

Spontaneous Spinal Epidural Hematoma Following Weight Lifting

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Spontaneous spinal epidural hematomas (SSEH) are well recognized but rare entities. First described in 1869 by Jackson,¹ approximately 460 have been reported. Many potential causes have been discussed.²⁻⁹ In our review of the literature, only four cases of SSEH following exercise have been reported.^{5,8-11} Some of these patients had additional risk factors, such as repeated Valsalva maneuvers^{8,9} or antiplatelet treatment.¹⁰ None of the reported cases occurred in the pediatric age group. The standard treatment for these hematomas is prompt surgical evacuation^{3,9,12-14} although spontaneous recovery has been reported.^{5,7,8,10,15,16}

We describe a conservatively treated 15-year-old patient with SSEH following weight lifting to make physicians aware of this rare mechanism of SSEH even in the pediatric age group.

CASE REPORT

Clinical presentation

This 15-years-old male presented to emergency department with a one week history of interscapular pain. The pain was of gradual onset, dull, but severe enough to wake him up from sleep. The pain radiated to the left side of his neck and left shoulder. The patient also experienced paresthesiae in both hands and weakness of the left arm which started a few days after the onset of the pain. He denied any trauma or medications but he admitted starting unsupervised weight lifting about two weeks prior to the presentation. On further enquiry he admitted feeling sharp intrascapular pain during bench press exercise. There was no past medical history.

On examination, he was of a slender build. There was mild tenderness over the lower cervical and upper thoracic spine. On neurological examination, abnormal findings were confined to his left arm. He had slightly reduced power of his left triceps muscle with decreased triceps jerk but normal sensation.

Radiological findings

Spinal MRI revealed an epidural mass lesion extending from the superior border of the 5th to the lower border of the 6th cervical vertebra, causing displacement of the spinal cord to the right. The lesion was of intermediate signal on T1 and T2 weighted images, hypointense on gradient echo sequences (Figure 1), and minimally enhanced with contrast. Oblique plain X-ray views of the cervical spine were done to look for possible enlargement of the C5-6 foramen and these radiographs were normal. The differential diagnosis included nerve sheath tumor or evolving extradural hematoma.

Clinical course

In view of minimal clinical findings and the normal C5-C6 foramen on plain radiographs, which was in favour of a hematoma rather than a neoplasm, it was elected to observe the patient. He was discharged home with instructions to refrain from strenuous physical activity. He was seen again ten days

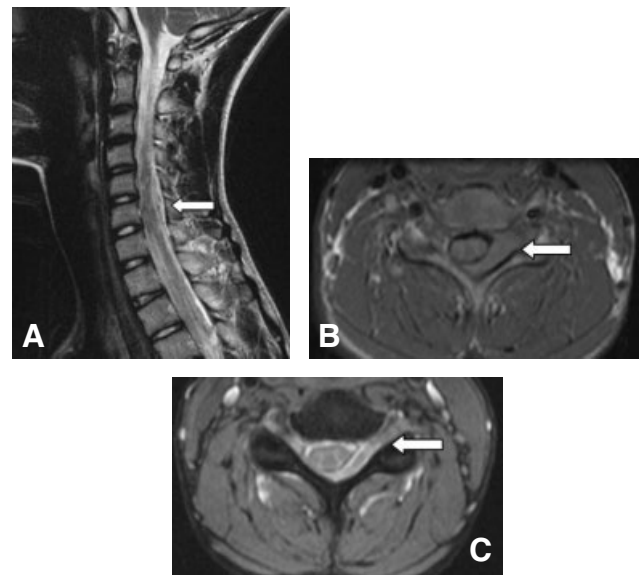


Figure 1. T2 sagittal (Figure 1 A), T1 axial (Figure 1 B), and T2 gradient echo axial (Figure 1 C), images showing epidural mass which is displacing the cord to left, and extending into the right intervertebral foramen (arrows) at the level of 5th and 6th cervical vertebrae.

