Spinal extradural meningeal cyst: correct radiological and histopathological diagnosis

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Object. Spinal extradural meningeal cysts are uncommon and rarely cause neural compression. The clinical, radiological, and histopathological characteristics of the lesions are discussed and previous reports reviewed.

Methods. The authors describe five cases of a spinal extradural meningeal cyst (three female and two male patients, with a mean age of 47 years (range 14–75 years). Four of the cysts were located at the thoracolumbar level, the fifth at the sacral level. Radiological and neuroimaging-based diagnosis was made using a combination of magnetic resonance imaging, myelography, and/or computerized tomography (CT) myelography.

A connection between the spinal subarachnoid space and the cyst cavity was demonstrated on myelography and/or CT myelography in all cases, and dural defects were confirmed visually intraoperatively. In all cases histopathological examination confirmed that the cyst wall was formed by nonspecific fibrous connective tissue without a single-cell layer of inner arachnoid lining.

Conclusions. A diagnosis of spinal extradural meningeal cyst is difficult to make solely on histopathological examination. It is essential that the final characterization and diagnosis be based on intraoperative inspection combined with radiological and histopathological findings.

KEY WORDS • spinal cyst • extradural cyst • meningeal cyst • arachnoid cyst

Spinal extradural meningeal cysts are an uncommon cause of spinal cord or nerve root compression. The actual lining of the cyst cavity may or may not be shown to be arachnoidal tissue on histological examination. Therefore, the term “extradural arachnoid cyst” is used interchangeably with “extradural meningeal cyst.” The classification of spinal meningeal cysts in the literature is indistinct and, in certain categories, histologically misleading. Goyal, et al., observed that extradural arachnoid cysts were synonymous with sacral meningoceles, arachnoid pouches, arachnoid diverticula, and meningeal cysts. Nabors, et al., have simplified the classification of spinal meningeal cysts into three major categories: extradural cysts without nerve root fibers (Type I); extradural cysts with nerve root fibers (Type II); and intradural cysts (Type III). Type IA is a so-called extradural meningeal cyst (extradural arachnoid cyst), Type IB is a sacral meningocele (occult sacral meningocele), Type II is a Tarlov perineural cyst or a spinal nerve root diverticulum, and Type III is an intradural arachnoid cyst.

Magnetic resonance imaging appears useful as an initial modality to identify the cystic mass. Myelography and/or CT myelography are essential to reveal any connection between the cyst and the subarachnoid space. Demonstration of this connection allows for an accurate diagnosis of a spinal meningeal cyst.

The final characterization is based on both the intraoperative inspection and the histopathological findings. A diagnosis of a spinal meningeal cyst should not be based solely on histopathological findings. In this study, we present five cases of a Type I spinal meningeal cyst, including one previously reported case.

CLINICAL MATERIAL AND METHODS

Table 1 provides a summary of the clinical data obtained in the five patients. Their mean age was 47 years (range 14–75 years). There were three female and two male patients. Four of the cysts were located at the thoracolumbar level and one at the sacral level. The patient in Case 3 had undergone a lumbar puncture 3 years before the present symptoms occurred; the other four patients had suffered no prior illness or trauma. Presenting symp-
toms included low-back pain, buttock pain, leg pain, leg weakness and/or numbness, gait disturbance, and urinary incontinence. Intermittent exacerbation of symptoms evidently occurred with changes in posture in one patient (Case 2). All patients underwent plain radiography, MR imaging, water-soluble myelography, and/or CT myelography. Laminectomy was performed for excision of the cyst in all cases.

RESULTS

Preoperative MR imaging revealed that all cysts had the same signal intensity as the CSF. A cord or cauda equina was observed anteriorly in all cases. Water-soluble myelography and/or CT myelography demonstrated a connection between the spinal subarachnoid space and the cyst cavity when the cysts filled with contrast medium. In each case, the dural defect was confirmed at the time of the surgery. In all cases, histopathological examination of the cyst wall showed nonspecific fibrous connective tissue, as well as the absence of single-cell layer of inner arachnoid lining.

ILLUSTRATIVE CASES

Case 1
This 14-year-old boy presented with a 2-week history of low-back pain. There was no history of illness or trauma. Sensory, bowel, and bladder functions were normal. Upper motor neuron dysfunction was not demonstrated. Routine laboratory tests yielded normal results. Magnetic resonance imaging demonstrated an extradural cystic lesion, with a CSF signal intensity, extending from T-12 to L-1 (Fig. 1 left). The cyst displaced the thecal sac and spinal cord anteriorly. Postmyelography CT scanning revealed that the cyst filled with contrast medium at this level (Fig. 1 right). The patient underwent a thoracolumbar laminectomy for excision of the cyst. Histopathological examination of the cyst wall showed nonspecific fibrous connective tissue. No single-cell layer of inner arachnoid lining was observed (Fig. 2).

