Medicolegal Cases for Spinal Epidural Hematoma and Spinal Epidural Abscess

KEISHA L. FRENCH, BS; ELDRA W. DANIELS, MD; URI M. AHN, MD; NICHOLAS U. AHN, MD

Educational Objectives

As a result of reading this article, physicians should be able to:

1. Diagnose spinal epidural hematoma and spinal epidural abscess.
2. Outline the most common neurological deficits that occur from a spinal epidural hematoma or spinal epidural abscess.
3. Identify indications for a good or poor prognosis.
4. Minimize adverse outcomes for the provider.

Abstract

Spinal epidural hematoma and spinal epidural abscess are rare surgical emergencies resulting in significant neurologic deficits. Making the diagnosis for spinal epidural hematoma and spinal epidural abscess can be challenging; however, a delay in recognition and treatment can be devastating. The objective of this retrospective analysis study was to identify risk factors for an adverse outcome for the provider.

From SUNY Upstate Medical University (KLF), Syracuse, New York; the Department of Orthopaedic Surgery (KLF, EWD, UMA, NUA), University Hospitals Case Medical Center, Case Western Reserve University School of Medicine, Cleveland, Ohio; the Department of Surgery (EWD), Marshall University, Huntington, West Virginia; and New Hampshire Spine Institute (UMA), Bedford, New Hampshire.

The material presented in any Vindico Medical Education continuing education activity does not necessarily reflect the views and opinions of ORTHOPEDICS or Vindico Medical Education. Neither ORTHOPEDICS nor Vindico Medical Education nor the authors endorse or recommend any techniques, commercial products, or manufacturers. The authors may discuss the use of materials and/or products that have not yet been approved by the US Food and Drug Administration. All readers and continuing education participants should verify all information before treating patients or using any product.

The authors thank Ms Nina McLaughlin and Leslie Henry for their help with researching and acquiring the current cases, and the Timothy L. Stephens Jr, MD, Fellowship Program for developing and implementing an extraordinary curriculum.

Correspondence should be addressed to: Nicholas U. Ahn, MD, Department of Orthopaedic Surgery, University Hospitals Case Medical Center, Case Western Reserve University, 11100 Euclid Ave, Cleveland, OH 44106 (nicolas.ahn@uhhospitals.org), doi: 10.3928/01477447-20121217-09
Spinal epidural abscess can occur by 3 mechanisms: hematogenous spread, extension of neighboring infected structures, and iatrogenic inoculation. Comorbidities such as diabetes mellitus, alcoholism, infection, or human immunodeficiency virus increase a patient’s susceptibility to spinal epidural abscess. The most common agent is Staphylococcus aureus. Clinical features may include spinal pain, fever, and limb weakness. The pathophysiology for spinal epidural hematoma is unclear; however, it is commonly described as internal rupture of the Batson vertebral venous plexus. This disease can occur spontaneously or with minor trauma, such as lumbar puncture or epidural anesthesia.

Both disease processes are rare, but their incidence is increasing due to the aging population, the increase of spinal procedures performed, and the number of patients with acquired immunodeficiency syndrome. In 1975, Baker et al reported an annual incidence of 0.2 to 2 cases per 10,000 hospital admissions. Delayed or misdiagnosed spinal epidural hematoma or spinal epidural abscess can lead to litigation. The Canadian Medical Protective Association reported 33 cases of spinal epidural abscess between 1996 to 2006 resulting in civil legal or regulatory action. In the current study, medical negligence resulting in litigation was due to failure to diagnosis spinal epidural hematoma or spinal epidural abscess; failure to complete a thorough physical examination, including a digital rectal examination; failure to obtain appropriate imaging studies; failure or delay in consulting a specialist; and failure to maintain a sterile field. The early clinical signs and symptoms of spinal epidural hematoma or spinal epidural abscess can be associated with a broad differential; therefore, it is important to maintain a high level of suspicion. Treatment within a 48-hour time frame indicates a higher probability for a good prognosis but does not guarantee that permanent neurologic deficits will not occur.

