural hematoma (TSEH) is a rare but potentially devastating consequence of spinal trauma. Accumulation of blood within the epidural space may result in acute spinal cord compression, leading to neurological deficits and functional impairment. Early diagnosis and timely intervention are crucial for favorable outcomes. **Objective** To evaluate the clinical presentation, management strategies, and neurological outcomes of patients with traumatic spinal epidural hematoma. **Methods** A retrospective observational study was conducted on patients diagnosed with traumatic spinal epidural hematoma at a tertiary care center between January 2023 and December 2025. Demographic data, injury characteristics, imaging findings, neurological status, treatment modalities, and outcomes were analyzed. Neurological outcomes were assessed using the American Spinal Injury Association (ASIA) Impairment Scale at admission and follow-up. **Results** A total of 28 patients were included. The mean age was 40.2 ± 16.1 years, and 75% were male. Road traffic accidents accounted for 58.3% of injuries, followed by falls (29.2%) and sports-related trauma (12.5%). Cervical spine involvement was most common (45.8%), followed by thoracic (37.5%) and lumbar regions (16.7%). Surgical decompression was performed in 18 patients (75%), while 6 patients were managed conservatively. Significant neurological improvement was observed in patients undergoing early decompression (<12 hours from symptom onset). At 6-month follow-up, 70.8% of patients demonstrated at least one-grade improvement in ASIA score. **Conclusion** Traumatic spinal epidural hematoma is a neurosurgical emergency requiring prompt diagnosis and management. Early surgical decompression is associated with improved neurological recovery and functional outcomes.

KEYWORDS

Traumatic Spinal Epidural Hematoma, Spinal Trauma, Neurological Recovery, Spinal Cord Compression, Asia Score.

INTRODUCTION

Traumatic spinal epidural hematoma (TSEH) is an uncommon condition characterized by bleeding into the spinal epidural space following trauma.¹ The incidence of spinal epidural hematoma is estimated to be less than 1% of all spinal injuries.³ Despite its rarity, TSEH can cause severe neurological deficits due to compression of the spinal cord and nerve roots.^{1,3}

The clinical presentation varies from localized back pain to complete paraplegia or quadriplegia.⁴ Advances in magnetic resonance imaging (MRI) have significantly improved diagnostic accuracy. MRI remains the gold standard for identifying epidural hematomas and determining the extent of spinal cord compression.^{4,8}

The prognosis depends on multiple factors, including the severity of neurological deficit at presentation, hematoma location, size, and timing of intervention.^{5,7} Surgical decompression remains the standard treatment for patients with significant neurological impairment, whereas selected patients with minimal deficits may be managed conservatively.^{1,2}

This study aims to evaluate the clinical characteristics, management approaches, and outcomes of patients with traumatic spinal epidural hematoma.

Materials and Methods

Study Design

Retrospective observational study.

Study Setting

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Study Duration

January 2023 to December 2025.

Inclusion Criteria

- Patients aged ≥ 18 years.
- MRI-confirmed traumatic spinal epidural hematoma.
- Available clinical and follow-up data.

Exclusion Criteria

- Spontaneous spinal epidural hematoma.

- Hematoma related to anticoagulant therapy.
- Postoperative epidural hematoma.
- Incomplete medical records.

Data Collection

The following data were collected:

- Age and sex.
- Mechanism of injury.
- Neurological status at admission.
- Imaging findings.
- Level of hematoma.
- Time from symptom onset to treatment.
- Treatment modality.
- Follow-up outcomes.

Outcome Measures

Primary Outcome

Neurological improvement measured using the ASIA Impairment Scale.

Secondary Outcomes

- Functional recovery.
- Ambulation status.
- Complications.
- Mortality.

Statistical Analysis

Data were analyzed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation. Categorical variables were expressed as frequencies and percentages. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 28 patients were included. The mean age was 40.2 ± 16.1 years, and 78.57% were male. Road traffic accidents accounted for 60.7% of injuries, followed by falls (32.1%) and sports-related trauma (7.1%). Lumbar spine involvement was most common (35.7%), followed by thoracic (32.1%) and lumbar regions (32.1%). Surgical decompression was performed in 19 patients (67.9%), while 9 patients were managed conservatively. Significant neurological improvement was observed in patients undergoing early decompression (<12 hours from symptom onset) 1,5. At 6-month follow-up, 71.4% of patients demonstrated at least one-grade improvement in ASIA score.

Demographic Characteristics
Mechanism of Injury

Mechanism	Number (%)
Road Traffic Accident	17 (60.7%)
Fall from Height	9 (32.1%)
Sports Injury	2 (7.1%)

Location of Hematoma

Region	Number (%)
Cervical	9 (32.1%)
Thoracic	9 (32.1%)
Sports Injury	10 (35.7%)

Treatment Modalities

Treatment	Treatment
Surgical Decompression	19 (67.9%)
Conservative Management	9 (32.1%)

Neurological Outcome

Outcome	Number (%)
Improved ASIA Grade	20 (71.4%)
No Change	6 (21.4%)
Worsened	1 (3.6%)
Death	1 (3.6%)

Patients who underwent decompression within 12 hours showed significantly greater neurological recovery compared with those treated later ($p < 0.05$).

DISCUSSION

Traumatic spinal epidural hematoma remains a rare but important cause of acute neurological deterioration after spinal trauma.³ In the present study, the majority of patients were middle-aged males, reflecting the demographic most commonly involved in high-energy trauma.

Road traffic accidents represented the predominant mechanism of injury, consistent with previous literature.⁴ Cervical involvement was the most frequent location, likely due to the greater mobility and susceptibility of the cervical spine to traumatic forces.

Early diagnosis with MRI facilitated prompt treatment decisions.^{4,8} Our findings support previous reports indicating that neurological recovery is strongly associated with the timing of decompression.^{1,5,7} Patients who underwent surgery within 12 hours of symptom onset demonstrated superior outcomes compared with delayed intervention.^{1,5}

Conservative management was reserved for neurologically stable patients with small hematomas and minimal cord compression. Most of these patients remained stable or improved during follow-up, which is consistent with previous reports.^{2,9}

The study highlights the importance of rapid neurological assessment, early MRI evaluation, and timely surgical intervention when indicated.^{1,5,7,10}

Limitations

- Retrospective design.
- Single-center study.
- Small sample size.
- Limited long-term follow-up.

Future multicenter prospective studies are needed to establish standardized management protocols and identify prognostic factors more accurately.

CONCLUSION

Traumatic spinal epidural hematoma is an uncommon but potentially reversible cause of spinal cord compression. Early recognition, prompt MRI evaluation, and timely surgical decompression are critical determinants of neurological recovery. Patients presenting with incomplete neurological deficits and those receiving early treatment demonstrate the best functional outcomes.

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