Case 2
This 75-year-old woman presented with a 3-year history of progressive buttock pain, left leg weakness, and urinary incontinence. Intermittent exacerbation of symptoms had occurred as had changes in posture. There was no history of illness or trauma. Routine laboratory testing yielded normal results. Magnetic resonance imaging demonstrated an extradural cystic lesion extending from S2 to S4 (Fig. 3). Water-soluble myelography revealed that the cyst filled with contrast medium (Fig. 4). The patient underwent a laminectomy for excision of the cyst. Histopathological examination of the cyst wall showed nonspecific fibrous connective tissue. No single-cell layer of inner arachnoid lining was observed.

DISCUSSION

Spinal meningeal cysts are uncommon, accounting for 1 to 3% of all spinal tumors.3,8 Spinal meningeal cysts occur most frequently in the thoracic spine (65%), followed by the lumbar and lumbosacral spine (13%), the thoracolumbar spine (12%), the sacral spine (6.6%), and the cervical spine (3.3%).2 Most of the lesions are located posteriorly in the spinal canal. The present sex ratio of female to male (2:1) patients is the reverse of that in previous series.7 Thoracic cysts typically occur in adolescents, and sacral cysts are more often found in adults.2 Intermittent exacerbation of symptoms may occur with postural changes and Valsalva maneuvers.2 Intermittent episodes of remission are shown in more than 30% of patients, although in the majority episodes progress in severity over months.

Magnetic resonance imaging is very effective when diagnosing meningeal cysts and does not require intrathecal injection of contrast medium. It can correctly delineate the cyst, which has a CSF signal intensity, and define its anatomical relation to the surrounding structures. Many authors believe that MR imaging should completely replace myelography in cases involving spinal meningeal cysts. Once the cyst is identified, however, myelography and/or CT myelography may aid in demonstrating any connection between the cyst and the subarachnoid space.

Myelography or intraoperative inspection has demon-

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yrs), Sex</th>
<th>Symptom</th>
<th>Cyst Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14, M</td>
<td>low-back pain</td>
<td>T12–L1</td>
</tr>
<tr>
<td>2</td>
<td>75, F</td>
<td>buttock pain, leg weakness &amp; urinary incontinence</td>
<td>S2–4</td>
</tr>
<tr>
<td>3</td>
<td>35, F</td>
<td>back pain &amp; bilat leg numbness</td>
<td>T12–L2</td>
</tr>
<tr>
<td>4</td>
<td>58, M</td>
<td>bilat leg weakness, numbness &amp; urinary incontinence</td>
<td>T11-L1</td>
</tr>
<tr>
<td>5</td>
<td>54, F</td>
<td>low-back pain</td>
<td>T11-L1</td>
</tr>
</tbody>
</table>
Spinal extradural meningeal cyst

strated a subarachnoid space–cyst cavity connection in approximately half the cases. In a recent study, however, the authors suggested that such a connection exists in nearly all cases of a meningeal cyst. A subarachnoid space–cyst cavity connection was identified in all five cases in this series.

Computerized tomography myelography demonstrates partial or complete CSF block in the spinal canal. The extradural position of the meningeal cyst is verified by its displacement in the subarachnoid space and its common extension through several intervertebral foramina. The cyst itself usually spans several vertebral bodies in length.

It has been reported that, histopathologically, the cyst wall consists of fibrous connective tissue with or without an inner single-cell lining, which may represent an arachnoid membrane. These findings have suggested that the cyst originates from the meninges because of the thick collagenous outer wall and a less consistent inner layer of arachnoid. The primary origin of the extradural meningeal cyst, however, remains uncertain.

The differential diagnosis includes tumor, ependymal cysts, epi- or dermoid cysts, enterogenous cysts, and teratogenous cysts. An ependymal cyst is typified by its lining of cuboidal-to-columnar, nonstratified, ciliated epithelium. It is usually situated anterior to the cervical cord and is found predominantly in children. Epidermoid and dermoid cysts occur most frequently in the lumbosacral area. Keratinizing squamous epithelium lines both cysts, but the wall of the dermoid contains sebaceous glands and hair follicles. Although rare, an enterogenous cyst most often affects the cervical and upper thoracic region. The cyst wall is only simple cuboidal or columnar epithelium, with or without cilia. The presence of an anterior osseous defect and/or goblet cells supports the diagnosis. A teratogenous cyst occurs at any level of the intradural compartment and is variably composed of neuroecto-, ecto-, endo-, and mesodermal derivative.

In previous reports, surgeons resected the cyst wall from the posterior aspect of the thecal sac and closed the dural defect to eradicate the valvelike mechanism. Because the remaining cystic wall does not promote recurrence, total resection is unnecessary if the posterior wall of the thecal sac has been explored and the dural opening has been obstructed. In general, asymptomatic patients do not need surgery. Surgery is usually recommended in cases involving a large cyst with a mass effect and associated symptoms.

Although a spinal meningeal cyst is rare, it should be kept in mind, especially when leakage of contrast medium is suspected during myelography and/or CT myelography. The diagnosis of a spinal extradural meningeal cyst is not made solely on histopathological findings. It is essential that the final characterization and diagnosis be based on combined intraoperative inspection, radiological findings, and histopathological results.
References


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