Medical literature in the United States has not addressed the medicolegal malpractice process involving spinal epidural hematoma or spinal epidural abscess in comparing individual factors that directly correlate with an adverse verdict for the provider. The purpose of this study was to determine whether neurologic outcomes, initial neurologic presentation, location of injury, specialty consult, time to imaging, or time to surgical intervention correlates to adverse decisions in medicolegal cases of spinal epidural hematoma or spinal epidural abscess.

### Materials and Methods

The LexisNexis Academic legal search database was used to identify 42 state and federal cases of spinal epidural hematoma and spinal epidural abscess. LexisNexis Academic is a database that compiles primary and secondary source material in the forms of laws, statues, and law reviews. It offers information on US Supreme Court decisions from January 1790 to the present, all federal laws from 1988 to the present, and state laws from 1970 to the present.
<table>
<thead>
<tr>
<th>Patient</th>
<th>Initial Presentation</th>
<th>Initial Setting</th>
<th>Region</th>
<th>Postop</th>
<th>Time to Surgery</th>
<th>Time to Consult</th>
<th>Time to Imaging</th>
<th>Rectal Exam</th>
<th>Specialty</th>
<th>Outcome</th>
<th>Complaint</th>
<th>Verdict ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/33</td>
<td>Swelling of neck with pain</td>
<td>OC</td>
<td>C</td>
<td>Yes</td>
<td>&lt;30 d</td>
<td>30 d</td>
<td>30 d</td>
<td>No</td>
<td>NS</td>
<td>#</td>
<td>Failed to diagnosis and treat in timely fashion</td>
<td>D</td>
</tr>
<tr>
<td>M/12</td>
<td>Neck pain, chills, limited use of UE and LE</td>
<td>ER</td>
<td>C</td>
<td>No</td>
<td>20 d</td>
<td>4 d</td>
<td>19 d</td>
<td>No</td>
<td>ID</td>
<td>#</td>
<td>Failed to diagnosis and treat in timely fashion</td>
<td>D</td>
</tr>
<tr>
<td>M/14</td>
<td>Numbness and weakness in LE</td>
<td>RR</td>
<td>C</td>
<td>Yes</td>
<td>&lt;24 h</td>
<td>&lt;24 h</td>
<td>&lt;24 h</td>
<td>No</td>
<td>#</td>
<td>UE weakness</td>
<td>Failed to diagnosis</td>
<td>D</td>
</tr>
<tr>
<td>M/12</td>
<td>Lower back pain radiating to right buttock and thigh</td>
<td>OC</td>
<td>L</td>
<td>Yes</td>
<td>#</td>
<td>10 d</td>
<td>No</td>
<td>No</td>
<td>Anesth</td>
<td>#</td>
<td>Failed to perform a good epidural injection and maintain a sterile field</td>
<td>D</td>
</tr>
<tr>
<td>M/12</td>
<td>Severe back pain and fever</td>
<td>ER</td>
<td>T</td>
<td>No</td>
<td>&gt;30 d</td>
<td>23 d</td>
<td>34 d</td>
<td>No</td>
<td>Urology</td>
<td>Permanent paralysis from mid-waist level down</td>
<td>Failed to diagnose and treat appropriately</td>
<td>P (819,000)</td>
</tr>
<tr>
<td>M/12</td>
<td>Back and leg pain</td>
<td>RR</td>
<td>L</td>
<td>Yes</td>
<td>19 hr</td>
<td>5 hr</td>
<td>18 hr</td>
<td>No</td>
<td>NS</td>
<td>Permanent neurological damage</td>
<td>Inadequately informed of the risks; Failed to examine and diagnose in a timely fashion; Delay in imaging studies</td>
<td>D</td>
</tr>
<tr>
<td>Patient Sex/Age, y</td>
<td>Initial Presentation</td>
<td>Initial Setting</td>
<td>Region</td>
<td>Postop</td>
<td>Time to Surgery</td>
<td>Time to Consult</td>
<td>Time to Imaging</td>
<td>Rectal Exam</td>
<td>Specialty</td>
<td>Outcome</td>
<td>Complaint</td>
<td>Verdict ($)</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
<td>----------------</td>
<td>--------</td>
<td>--------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-------------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>M/49</td>
<td>Chest pain and weakness in the legs</td>
<td>OC</td>
<td>C</td>
<td>Yes</td>
<td>&lt;24 h</td>
<td>&lt;24 h</td>
<td>&lt;24 h</td>
<td>No</td>
<td>Neuro</td>
<td>#</td>
<td>Failed to diagnose and treat in timely fashion, used improper drugs</td>
<td>D</td>
</tr>
<tr>
<td>F/#</td>
<td>Left hip pain</td>
<td>OC</td>
<td>L</td>
<td>Yes</td>
<td>11 d</td>
<td>No</td>
<td>8 d</td>
<td>No</td>
<td>#</td>
<td>Transferred to rehab facility</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>M/49</td>
<td>Diabetic ketoacidosis</td>
<td>ER</td>
<td>L</td>
<td>No</td>
<td>24 h</td>
<td>10 h</td>
<td>20 h</td>
<td>No</td>
<td>#</td>
<td>Permanent LE paralysis</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>M/49</td>
<td>Difficulty with urinating and bowel movements</td>
<td>ER</td>
<td>T</td>
<td>No</td>
<td>9 d</td>
<td>9 d</td>
<td>No</td>
<td>No</td>
<td>#</td>
<td>Paraplegia</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>F/23</td>
<td>Legs felt numb and heavy</td>
<td>ER</td>
<td>L</td>
<td>Yes</td>
<td>30 h</td>
<td>29 h</td>
<td>No</td>
<td>NS</td>
<td>Lumbar pain</td>
<td>Failed to diagnose and treat appropriately</td>
<td>P (125,000)</td>
<td></td>
</tr>
<tr>
<td>F/49</td>
<td>Low back pain</td>
<td>ER</td>
<td>L</td>
<td>No</td>
<td>60 d</td>
<td>&lt;24 h</td>
<td>&lt;24 h</td>
<td>No</td>
<td>Pain manag</td>
<td>Chronic low back pain</td>
<td>Failed to diagnose and treat appropriately</td>
<td>D</td>
</tr>
</tbody>
</table>

