Extensive Postoperative Epidural Hematoma After Full Anticoagulation: Case Report and Review of the Literature

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Abstract

Background/Objective: A 67-year-old man with degenerative lumbar spinal stenosis and a medical history significant for coronary artery disease underwent routine lumbar surgical decompression. The objective of this study was to report a case of postoperative epidural hematoma associated with the use of emergent anticoagulation, including the dangers associated with spinal decompression and early postoperative anticoagulation.

Methods: Case report.

Findings: After anticoagulation therapy for postoperative myocardial ischemia, the patient developed paresis with ascending abdominal paraesthesias. Immediate decompression of the surgical wound was carried out at the bedside. Magnetic resonance imaging revealed a massive spinal epidural hematoma extending from the middle of the cervical spine to the sacrum. Emergent cervical, thoracic, and revision lumbar laminectomy without fusion was performed to decompress the spinal canal and evacuate the hematoma.

Results: Motor and sensory function returned to normal by 14 days postoperatively, but bowel and bladder function continued to be impaired. Postoperative radiographs showed that coronal and sagittal spinal alignment did not change significantly after extensive laminectomy.

Conclusions: Full anticoagulation should be avoided in the early postoperative period. In cases requiring early vigorous anticoagulation, patients should be closely monitored for changes in neurologic status. Combined cervical, thoracic, and lumbar laminectomy, without instrumentation or fusion, is an acceptable treatment option.

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Key Words: Spinal stenosis, lumbar; Spinal decompression; Anticoagulation; Epidural hematoma; Laminectomy

INTRODUCTION

Symptomatic spinal epidural hematoma is a rare occurrence, and the incidence of symptomatic postoperative spinal epidural hematoma requiring intervention has been reported to range from 0.1% to 3% (1–3). Most epidural hematomas that occur after spinal surgery are asymptomatic; however, in the rare instance that a spinal epidural hematoma becomes clinically significant, devastating neurologic complications can result (3–7). Risk factors for spinal epidural hematoma after spinal surgery are multilevel procedures, preoperative coag-

ulopathy, postoperative coagulopathy, anticoagulation therapy, older than 60 years of age, preoperative nonsteroidal anti-inflammatory drugs (NSAIDs), Rh-positive blood type, hemoglobin less than 10 g/L, and surgical blood loss of 1 L or more (1,8,9).

Treatment outcomes are usually favorable, with rapid diagnosis and emergent surgical intervention (1,3,5). However, little is known about the exact risks of full anticoagulation therapy in spinal decompression patients. A recent literature review by Barnes et al (9) noted that there are insufficient data to establish guidelines for the use of anticoagulation therapy in spinal surgery patients. The authors suggest that frequent neurologic examinations in patients who underwent spinal surgery who require full anticoagulation seems to be the only option.

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Figure 1. (A) MRI (T2) image of the cervical spine showing the epidural hematoma extending to the midcervical spine. (B) MRI (T2) image of the thoracolumbar spine showing the epidural hematoma extending to the prior surgical levels in the lumbar spine.

We present the case of a 67-year-old man with a previous history of coronary artery disease who developed myocardial ischemia after routine lumbar decompressive surgery. Postoperative anticoagulation therapy was instituted, and a subsequent massive cervical, thoracic, and lumbar epidural hematoma developed, causing acute postoperative paraparesis.

CASE REPORT

A 67-year-old man presented with chronic bilateral buttock and leg pain with ambulation, suggestive of neurogenic claudication. Plain radiographs showed lumbar disk degeneration at multiple levels with no evidence of instability. Magnetic resonance imaging (MRI) showed 4-level degenerative lumbar stenosis from L2 to the sacrum.

The patient's symptoms persisted despite 3 months of conservative measures including physical therapy and anti-inflammatory medications. He did experience tem-

poral relief with selective bilateral injections of the L3 and L5 nerve roots. However, his severe claudication symptoms markedly affected his quality of life and decreased his ability to perform activities of daily living. Therefore, operative intervention was pursued, and preoperative planning was initiated.

