Totally Cystic Schwannoma of the Lumbar Spine

Desheng Wu, MD; Zhaoyu Ba, MD; Yufeng Huang, MD; Weidong Zhao, MD; Bin Shen, MD; Heng Kan, MD

abstract

A schwannoma is a benign tumor arising from a schwann cell and occurs mainly in the nerve sheath in the intradural extramedullary region. Schwannomas have been well described as occurring in the lumbar spine, but total cystic degeneration of schwannomas is rarely reported. The authors describe the clinical and radiographic evaluations and treatment of a rare case of an intraextradural totally cystic schwannoma on the lumbar spine.

Two patients reported a history of 6 to 12 months of pain accompanied by weakness in the lower extremities. On examination, 1 patient had bilateral lower-extremity muscle strength graded at 4/5, and magnetic resonance imaging revealed a cystic schwannoma (1.5×2.0 cm in the sagittal dimension) at L2-L3. The other patient had a right lower-extremity muscle strength graded at 3/5, and magnetic resonance imaging revealed a cystic schwannoma (2.0×3.0 cm in the sagittal dimension) at L4-L5. The patients underwent operative treatment, and the tumors were completely removed, as were the filum terminale adhered to the tumor. Pedicle screws were used to maintain stability of the lumbar spine. Gross examination of the tumors showed yellowish-white soft contents. Histologic examination confirmed that they were benign totally cystic schwannomas. Postoperatively, the patients’ neurologic symptoms completely resolved.

Cystic schwannomas can be diagnosed using preoperative magnetic resonance imaging. The filum terminale cut off the tumor walls did not cause the clinical symptoms in the 2 patients.

Figure 2: Photograph of a strand of filum terminale adhered to the tumor for patient 1 (A). Photograph of a strand of filum terminale adhered to the tumor for patient 2 (B).
Schwannomas are benign tumors of nerve sheath cell of a schwann cell that account for 0.3% of primary intraspinal tumors. However, totally cystic schwannomas of the lumbar spine are rare. The current report describes 2 patients with totally cystic schwannomas of the lumbar spine.

**CASE REPORT**

**Patient 1**

A 62-year-old man reported pain and motor weakness of both lower extremities for 1 year. Examination revealed muscle strength graded at 4/5 in both legs. Both patella tendon reflexes were hyperreflexia. Magnetic resonance imaging (MRI) of the lumbar spine showed an intrathecal lesion at L2-L3 (Figure 1 A). The lesion was nearly isointense with the spinal cord on T1-weighted MRI. The contrast MRI revealed a ring-like enhancement of the tumor (Figure 1B). A diagnosis of a cystic schwannoma was made preoperatively, and a laminectomy was performed at L2-L3 to remove the tumor.

The large tumor arising from the cauda equina was found after opening the dura (Figure 2A). The authors completely removed the tumor and cut off the filum terminale that had adhered to the tumor. Macroscopically, the tumor was found to be totally cystic. Immunohistochemistry examination confirmed the diagnosis of totally cystic schwannoma (Figure 2B). The patient experienced significant pain relief at the 2-week postoperative examination. At the 2-year follow-up, no schwannoma recurrence was observed (Figure 3A).

**Patient 2**

A 63-year-old man presented with a 6-month history of radicular pain of the right lower extremity. On examination, motor weakness was observed in his right lower limb, which had a muscle strength grade of 3/5 and absent knee and ankle reflexes on the right extremity. Magnetic resonance imaging of the lumbar spine revealed a homogeneous cystic mass extending from L4-L5 that was causing cauda equina compression (Figure 1C). The contrast MRI revealed a ring-like enhancement of the lesion (Figure 1D). The patient underwent laminectomy from L3-L5.

A large schwannoma originating from the filum terminale of cauda equina was immediately observed. The tumor was completely extirpated, and the filum terminale adhering to the tumor was cut off (Figure 2C). Histological diagnosis confirmed a totally cystic schwannoma (Figure 2D). The patient had complete recovery of his symptoms postoperatively. At the 2-year follow-up, no recurrence was observed (Figure 3B).

**DISCUSSION**

Schwannoma, the most common peripheral nerve benign tumor, is a slow-growing nerve tumor. The lumbar region is one of the most common sites for spinal schwannoma, but totally cystic schwannomas in the lumbar spine are rarely documented in the English literature. Schwannoma of the cauda equina has no specific clinical presentation, thus the slow-growing lesions in the lumbar region are often ignored for a long period of time, which accounts for their large size at presentation.

