



Case Report

Cauda equina schwannoma presenting with subarachnoid and subdural hemorrhage: Its underlying mechanism

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ABSTRACT

Background: A patient presented with a spinal subarachnoid hemorrhage (SAH) and subdural hematoma (SDH) attributed to a spinal schwannoma at the T12-L1 level.

Case Description: A 67-year-old male acutely presented with severe back pain and L1 paraparesis/sensory loss, with urinary incontinence. CT/MR studies showed a spinal SAH and SDH within a likely T12-L1 schwannoma. At surgery, the hemorrhage within the tumor was continuous through the lower pole of the tumor into the subarachnoid and subdural spaces; tumor was dissected away from the surrounding tissues and totally removed. The postoperative course was uneventful, and the preoperative neurological deficits gradually resolved. Histopathologically, the lesion was a schwannoma with intratumoral hemorrhage.

Conclusion: This case demonstrates the rare acute presentation of a T12-L1 schwannoma with an accompanying intratumoral hemorrhage resulting in both a SDH/SAH.

Keywords: Cauda equina, Intratumoral hemorrhage, Mechanism, Spinal schwannoma, Subarachnoid hemorrhage

INTRODUCTION

Subarachnoid hemorrhage (SAH) originating from spinal lesions is rare, occurring in <1.5% of spinal tumors; they are typically spinal ependymomas or cavernous angiomas.^[2,9] Even more unusual, are hemorrhages occurring in spinal schwannomas resulting in both SAH and subdural hematomas (SDHs); there are approximately 20 such cases reported in the literature.^[9]

Here, we present a hemorrhage into a T12-L1 schwannoma resulting in both a SAH and SDH.

CASE DESCRIPTION

A 67-year-old male on anticoagulants for atrial fibrillation, suddenly complained of severe back pain, an L1-level paraparesis/sensory loss with urinary incontinence. On examinations, he had 3/5 motor function loss from L1 downward and a partial sensory level to pin appreciation.

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Radiological evaluation

The brain CT showed SAH clots in the posterior fossa. Cerebral angiography, however, showed no cranial vascular lesions. Notably, the lumbar MR demonstrated a T12-L1 lesion that was homogeneously enhanced with contrast consistent with a schwannoma [Figure 1]. Furthermore, there was intratumoral hemorrhage with SAH/SDH spread resulting in cauda equina compression [Figure 2].

Surgery

The patient underwent a T12-L2 laminectomy 3 weeks later using intraoperative sensory evoked potential (SEP) and motor evoked potential (MEP) [Figure 3]. Once the dura was opened, there was subdural and subarachnoid blood underlying which a large tumor with intrinsic hemorrhage was identified. The rostral side of the tumor, was strongly adherent to the conus medullaris from which it had to be carefully dissected and removed. There were no SEP/MEP changes during surgery. Postoperatively, the paraparesis transiently worsened, but, over the next 6 months, the motor, sensory, and sphincteric function then gradually improved. At that point, the follow-up MRI revealed no recurrence of tumor.

Pathology

The tumor was a typical schwannoma. It contained proliferating spindle cells arranged in short bundles or interlocking fascicles containing hypocellular and hypercellular area (Antoni A and B area, respectively). On immunohistochemistry, most of the tumor cells were positive for S-100 protein. Hyalinized and ectatic vessels were also found within the tumor close to

the tumor capsule, with inflammatory cells clustered around them. Fresh hemorrhage associated with focal necrosis was also found within the tumor [Figure 4].

DISCUSSION

Spinal SAH occurs in only 0.05–1.5% of all spinal tumors. In addition to trauma, the most common causes of spinal SAH are spinal vascular lesions (i.e. saccular aneurysm of the spinal artery, spinal arteriovenous malformation, or fistula).^[1,3-6,8] Spinal tumors such as cavernous angiomas and ependymomas rarely cause SAH, but even less frequent causes of spinal SAH are schwannomas.^[9] Notably, most spinal schwannomas with spinal SAH are located at the lower thoracic to upper lumbar levels, (i.e. conus medullaris/cauda equina).^[1,3,4,5-8]

As in the present case, SDHs often accompany SAH in patients with intratumoral hemorrhages into spinal schwannoma.^[4,6] In these patients, typically immediately the onset of paraparesis/sphincter loss secondary to extension of the hemorrhage into the subarachnoid and subdural spaces results from conus medullaris/cauda equina compression.

