Intratumoral Hemorrhage of Spinal Schwannoma of the Cauda Equina Manifesting as Acute Paraparesis
—Case Report—

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Abstract

A 64-year-old man presented with spinal schwannoma of the cauda equina at the thoraco-lumbar junction manifesting as acute paraparesis and urinary incontinence after intratumoral hemorrhage. Surgical resection of the tumor resulted in significant neurological recovery. T2*-weighted gradient-echo magnetic resonance imaging is very useful to help establish the preoperative diagnosis, leading to early surgical intervention and better outcome after surgery.

Key words: cauda equina, hemorrhage, spinal schwannoma

Introduction

Patients with spinal schwannomas commonly present with gradually progressive symptoms of radicular pain, paresthesia, or paraparesis, because these tumors are generally slow growing with gradual mass effects on the normal neural tissue.4,9) Spinal schwannomas presenting with subarachnoid hemorrhage, and rarely subdural hematoma, occur sporadically,2,5,7,8,11) whereas intratumoral or peritumoral hemorrhage is extremely unusual. We treated a patient with spinal schwannoma of the cauda equina at the thoraco-lumbar junction manifesting as acute paraparesis and urinary incontinence after intratumoral hemorrhage.

Case Report

A 64-year-old man presented with severe onset of back pain, acute paraparesis, and urinary incontinence. He had been admitted to a local hospital to undergo physical and occupational rehabilitation for left hemiparesis caused by cerebral infarction. He had a past history of cardiovascular surgery for bacterial endocarditis and was receiving anticoagulant therapy. The patient was referred to our institution for further evaluation and treatment about 3 weeks after the onset of his symptoms.

Neurological examination on admission showed severe weakness of the bilateral lower extremities, inability to stand, decreased sensation below the T12 level, and severe sphincter and urinary dysfunction. Magnetic resonance (MR) imaging demonstrated an intradural spinal tumor at the thoraco-lumbar junction, located at or close to the conus medullaris, appearing as slightly hyperintense on T1-weighted images and heterogeneously hyperintense with intramedullary edema on T2*-weighted images (Fig. 1).

Fig. 1 Preoperative magnetic resonance images revealing an intradural tumor as mixed hyperintensity on T2-weighted (A), mixed hypointensity on T2*-weighted gradient-echo (B), and irregular rim enhancement on T1-weighted images (C) at the T12-L1 levels, associated with edema formation within the conus medullaris.
1A), with irregular rim enhancement after injection of contrast medium (Fig. 1C). T₂*-weighted gradient-echo MR imaging showed mixed hypointensity within the tumor (Fig. 1B), which was consistent with blood degradation products.

The patient underwent T12-L1 osteoplastic laminotomy with partial dome-laminectomy of T11 and L2 on 4 weeks after the onset of his symptoms. Opening the dura mater detected no evidence of subarachnoid hemorrhage on the surface of the spinal cord, and exposed the hemorrhagic tumor adjacent to the conus medullaris (Fig. 2). A cystic lesion containing xanthochromic fluid was found at the caudal side of tumor. After removal of old or subacute blood products within the tumor, the solid portion of the tumor was identified. Careful inspection of the tumor revealed no direct continuation with the conus medullaris and the origin from the cauda equina. The tumor was clearly separated and safely resected using standard microsurgical technique with sacrifice of the involved nerve roots. The histological and immunohistochemical diagnosis was schwannoma (Fig. 3). The S-100 protein immunostaining was positive. The postoperative course was uneventful.

The patient was discharged to an inpatient rehabilitation hospital. At the 8-week follow-up examination, the patient could walk with assistance without back pain, and had significant recovery of sphincter and urinary functions. Postoperative MR imaging obtained 3 months after surgery revealed total resection of the tumor and diminished intramedullary edema formation.

### Discussion

The present case of solitary intratumoral hemorrhagic tumor adjacent to the conus medullaris, containing old or subacute blood products within the tumor.

![Fig. 2](image1.png)

Intraoperative photograph revealing hemorrhagic tumor adjacent to the conus medullaris, containing old or subacute blood products within the tumor.