In this report, 2 cases of totally cystic schwannoma of the cauda equina are presented. Magnetic resonance imaging of the lumbar spine revealed a lesion at L2-L3 for patient 1 and at L4-L5 for patient 2. The contrast MRIs revealed a ring-like enhancement of the tumors in both patients. Therefore, contrast MRI should be performed to diagnose cystic schwannomas because they have a well-enhanced wall compared with other cystic lesions, which usually lack this structure. Both tumors were associated with compression of the spinal nerve roots and stenosis of the lumbar spinal canal, so a posterior approach was used to remove the lesions. A comparison of
the current patients with previous reports is provided in the Table.

Schwannoma is a mostly solid tumor. Cystic degeneration can occur in the peripheral nerve root; due to the rarity of the totally cystic schwannoma, it is necessary to distinguish it from other cystic lesions, such as Tarlov, arachnoid, or neurenteric cysts. The importance of diagnosing this tumor cannot be overemphasized in view of their varied biological behavior and prognosis. Postoperative histopathological examination forms the mainstay of differentiation.

The prognosis for cystic schwannomas is similar to that of solid schwannomas, and the treatment of cystic schwannomas is also similar to that for other solid spinal schwannomas. For the 2 current patients, a laminectomy was performed (at L2-L3 for patient 1 and at L3-L5 for patient 2) and the lesions were completed excised. Most of the filum terminale were pushed dorsally by the tumor, although a single strand of filum terminale adhered to the tumor for both patients. The tumor was completely removed by cutting off the single strand of the filum terminale without any complications. Kim et al. reported that the involved nerve roots or cauda equina were nonfunctional at the time of surgery and

### Table

<table>
<thead>
<tr>
<th>Authors</th>
<th>No. of Patients</th>
<th>Sex/Age, y</th>
<th>Tumor Location</th>
<th>Imaging Characteristics</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current study</td>
<td>2</td>
<td>M/62</td>
<td>L2-L3</td>
<td>MRI revealed a ring-like enhancement of the 2 lesions.</td>
<td>2 y</td>
</tr>
<tr>
<td>Turgut &amp; Erkus¹</td>
<td>1</td>
<td>F/43</td>
<td>L1-L5</td>
<td>An intrathecal mass nearly filled the thecal sac.</td>
<td>16 mo</td>
</tr>
<tr>
<td>Parmar et al⁴</td>
<td>5</td>
<td>F/26</td>
<td>L2-L4</td>
<td>The intensity of the lesion was higher than the surrounding cerebrospinal fluid. The lesion showed a ring-like enhancement with irregular nodular margins.</td>
<td>6 mo</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L1-L2</td>
<td>The lesion was hyperintense on the T2-weighted MRI, and a homogenous ring-like enhancement was observed.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L1</td>
<td>The lesion was hypointense on T1- and T2-weighted MRI. Contrast MRI revealed a thick, irregularly enhanced wall.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L2-L3</td>
<td>The lesion was hypointense on T1- and T2-weighted MRI. Contrast MRI revealed a homogenous enhancement of the wall.</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L1</td>
<td>The lesion was hypointense on T1- and T2-weighted MRI. Contrast MRI revealed enhancement of the wall and septa.</td>
<td>3 mo</td>
</tr>
<tr>
<td>Borges et al⁷</td>
<td>1</td>
<td>M/55</td>
<td>L4-L5</td>
<td>Contrast MRI revealed a ring-like enhancement of the cyst.</td>
<td>1 y</td>
</tr>
<tr>
<td>Kasliwal et al⁸</td>
<td>1</td>
<td>M/70</td>
<td>L3</td>
<td>Characteristic ring-like enhancement was seen on MRI.</td>
<td>None</td>
</tr>
<tr>
<td>Saiful Azli et al⁹</td>
<td>1</td>
<td>M/54</td>
<td>L4-S1</td>
<td>Contrast MRI revealed a ring-like enhancement of the wall.</td>
<td>1 y</td>
</tr>
</tbody>
</table>

Abbreviation: MRI, magnetic resonance imaging.
that the risks of neurologic deficits after sacrificing these roots are small.

Many theories exist for the cystic degeneration of schwannomas. One theory is that the degeneration of the Antoni B of a schwannoma leads to cyst formation, which can progress in size over time; another theory is that lesion growth can result in central ischemic necrosis and cyst formation within the tumor. However, the true mechanism needs to be further studied.

**CONCLUSION**

Totally cystic schwannoma of the cauda equina is a rare, benign tumor. Operative intervention is needed if the tumor causes stenosis of the lumbar spinal canal or compression of the nerve root. Totally cystic schwannoma can be diagnosed using preoperative MRI. Filum terminale adhered to the wall of the tumor can be cut off, which may not cause any neurologic deficit.

**REFERENCES**


*Figure 3:* At the 2-year follow-up, no schwannoma recurrence was seen on the sagittal T2-weighted magnetic resonance imaging without contrast for patient 1 (A) or the sagittal contrast T2-weighted magnetic resonance imaging for patient 2 (B).