The hyalinized enlarged vessels of spinal schwannomas may become occluded by thrombosis, resulting in intrinsic tumor necrosis and intratumoral hemorrhage. The histological examination also revealed the presence of numerous degenerated blood vessels in the tumor with inflammatory cells clustered around them, suggesting that disruption of the degenerated blood caused the intratumoral hemorrhage.

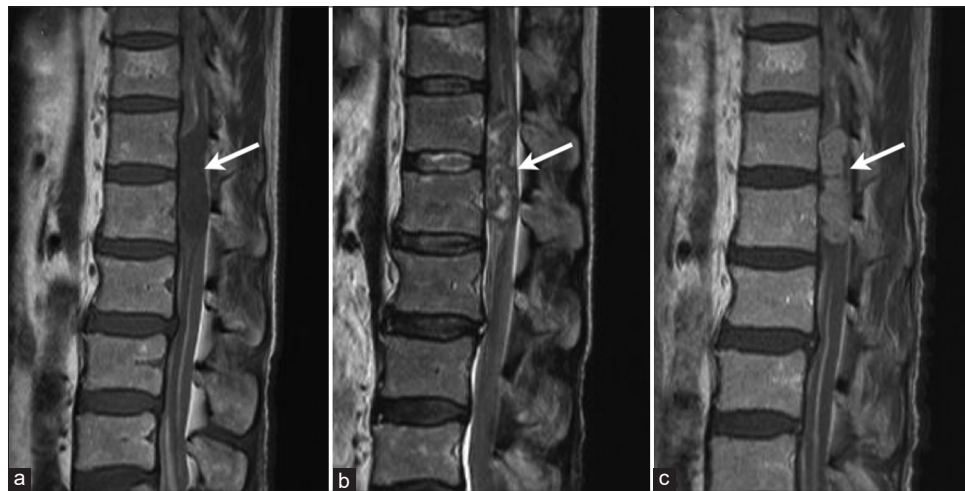


Figure 1: Sagittal images of T2- (a), T1- (b), and Gd-enhanced T1-weighted MRI (c). The tumor mass with iso-intensity on T1-weighted image and mixed intensity on T2-weighted image was located at the T12-L1 level and occupied the spinal canal (arrows).

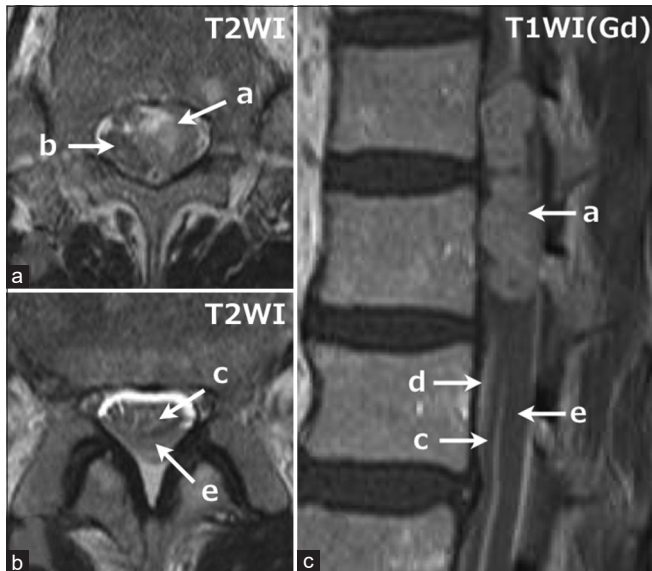


Figure 2: Axial images of T2-weighted MRI at the level of L1 (a) and L2 (b), and sagittal image of Gd-enhanced T1-weighted MRI (c). The tumor mass (a) markedly compressed the conus medullaris (b) to the right side. The subarachnoid space around the cauda equina (c) just caudal to the tumor mass (a) is densely filled with clots (d), and there is a thick subdural hematoma (e) dorsal to the cauda equina.