![Fig. 3](image2.png)

Photomicrograph revealing typical schwannoma consisting of spindle cells with rich vascularization and deposit of hemosiderin, but without signs of malignant transformation. Hematoxylin and eosin stain, ×200.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Author (Year)</th>
<th>Age (yrs/ Sex)</th>
<th>Level</th>
<th>Type of hemorrhage</th>
<th>Timing of MR imaging after onset</th>
<th>MR imaging intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chalif et al. (1990)</td>
<td>56/F</td>
<td>C1-C2</td>
<td>SAH</td>
<td>12 days</td>
<td>low high ND</td>
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<td>2</td>
<td>Vazquez-Barquero et al. (1994)</td>
<td>68/M</td>
<td>C5-C7</td>
<td>SDH</td>
<td>3 days</td>
<td>mixed high ND</td>
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<tr>
<td>3</td>
<td>Corriero et al. (1996)</td>
<td>37/M</td>
<td>C7-T1</td>
<td>SAH</td>
<td>11 days</td>
<td>ND ND ND</td>
</tr>
<tr>
<td>4</td>
<td>Uemura et al. (1998)</td>
<td>58/F</td>
<td>T12</td>
<td>intratumoral</td>
<td>3 hrs</td>
<td>mixed high ND</td>
</tr>
<tr>
<td>5</td>
<td>Cordan et al. (1999)</td>
<td>28/F</td>
<td>L1-L2</td>
<td>SAH</td>
<td>10 days</td>
<td>ND ND enhanced</td>
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<tr>
<td>6</td>
<td>Cohen et al. (2000)</td>
<td>52/F</td>
<td>T11-T12</td>
<td>intratumoral</td>
<td>1 day</td>
<td>ND high ND enhanced</td>
</tr>
<tr>
<td>7</td>
<td>Ng (2001)</td>
<td>43/F</td>
<td>C7</td>
<td>SDH</td>
<td>3 days</td>
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<td>8</td>
<td>Tanaka et al. (2002)</td>
<td>26/F</td>
<td>T9-T12</td>
<td>SDH</td>
<td>0 day</td>
<td>ND mixed high ND</td>
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<td>9</td>
<td>Parmar et al. (2004)</td>
<td>50/M</td>
<td>T11-L1</td>
<td>SAH and SDH</td>
<td>ND</td>
<td>low mixed high mixed low</td>
</tr>
<tr>
<td>10</td>
<td>Present case</td>
<td>64/M</td>
<td>T12-L1</td>
<td>intratumoral</td>
<td>3 wks</td>
<td>iso mixed high mixed low</td>
</tr>
</tbody>
</table>

Hemorrhagic Spinal Schwannoma of the Cauda Equina

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Hemorrhage of spinal schwannoma of the cauda equina manifesting as acute paraparesis and urinary incontinence was possibly associated with the ongoing anticoagulant therapy. Only 9 previous cases of hemorrhagic spinal schwannoma have been evaluated by MR imaging, excluding cases of multiple tumors or unknown origin of hemorrhage (Table 1).3,6,10–14) Only 2 cases involved solitary intratumoral hemorrhage,3,13) and none were related to anticoagulant therapy.

The occurrence of hemorrhage arising from spinal cord tumors is related to several factors such as the histology and location of the tumor. Ependymomas are the most frequent type associated with intratumoral hemorrhage, followed by schwannomas, meningiomas, and gliomas. The ectatic and hylanized vessels of the tumor may develop spontaneous thrombosis, followed by tumor necrosis and hemorrhage. The large prevalence in tumors localized in the conus medullaris or cauda equina can be explained by physical and mechanical factors.7) Such tumors are easily subjected to traction movements along the spinal axis. Their vascular attachments to the conus medullaris or nerve roots can bleed within the tumor or the subarachnoid space. Our patient had no clear history of physical exertion. We speculate that the highly vascularized nature of the tumor together with minor mechanical stress at the conus medullaris and anticoagulant therapy caused the intratumoral hemorrhage.

MR imaging is extremely useful for detecting hemorrhagic change associated with spinal cord tumors. Signal intensity within the tumor on T1- and T2-weighted images can be affected by the duration after onset and the type of hemorrhage. Hemoglobin oxidation within the hemorrhage results in signal intensity changes to hyperintense on T1-weighted images, and hypointense center changing to hyperintense with hypointense rim on T2-weighted images.1) MR imaging has shown some variation in signal intensity in previous cases (Table 1). The clinical presentation can make MR imaging diagnosis more nuanced and complicated. In our case, we obtained both conventional and T2*-weighted gradient-echo MR images that showed mixed hypointensity within the tumor, highly suggestive of the presence of blood degradation products.

This case report illustrates the unexpected occurrence of solitary intratumoral hemorrhage of spinal schwannoma. T2*-weighted gradient-echo imaging is very useful to help establish the preoperative diagnosis, leading to early surgical intervention and better outcome after surgery.

References


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