The patient had a medical history significant for diabetes mellitus, coronary artery disease including a coronary artery bypass graft with a subsequent stenting procedure, and multiple myeloma, currently in remission. His medications included antihypertensive medications, oral and injectable hypoglycemic medications, and NSAIDs, but did not include anticoagulation medications. Given his complicated medical history, preoperative clearance was obtained by his primary care provider, in conjunction with his cardiologist, before proceeding to the operating room.

After medical clearance was obtained, he underwent routine, uncomplicated, 4-level lumbar decompression at

Figure 2. Postoperative MRI (T2) of the cervical spine showing evacuation of the epidural hematoma.

the L2-L3, L3-L4, L4-L5, and L5-S1 levels. Blood loss was minimal (200 mL), and the wound was noted to be dry at the time of closure. A small surgical drain was placed before closure, and the patient was extubated and transferred to the surgical floor for postoperative management. The patient was noted to be doing well in the immediate postoperative period, with minimal drainage in the surgical drain.

Thirteen hours after completion of the operation, the patient began experiencing left-sided chest pain. The orthopedic house officer was called to evaluate the patient, and an electrocardiogram (ECG) and cardiac enzymes were obtained. ECG showed changes consistent with myocardial ischemia. Cardiology consultation was obtained, and full anticoagulation therapy was initiated because the patient was not a candidate for angiography as per the cardiology team. This included an initial intravenous heparin bolus based on the patient's weight, followed by a continuous intravenous heparin drip with a goal of a prothrombin time (PTT) of 60 to 80 seconds. The initial PTT was 123.5 seconds, which was corrected by stopping the heparin drip for 60 minutes and resuming the drip at a decreased rate. The subsequent PTT value was 65.6 seconds.

The patient's chest pain resolved, and he clinically progressed well, ambulating out of bed to a chair on postoperative day 1. At 24 hours postoperatively, the surgical drain had 50 mL of bloody drainage and was

Figure 3. Postoperative MRI (T2) of the thoracic spine showing evacuation of the epidural hematoma.

therefore discontinued. At 48 hours, the patient complained of severe sharp pain in the lower extremities followed by numbness and inability to move his legs. Physical examination revealed a profound motor deficit in his bilateral lower extremities, a sensory deficit below the T7 level, decreased rectal tone, and an absent bulbocavernosus reflex. Immediate decompression of the lumbar wound was carried out at the bedside by release of all sutures from the surgical site. Copious amount of blood was produced from the decompression; however, the patient's symptoms did not resolve.

The patient was immediately transported to radiology for emergency MRI of the entire spinal canal. MRI revealed an extensive spinal epidural hematoma extending from the inferior aspect of C4 to the surgical site in the lumbosacral levels (Figure 1A and B). Immediate reversal of all anticoagulation was performed with administration of fresh frozen plasma, platelets, and vitamin K, and the patient was taken to the operating room for prompt evacuation of the epidural hematoma.

Figure 4. Postoperative MRI (T2) of the lumbar spine showing the previous surgical region with evacuation of the epidural hematoma.

Surgical findings consisted of a large, consolidated, and continuous epidural hematoma. The consolidated nature of the hematoma precluded removal with a suction catheter and necessitated primary laminectomy at the cervical and thoracic levels and revision laminectomy at the lumbosacral levels. Evacuation was performed manually with irrigation, and 1 epidural drain and 2 paraspinal drains were placed before closure.

The patient was transported to the Intensive Care Unit postoperatively, where he was extubated without difficulty. After discussion with the cardiology team, anticoagulation was not used postoperatively because the patient's cardiac issues had resolved, and an inferior

vena cava filter was placed for protection against future potential emboli. The remainder of his hospital stay was without complications, and he was discharged to the rehabilitation unit several days postoperatively.