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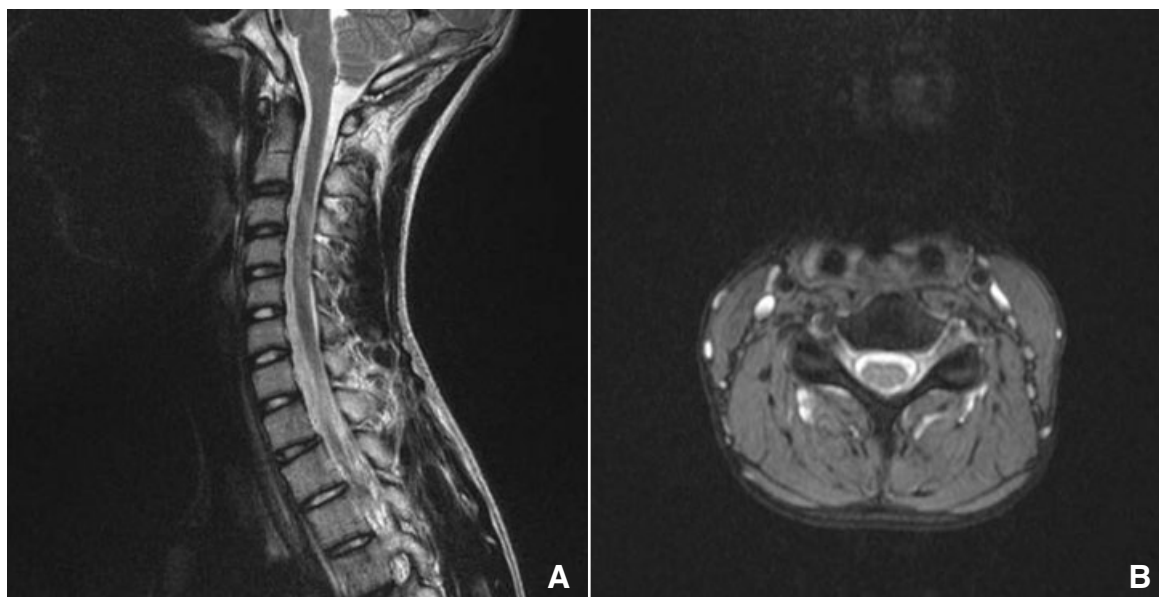


Figure 2. T2 sagittal (Figure 2 A) and T2 gradient echo (Figure 2 B) images of the same area four weeks later showing complete resolution of the collection.

later as an outpatient. By that time his pain and the left arm weakness were improving, and he had no paresthesiae. The triceps weakness was less than previously.

Four weeks later, a follow-up magnetic resonance image (MRI) examination showed almost complete resolution of the epidural lesion (Figure 2). The pain had resolved and neurological examination was normal. The diagnosis was presumed to be a hematoma.

DISCUSSION

Spontaneous spinal epidural hemorrhage is defined as bleeding outside the dura mater, within the spinal canal, without an obvious precipitating cause. Bleeding due to trauma, anticoagulants, bleeding diatheses, or tumor is excluded. The incidence of SSEH, thus defined, has been estimated as less than 1% of all spinal epidural lesions.⁴

The cervico-thoracic and thoraco-lumbar regions are most commonly affected, with more than one-third of cases in the C5-T2 levels.^{4,17} It has been reported in patients from 14 months to 90 years of life.^{16,18}

The potential causes include undiagnosed acquired or congenital coagulopathies, hypertension, increased venous pressure (during coughing, sneezing, vomiting, straining to void or stool), seemingly trivial, daily events leading to minor trauma (bending, twisting, lifting), cocaine or alcohol use.^{2,5,7-9} Anatomic lesions predisposing to SSEH include venous angiomas, hemangiomas, arteriovenous malformations, unclassifiable venous abnormalities, arterial aneurysms, vascular neoplasms, and Paget's disease.^{4,6,8} In those cases in which there is no underlying vascular abnormality the bleeding is believed to be venous in origin,^{1,12} although an arterial etiology has also

been suggested.¹⁷ Proof of either is difficult, as in most cases there is lack of angiographic documentation of the lesion and even with open surgical exploration and clot removal, the specific cause is often not evident.^{10,19}

