



SPINAL EXTRADURAL ARACHNOID CYSTS- RARE ENTITY: OUR EXPERIENCE AND REVIEW OF LITERATURE.

Dr Pradeep Jain	MS Mch Director, Department Of Neurosurgery And Ramraja Superspeciality Hospital.
Dr Anupama Jain	MD Radiodiagnosis, Director, Department of Radiodiagnosis, Ramraja Superspeciality Hospital.
Dr Chandan Mourya	MD Radiodiagnosis Consultant, Department of Radiodiagnosis, Ramraja Superspeciality Hospital.
Dr Siddharth Mishra	MD Radiodiagnosis Consultant, Department of Radiodiagnosis, Ramraja Superspeciality Hospital.

ABSTRACT

Extradural spinal arachnoid cysts (SEACs) are rare lesions, which may become symptomatic due to mass effect. Multiple cysts are even rarer of which few are reported to date. To the best of our knowledge only 18 cases of multiple extradural arachnoid cysts have been reported so far¹.

We experienced 2 cases of SEACs over a period of 5 years. 42 years old female patient presented with back ache and progressive paraparesis. Magnetic resonance imaging of spine revealed dorsal arachnoid cyst. 12-year-old female presented with back ache progressive paraparesis. Magnetic resonance imaging of spine revealed multiple spinal extradural arachnoid cysts located in dorso-lumbar spine causing mass effect. The patients underwent surgery for the excision of the cysts and closure of dural defects.

In the present paper the authors review the literature and discuss the clinical and neuroimaging characteristics, and surgical management of spinal extradural arachnoid cysts.

KEYWORDS : Spinal arachnoid cyst • Extradural arachnoid cyst • Paraparesis

INTRODUCTION

Spinal arachnoid cysts are a rare cause of spinal cord compression. These cysts most commonly occur in the middle to lower thoracic spine but also have been reported in the lumbar, lumbosacral, and thoracolumbar regions^{2,3,4,5}. Extra- dural arachnoid cysts develop from protrusions of arachnoid herniating through a small dural defect, and cyst enlargement can result in symptomatic spinal cord compression². The presenting symptoms may include pain, paresthesia, neurogenic intermittent claudication, bowel or bladder dysfunction, and variable degrees of spastic weakness. The cysts have a pedicle in communication with the spinal subarachnoid space and, because of their origin, contain CSF². MRI is the diagnostic procedure of choice as it is noninvasive and can demonstrate the nature of cyst, size, and the anatomic relationship with the spinal cord. The etiology and pathogenesis of spinal extradural arachnoid cysts are not clear. Although they most probably have a congenital origin, some may be acquired from trauma, iatrogenic.

Case 1 -

Clinical history- 42 Years old female patient presented with back ache with progressively increasing paraparesis over period of 3 yrs
Examination- Physical examination revealed 4/5 motor power in right lower limb and 4+5 in left lower limb with bilateral exaggerated tendon reflexes. There was sensory loss below D-6 level.

Imaging findings – X-Ray revealed scalloping of D-6 vertebra. MRI of dorsal spine revealed 6x3.1 cms. intraspinal dorsal extra dural CSF intensity nonenhancing lesion extending D3 to D7 vertebral level causing cord compression without myelopathic changes. Figure 1

Operative finding – D4 – D6 laminectomy done, which revealed bluish white fibrous and tense cystic lesion. Total removal of cyst with watertight closer of ostium at D5 level was done. Figure 2

Post operative course – Post operative course uneventful. Patient was in the follow up for 6 month with relief in clinical symptoms.

Case 2-

Clinical features- 12 year old female patient presented with back

ache with progressive paraparesis over a period of 2 months and acute onset of urinary problems.

Imaging finding- Multiple extra dural intra spinal CSF intensity lesions extending from D5 – L3 vertebral level causing widening of spinal canal and scalloping of vertebrae. Extension of lesion is also seen along nerve roots with widening of neural foramina. Dorsal spinal cord displaced anteriorly.

Operative finding – D6 – L4 laminectomy done which revealed Multiple (five) well defined CSF filled cysts with dural defects at D5, D7, D9, D12 nerve roots sheaths. Widening of spinal canal was seen in affected segments. The cyst were excised, their ostia were closed. Post operative course – Post operative period uneventful. Patient discharged 6th post operative day with improved motor strength in lower limbs and improved bladder control. In two months follow up patient remained relatively asymptomatic.

DISCUSSION-

Spinal arachnoid cysts were first described by Spiller in 1903⁷, although the first reported case is traced back to 1898 by Nonne (an autopsy finding). Most of the reported cases are solitary ones⁸. Extradural cysts occur most frequently in the thoracic spine (65%) followed by lumbar and lumbo-sacral (13%), thoraco-lumbar (12%), sacral (6.6%), and cervical (3.3%) regions.^{3,4,5,6}. They could occur either dorsal or ventral to the cord, with the former being more common.

Regarding the reported case so far, multiple extra-dural spinal arachnoid cysts seem to occur with higher frequency in females¹. The peak age of presentation is the early second decade of life. Thoracic cysts usually occur in young adolescents whereas thoracolumbar and lumbar cysts usually appear in adults in the 3-4th decade of life.

SEAC is a rare disease entity accounting for 1% of all spinal tumors⁹. SEACs are assumed to be the result of dural defects. Communication between the cysts and the intradural subarachnoid space has been reported in nearly all cases of arachnoid cysts^{10,11}.