Abbreviations: #, data unknown; anesth, anesthesia; C, cervical; D, defendant; ER, emergency room; Exam, examination; ID, infectious disease; L, lumbar; LE, lower extremity; manag, management; NS, neurosurgeon; OC, outpatient clinic; Ortho, orthopedic surgeon; P, plaintiff; Postop, postoperative; rehab, rehabilitation; Rheum, rheumatology; RR, recovery room; T, thoracic; UE, upper extremity.

*Symptoms experienced at initial visit.

**Neurological deficits identified at first time postoperatively.

***Whether rectal examination was performed on initial presentation.

**Table 2 (Continued)**

**Table 2 (Continued)**

**Complete List of Reviewed Cases**

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.

A total of 19 cases were reviewed and analyzed. Linear regression analysis showed no significant correlation between loss of function and an adverse verdict for the defendant (ie, provider) (P = .268). Thirteen (68%) of 19 cases demonstrated loss of function ranging from temporary to permanent. No significant difference was found in the initial presentation and an adverse verdict (P = .268). Of 19 cases, 14 (74%) presented with symptoms experienced at initial visit.
escalating pain, 5 (26%) with weakness, and 3 (16%) with bowel or bladder dysfunction. Spinal injury was differentiated into cervical, thoracic, and lumbar regions, with 6 (32%), 4 (21%), and 9 (47%) lesions documented, respectively. No significant relationship was found between individual spinal lesion or grouping of all cord lesions in comparison to adverse verdict ($P = .907$ and .720, respectively). Specialists who consulted for the cases included orthopedic surgeons, neurosurgeons, and others (rheumatology, pain management, anesthesiology, urology, and infectious disease). The majority of patients presented to the emergency department (58%) or outpatient clinic (32%). No significant correlation was found between the setting of the initial presentation or specialty consultant and an adverse verdict ($P = .878$ and .568, respectively).

