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Case Report

Diagnosis and treatment of noncommunicating extradural spinal thoracolumbar arachnoid cyst

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ABSTRACT

Background: Noncommunicating extradural spinal arachnoid cysts are extremely rare. They are believed to arise from congenital defects in the dura mater and become enlarged as a consequence of increased cerebro-spinal fluid (CSF) pressure within the subarachnoid space. Most retain a communicating pedicle through which the extradural cyst maintains connection with the subarachnoid space, and only rarely does this communication become sealed. The optimal treatment consists of complete surgical removal of the cyst with ligation of the communicating pedicle.

Case Description: A 29-year-old male presented with a progressive spastic paraparesis of 6 months' duration. The MRI showed a circumscribed intradural extramedullary cystic lesion located from D11-L2. Notably, peroperatively, the cyst appeared to be entirely extradural, without a communicating intradural pedicle. Further, no CSF leak was observed even after Valsalva maneuvers. Following surgical extirpation of the cyst, the patient sustained an uneventful recovery within 1 postoperative month.

Conclusion: Noncommunicating extradural arachnoid cysts are extremely rare causes of spinal cord compression and should be fully excised.

Keywords: Cerebro-spinal fluid, Noncommunicating extradural spinal arachnoid cyst

INTRODUCTION

Noncommunicating spinal extradural arachnoid cysts are extremely rare contributors to spinal cord compression and most typically involve thoracic spine (65%).[2,4] They typically develop when the arachnoid herniates through small dural defect and progressively enlarges following raised cerebro-spinal fluid (CSF) pressures. This increased wall tension causes back pressure which may contribute to the closure of the communicating pedicle[4,7] [Figure 1]. Magnetic resonance imaging is the diagnostic modality of choice, although computed tomography myelography is superior in detecting the specific location of the dural defect (e.g., communication between the cyst and the subarachnoid space).[3] Complete surgical excision with repair of the dural defect, either primarily or utilizing a duraplasty, is the treatment of choice.[1,5,6] Here, we reviewed the clinical presentation, pathogenesis, neuroimaging features, and surgical management of a noncommunicating spinal extradural arachnoid cyst.

CASE REPORT

History and physical examination

A 29-year-old male patient presented with 6 months' duration of a progressive paraparesis (4/5) accompanied by a partial T8 sensory level, but with intact sphincter function.

Neuroimaging findings

The thoracic MR revealed a well-defined, nonenhancing intradural extramedullary cystic lesion in the spinal canal measuring 8 cm × 3.2 cm extending from D11 to L2. It was hypointense on T1 and hyperintense on T2WI studies and contained internal septations. The lesion significantly compressed the spinal cord, conus, and cauda equina [Figures 2a-c and 3a and b].

Surgery: A laminectomy was performed from D11 to L2. Once the large extradural spinal arachnoid cyst was exposed, a plane was easily developed between the cyst and thecal sac allowing for complete *en bloc* cyst removal [Figure 4a and b]. There was no communication with the subarachnoid space as confirmed utilizing multiple Valsalva maneuvers. Due to the extensive laminectomy at the thoracolumbar junction and the anticipation of instability, the patient then underwent pedicle screw/rod fixation with posterolateral fusion using autologous bone chips from D11 to L2. Within 1 postoperative month, there was complete resolution of the preoperative motor deficit (e.g., with subsidence of the preoperative T8-level tingling, numbness, and resolution of weakness). Histopathologically, the lesion was an arachnoid cyst.

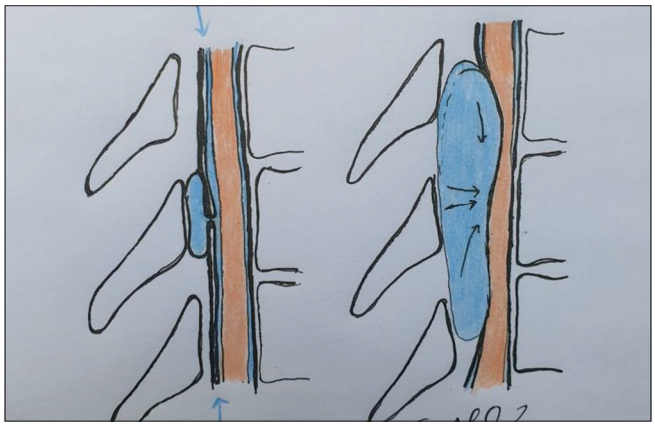

Figure 1: Schematic picture demonstrated the natural history and pathogenesis of the spinal arachnoid cyst. A small extradural arachnoid pouch with a communicating pedicle is illustrated. Progressive expansion of the cyst occur as a consequence of raised CSF pressure within the spinal subarachnoid space (drawn by blue arrowhead); the cyst wall tension is greater enough to seal the communication (drawn by black arrowhead).