The spinal epidural space contains an extensive internal venous plexus, which communicates with the external vertebral venous plexus. Together they form Batson's plexus which is a valveless low-pressure system.²⁰ This system provides an alternate route for venous return from other areas of the body and assists in regulating volume and pressure changes between the intrathoracic, intraabdominal, and intraspinal systems.^{12,20} Valsalva maneuvers, such as straining, coughing or lifting, increase intraabdominal and intrathoracic pressure.^{19,20} This, in turn, is transferred to the spinal epidural venous system¹⁹ and is thought to contribute to the rupture and hemorrhage of the epidural venous vessels.²¹ The basic pathophysiologic cause is presumed to be a weakened vessel in a preexisting abnormal venous plexus.⁴ Weight lifting may involve a Valsalva maneuver, which may be accentuated by improper breathing. Even though athletes are taught to exhale with contraction, many do not employ this technique. Many untrained people wanting to become fit, as in our patient, will often lift weights without proper knowledge or guidance and may be more susceptible to accentuated Valsalva maneuvers.⁹ In the absence of any other predisposing factors, it was felt that the SSEH in our patient was caused by the weight lifting and presumably was venous in origin.

The typical presentation of SSEH is that of the acute onset of localized back, neck or interscapular pain followed by radicular pain in the extremities and signs and symptoms of spinal cord or cauda equina compression.¹⁷ The initial pain is usually localized

and is referable to the level of the lesion.^{3,9,10,19} Progressive sensory and motor deficits usually occur within minutes or hours, but occasionally after many days.

The differential diagnosis of SSEH includes: acutely ruptured intervertebral disc, epidural neoplasia, transverse myelitis, a dissecting aortic aneurysm, congenital cysts, spondylitis, infection, spondylitis, toxic exposure, Guillain-Barre syndrome and pathological vertebral fractures.^{8,10,16} In our patient the subacute onset of pain was more suggestive of a neoplastic lesion than of a hematoma.

Magnetic resonance imaging is the modality of choice for the diagnosis of spinal epidural hematoma. In our patient, the initial MRI findings were consistent with but not diagnostic of a subacute hematoma. The differential diagnosis included a nerve sheath tumor. The typical MRI characteristics of hematoma and nerve sheath tumor are different. Subacute or chronic hematoma is hyper- to isointense on T1 and T2 weighted images, hypointense on gradient echo images with minimal contrast enhancement.^{10,22} Nerve sheath tumors are expected to be isointense on T1, hyperintense on T2, hyperintense on gradient echo sequences with variable but usually well evident gadolinium enhancement.²³ The radiological evidence of the complete resolution of the lesion, however, was most consistent with a hematoma.¹⁰

The usual treatment of SSEH is almost always rapid surgical decompression,^{3,9,12-14} which is most appropriate if the onset is acute and rapidly progressive, as is typical. Neurological outcome has been correlated with preoperative neurological deficits and rapid spinal cord decompression.¹⁰ Rarely, spontaneous recoveries have been reported.^{5,8,10,15,16} Stable patients with minimal neurological dysfunction and no evidence of spinal cord compression can be treated expectantly, as in our case.^{7,10}

CONCLUSIONS

We report a pediatric patient with spontaneous spinal epidural hematoma, who, in view of presence only minor neurological deficits, was managed conservatively with complete recovery. Neurosurgeons dealing with children and adolescents should be aware of this possible complication of weight lifting and other forms of exercise that might be associated with significant Valsalva maneuvers.

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