Postoperatively, the patient showed signs of neurologic improvement. By 2 weeks, the patient had regained complete sensation and full motor strength in his legs. On discharge from the rehabilitation facility, he was ambulating with minimal assistance, but bowel and bladder function remained impaired. Postoperative MRI was obtained at 3 weeks after the operation. Images showed complete resolution of the epidural hematoma and no evidence of postlaminectomy instability (Figures 2–4). Additional standing radiographs obtained at 3 months postoperatively did not show any evidence of postlaminectomy kyphosis (Figure 5A and B). At 8 months after the extensive decompression laminectomy, the patient noted minimal back pain, and bowel and bladder function continued to be impaired.

DISCUSSION

While the majority of postoperative epidural hematomas are clinically asymptomatic, the rare hematoma that causes significant spinal cord or nerve root compression can result in devastating neurologic consequences. Timely recognition and intervention are important for functional recovery; however, a favorable prognosis can depend on several factors such as the rate of development of symptoms, time to surgical decompression, spinal level involvement, and the degree of neurologic deficit (3,8,10–14).

With full anticoagulation as a known risk for the development of spinal epidural hematomas in patients who underwent spinal surgery, there are no evidenced-based guidelines for the use of anticoagulation therapy in these patients (9). Published data in the animal model suggest that the risk of postoperative hemorrhage after intracranial surgery is significantly decreased 10 to 14 days after surgery (15). However, it is difficult to translate these data to the spinal surgery patient. Frequent neurologic examinations seem to be the only option for the detection and treatment of epidural hematomas in this patient population.

Establishment of baseline neurologic examinations in the immediate postoperative period followed by periodic follow-up neurologic examinations will help distinguish between changes that may have occurred intraoperatively and those that develop during the postoperative course. Commonly, patients will have few complaints other than increasing back pain that may progress to leg pain. Leg pain that becomes severe and unremitting often is the heralding event to subsequent neurologic deterioration (1,6). Detailed neurologic examinations should include rectal examination and testing of pinprick sensation. Any new or significant changes in the neurologic examination should warrant emergency spinal imaging.

Figure 5. (A) Standing radiograph of the thoracic spine 2 months postoperatively showing no evidence of deformity after extensive laminectomy and decompression of the epidural hematoma. (B) Standing radiograph of the lumbar spine 2 months postoperatively showing no evidence of deformity after revision, decompression, and evacuation of the epidural hematoma.

Symptomatic epidural hematomas should be treated emergently through surgical decompression of all involved spinal levels. Laminectomy is performed to decompress the entire length of the compressed spinal canal and removal of coagulated products. In very severe

cases, early decompression may involve removing the wound sutures at the patient's bedside.

After a thorough search of the current literature, this case represents the largest postoperative spinal epidural hematoma to date. It also shows the potential conse-

quences of anticoagulation therapy and the important steps required for the diagnosis and treatment of symptomatic postoperative spinal epidural hematomas. If the surgeon maintains a high level of suspicion and facilitates rapid intervention, the patient's outcome can be maximized.

Current and future developments in anticoagulation therapy may change the way such medications are used in the postoperative period. Low molecular weight heparins are currently being used to develop protocols for the treatment of thromboembolic disease and acute coronary syndrome by many hospitals. These drugs have more reliable dosing and may actually avoid some of the adverse effects seen with the use of unfractionated heparin. These include the short period of supratherapeutic anticoagulation levels often seen with the use of a heparin drip, as was seen in this patient. However, the data for the use of such drugs are still being collected, and its use in spinal surgery patients is promising but unclear.

CONCLUSION

The use of full anticoagulation should be used cautiously in the early postoperative period in patients undergoing spinal decompressive surgery. Each patient should be treated on an individual basis, and the potential benefits of anticoagulation should be compared with the potential risks (risk-benefit ratio). In those select cases requiring therapeutic anticoagulation, patients should be closely monitored for changes in neurologic status. With any change in neurologic status, rapid diagnostic imaging should be pursued, and surgical decompression should be performed if an epidural hematoma is discovered. In cases with an extensive epidural hematoma, as in this case report, combined cervical, thoracic, and lumbar laminectomy, without instrumentation or fusion, is an acceptable treatment option.

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