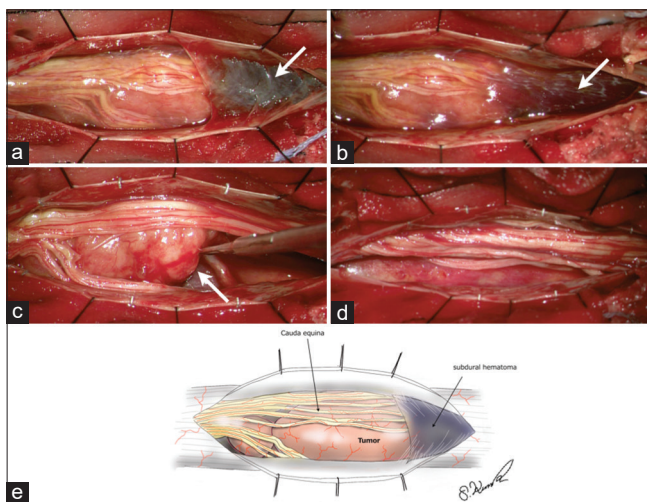


Figure 3: Intraoperative findings (a-d) and illustration by the author (e). (a) When the dura was opened, the tumor was strongly compressing the surrounding cauda equina. Since 3 weeks had already passed since the onset, most of the clot in the subarachnoid space had been washed out. A thick subdural hematoma was present just caudal to the tumor (arrow). (b) When this subdural hematoma was removed, the arachnoid membrane, which had been compressed by the subdural hematoma, was found on its ventral side (arrow). (c) When the arachnoid was opened and the tumor was dissected from the surrounding cauda equina, bleeding from the lower pole of the tumor was found to have extended into the subarachnoid space (arrow). (d) The tumor was totally removed.

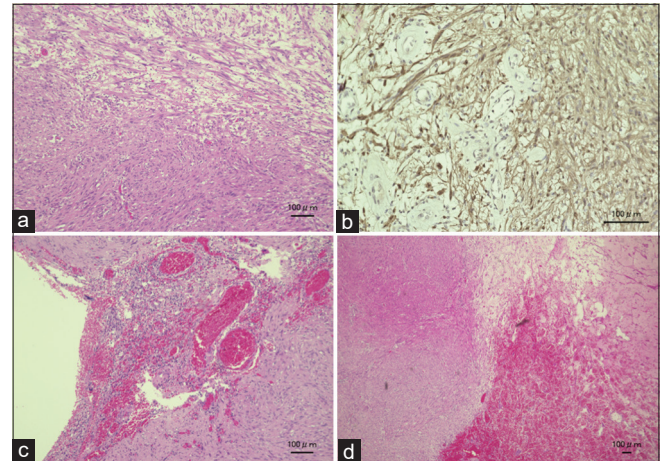


Figure 4: Histopathological findings. (a) HE staining. Section of non-hemorrhagic lesion shows a cellular area consisting of elongated cells with Antoni A and B structures. (b) Immunohistochemistry reveals that most of tumor cells are positive for S-100. (c) HE staining. Section of hemorrhagic lesion demonstrates the enlarged, degenerated vessels in the tumor, which are surrounded by the inflammatory cells. (d) Section of hemorrhagic lesion shows fresh hemorrhage with typical Antoni A and B structures.

CONCLUSION

The present case demonstrates the rare acute presentation of a T12-L1 schwannoma with an accompanying intratumoral hemorrhage resulting in both a SDH/SAH.

Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

Financial support and sponsorship

None.

Conflicts of interest

There are no conflicts of interest.

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