CASE REPORT

Complete Spinal Cord Injury

Emergency surgical cord decompression before functional paralysis can preserve function after spinal cord injury.

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Clinical Presentation

Mr. I, age 31, has no significant past medical history and awoke with neck pain 2 hours before coming to the emergency department. He described his pain as sharp, rated 8 to 9 out of a possible 10 in intensity, and localizing to his neck and upper back without extremity radiation. During initial triage, some subtle weakness of the lower extremities was noted, but Mr. I remained ambulatory. While awaiting further assessment, he remarked that his legs became numb and his leg motor strength weaker.

Diagnostic Studies and Diagnosis

Mr. I was sent for an emergent cervicothoracic MRI and findings showed a large dorsal epidural hematoma with severe spinal cord compression from C5 to T2 (Figure 1). His preoperative laboratory values including coagulation studies were unremarkable. Immediately after MRI, Mr. I was noted to have flaccid paralysis of his lower extremities, no rectal tone, and progressive upper extremity weakness with a sensory level at C5 (ASIA-A impairment, Table).

Treatment

Mr. I was immediately taken for neurosurgical treatment. An arterial line was placed and mean arterial pressures were augmented to greater than 90 mm Hg to improve spinal cord perfusion. High-dose dexamethasone was started via intravenous infusion.

Figure 1. Axial (A) and sagittal (B) T2-weighted MRI shows a large compressive epidural hematoma (arrow) extending from C5 to T2. The spinal cord is notably displaced ventrally and severely flattened.
After initiating general anesthesia, cervicothoracic laminectomy was performed over the extent of the hematoma. A thick compressive acute epidural hematoma was found and completely evacuated. Heavy epidural bleeding from what appeared to be abnormal ectatic vasculature was also noted. The abnormal epidural vessels, which were the source of the epidural hematoma, were cauterized, completely resected, and sent to pathology for analysis.

Postoperative Care and Outcome
Postoperatively, Mr. I was transferred to the intensive care unit (ICU) where he immediately recovered normal upper extremity function bilaterally and regained sensation in his lower extremities. On postoperative day 1, he recovered some antigravity motor function in his legs. By postoperative day 3, he had regained near complete lower extremity motor strength and was ambulatory with physical therapy. He failed his initial trial of void, requiring replacement of his bladder catheter. His spinal angiogram, taken on postoperative day 4, confirmed there was no residual vascular lesion present in his spine.

Histopathologic analysis confirmed excision of an epidural arteriovenous malformation (AVM). Clustered abnormal blood vessels with various wall thickness were clearly demonstrated after staining the surgical specimen for vessel elastic fibers (Figure 2).

Mr. I was discharged home, fully ambulatory, on postoperative day 5. He subsequently was able to spontaneously void when his bladder catheter was removed several weeks later in the outpatient urology clinic.

Discussion
Complete spinal cord injury (SCI) remains challenging to treat effectively, and recovery is limited in most cases. The incidence of SCI peaks in young adulthood and is higher among men. Trauma is the most common cause of nearly 13,000 cases reported in the US annually.

This incidence rate is higher than in any other developed country. The degree of functional preservation below the level of the SCI is used to classify it as complete or incomplete (Table).

Growing evidence suggests preservation or recovery of function is possible when expedited care, including early surgical decompression, is provided. An accurate initial neurologic assessment and grading facilitates communication among health care providers and drives overall management.

In the case presented, early progressive clinical deterioration and high suspicion for spinal cord injury prompted emergent spine MRI. Prompt clinical reassessment after MRI was obtained was notable for evidence of progression to ASIA-A status, identifying an immediate need for spinal cord decompression.

Although there are no definitive studies of the utility or outcomes of early decompressive surgery for individuals with ASIA-A acute spinal cord injury, it is clear that this approach has utility for some cases, as described. In the presence of extended paralysis (>72 hrs), the benefit of surgical decompression is certainly more dubious. Some reports suggest that once functional paralysis has occurred, up to 50% of affected individuals remain bed or wheelchair bound after 3 months.

Conclusions
As yet, there is no standardized management of acute complete spinal cord injury. Questions regarding...
optimal timing for spinal cord decompression surgery, utility of high-dose intravenous steroids, and the need for hemodynamic augmentation remain unanswered. As demonstrated by our case report, however, early decompressive surgery may be beneficial in some cases. Randomized trials and/or large registries are needed to generate more data to support clinical decision-making that is now largely based on anecdotal cases.


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