DISCUSSION

Noncommunicating spinal extradural arachnoid cysts are extremely rare. The pathophysiology of cyst enlargement can be explained by either the active fluid secretion theory or pulsatile CSF dynamic theory.[6]

They have been classified into three categories: extradural cysts without spinal nerve root fibers (Type I), subdivided into extradural arachnoid cysts (Type IA), sacral meningoceles (Type IB), extradural cysts with spinal nerve root fibers (Type II), and intradural cysts (Type III).[1]

Clinical presentation

These cysts are usually seen in adolescents, whereas dorsolumbar and lumbar cysts usually appear in adults. Single cysts can extend over several spinal segments in craniocaudal direction, and may be accompanied by multiple, separate dural defects/communicating pedicles.[8]

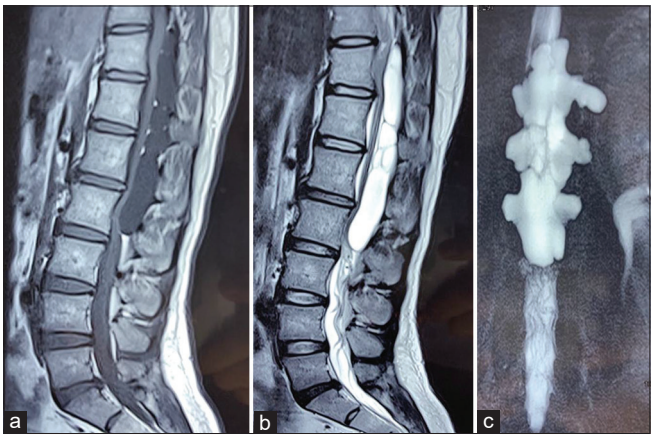

Figure 2: MRI of the dorsolumbar region sagittal section, T1WI (a) and T2WI (b), demonstrates a large intradural extramedullary cystic lesion with multiple internal septations, having significant compression over spinal cord, conus medullaries, and cauda equine. MR myelogram (c) showing variable extension into bilateral neural foramen.

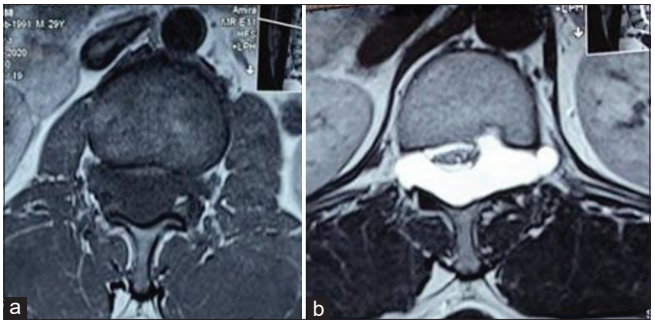

Figure 3: MRI of the dorsolumbar spine, axial section T1WI (a) and T2WI (b), demonstrates that intensity is similar to that of CSF which is isointense in T1WI and hyperintense in T2WI.

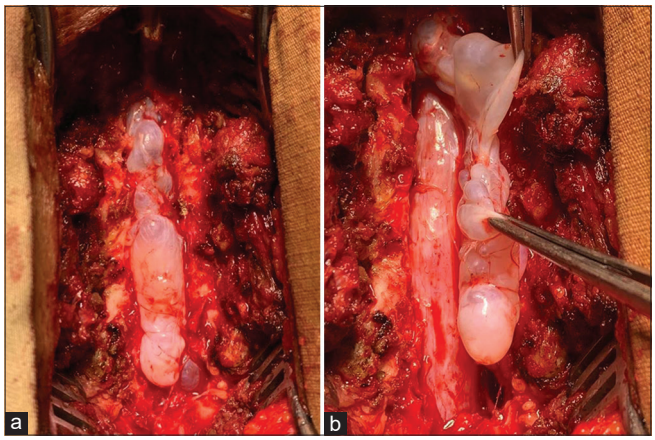

Figure 4: Peroperative photograph demonstrated a large cystic lesion after laminectomy of D11, D12, L1, and L2 (a) and *en bloc* removal of the cyst (b).

Neurological deficits depend on the location of the cyst and extent of compression and/or compromise of neurovascular structures.[5]

Diagnostic studies of choice for spinal arachnoid cysts

MR is the diagnostic study of choice because as it best defines the type and extent of the cyst, and relationship to surrounding neurovascular structures. For demonstrating the communication with the subarachnoid space, the optimal examination is the CT myelogram.[3]

CONCLUSION

Noncommunicating extradural thoracic spinal arachnoid cysts rarely contribute to spinal cord compression as shown in the case presented. The treatment of choice is routine gross total resection utilizing a decompressive laminectomy alone, with only select cases warranting consideration of fusion.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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