The only statistically significant risk factor influencing litigation decisions was a time to surgery greater than 48 hours ($P = .013$). The 4 cases in favor of the plaintiff had an average of 33.5 days to surgery (range, 30 hours to 73 days). However, 6 cases found in favor of the defendant had an average of 18.9 days to surgery (range, 6 to 60 days). Of these 6 cases, 3 were won by the defendant due to statute of limitations and 3 sided with the defendant for lack of evidence or inappropriate documentation.

**Discussion**

Spinal epidural hematoma and spinal epidural abscess are medical emergencies that require prompt diagnosis, appropriate imaging, and referral to qualified spinal surgeon for further assessment. As reported in this study, the time frame for action is restricted to 48 hours. Physicians should not rely on neurological deficits seen on initial presentation to solidify a diagnosis of spinal epidural hematoma or spinal epidural abscess. Only 42% of the cases reviewed presented with neurological impairments, but 74% of the patients presented with pain. To heighten physician awareness regarding spinal epidural hematoma and spinal epidural abscess, the Canadian Medical Protective Association established a broad list of guidelines to assist with the diagnosis:

1. patients presenting with back pain and unexplained fever;
2. symptoms associated with intravenous drug abuse, diabetes mellitus, recent spinal surgery or spinal anesthesia, or recent bactereemia;
3. facilitate timely diagnosis and treatment with magnetic resonance imaging or computed tomography scan, neurological consultation, and admission to hospital. Once diagnosis is confirmed, arrange for urgent neurosurgical or orthopedic consultation. Other recognizable clinical features include fever, spinal pain or tenderness, radiating root pain, and limb weakness.

In this study, location of the spinal lesion was not an indicating factor in the medicolegal verdict. However, it could prove to be beneficial diagnostically. Only 20% of spinal lesions occur anterior to the spinal cord and are more frequently associated with vertebral osteomyelitis. This would present with more systemic clinical features compared with posterior spinal lesions of the thoracic and lumbosacral region. In the cases reviewed, the majority of spinal lesions were located at the cervical and lumbosacral region, which differs from previous literature. The loss of function varied between the cases presented and the various spinal cord lesions.

It is important to note that most of the individuals who initially presented to a medical professional were seen in the emergency department (58%) or outpatient setting (32%). Therefore, it is important for all medical professionals to maintain a high level of suspicion and act quickly. The most important factor for prognosis and litigation outcomes is diagnosis and treat the patient within 48 hours. Patients who were misdiagnosed or were not offered treatment within 48 hours of onset of symptoms won their litigations 100% of the time. The only instance in which the defendant was exempted from an adverse verdict is when the patient or family did not file a lawsuit within an appropriate amount of time or failed to present accurate documentation of evidence.

It is apparent that the legal system is not interested in the loss of function, temporary or permanent neurological deficit acquired, or lack of physical examination performed (rectal examinations were not performed in any case). The only influential factor is the ability to diagnose a patient with spinal epidural hematoma or spinal epidural abscess and treat.

Limitations to this study included its retrospective nature; legal cases involving spinal epidural hematoma and spinal epidural abscess are difficult to locate. Although the LexisNexis Academic database is an excellent source to locate lawsuits, the consistency of the background information (ie, timeline of events) varied from case to case.

**Conclusion**

Spinal epidural hematoma and spinal epidural abscesses are rare medical emergencies that are difficult to clinically diagnose. A patient with escalating pain, fever, and limb weakness with no identifiable source must be suspected for spinal epidural hematoma or spinal epidural abscess. A systematic algorithm would prove useful to workup and diagnose individuals with more than 1 risk factor or predisposing condition enhancing their probability. Physicians of every specialty, especially those working in the emergency department or outpatient settings, can protect their practice and integrity by trying to establish a diagnosis and appropriate treatment of spinal epidural hematoma or spinal epidural abscess within 48 hours of presentation.
REFERENCES