The cause of dural defect can be congenital or acquired. Trauma,

arachnoiditis or iatrogenic cause can result in small dural tear and subsequent CSF accumulation to develop SEACs. Some reports demonstrated an association with dural ectasia or Marfan syndrome¹². In this condition, a primary defect in the organization of collagen with decreased tensile strength weakens the ligamentous structures and other supporting tissues. Dural stretching can lead to dural thinning to such an extent that it becomes ectatic and even deficient in areas. Although there is still debate in determining the etiology of SEACs, the theory of congenital dural defect is widely accepted¹¹. Dural defects may also be found around the nerve. The explanation is that tension across the movable dural sac and relatively fixed roots can predispose such dural tears. If patients have underlying structural abnormality such as Marfan syndrome, the probability of such tears may be further increased.

The wall of a spinal extradural arachnoid cyst usually consists of fibrous connective tissue with an inner single cell arachnoid lining; however, this lining is sometimes absent on histological examination. A SEAC is a meningeal cyst that can be classified into three major categories (Nabors et al). Type I cysts are composed of extradural arachnoid cysts (EAC) without nerve root fibers, Type II cysts are composed of EAC with nerve root fibers, and Type III cysts are composed of intradural meningeal cyst. Type 1 meningeal cysts can be subcategorized as EAC (Type Ia) and sacral meningoceles (Type Ib).¹³

Magnetic resonance imaging appears to be effective as an initial modality for diagnosing arachnoid cysts and does not require the intrathecal injection of contrast medium. It can define the anatomical relationship to surrounding structures. The imaging characteristics of arachnoid cysts are similar to those of CSF signal intensity. The presence of vertebral body scalloping and expansion of the neural foramina bilaterally from osseous remodeling suggests longstanding mass effect from the lesion. With use cinematic MRI (cine -MRI) small dural defect may be detected which were missed on routine MRI.¹⁴

One important aspect of preoperative evaluation is to determine the size and location of the dural defect, since it facilitates its repair via minimal laminectomy¹⁵. However, the preoperative identification of dural defects is difficult¹⁶. Myelography and CT myelography may disclose the cystic nature of the lesion along with its communication with the subarachnoid space as well as determination of the communication between different cysts.

The location of the cyst within the spine and the severity of spinal cord and root compression affect the clinical presentation. Spastic tetraparesis and impaired sensory levels are indicative of cervical cysts, whereas Horner syndrome is a common presentation in patients with cysts that occur lower in the cervical spine. Patients with thoracic cysts tend to present with progressive spastic paraparesis, but back pain is generally uncommon; conversely, patients with lumbar and lumbosacral cysts classically present with low-back pain, radiculopathy, and bowel and bladder dysfunction. Overall, motor weakness is usually more predominant than sensory loss. Symptoms can be intermittent and exacerbated by Valsalva maneuvers or gravitational positional forces. Remissions and fluctuation in symptoms have been reported in approximately 30% of cases.¹⁷

Total cyst excision, obliteration of the communicating pedicle, and repair of the dural flaw is the treatment of choice of the symptomatic lesions. Postoperative kyphosis may be prevented by performing laminoplasty rather than laminectomy.

CONCLUSION

Spinal arachnoid cysts are a rare cause of spinal cord compression. MRI is the diagnostic procedure of choice as it is noninvasive and can demonstrate the nature of cyst, size, and the anatomic relationship with the spinal cord. Signs and symptoms of SEACs are due to chronic cyst expansion and compression of the neural structures and thus, SEACs need surgical treatment. Diverse surgical

techniques have been introduced and complete microsurgical resection of SEACs with meticulous repair of dural defect has been advocated as treatment of choice for SEACs.

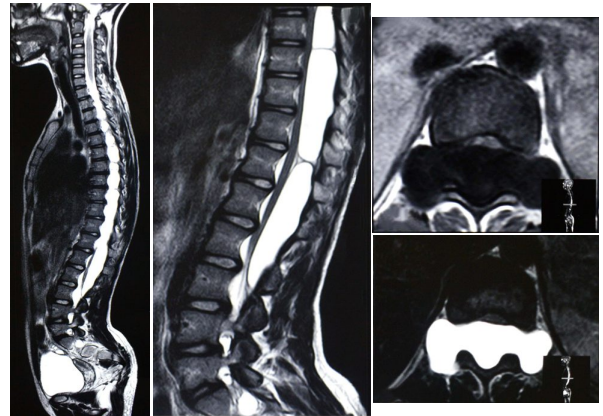


Figure 1 A sagittal T2W image showing large segment T2 hyperintense lesion extending from D3 – L4 level. Figure 1B T2 sagittal image showing thin T2 hypointense cyst walls. Image 1C T1W showing hypointense lesion in the spinal canal extending in the neural foramina. Image 1D T2W axial image showing T2 hyperintense lesion consistent with CSF intensity. Spinal cord is displaced anteriorly.



Figure 2 – Intra operative image showing CSF filled cystic lesion.

Reference

1. Bitaraf MA, Zeinalzadeh M, Meybodi A T, Meybodi K T, Habibi Z: Multiple extradural spinal arachnoid cysts: a case report and review of the literature. *Cases Journal* 2009
2. Liu JK, Cole CD, Kan P, Schmidt MH: Spinal extradural arachnoid cysts: clinical, radiological, and surgical features. *Neurosurg Focus* 22(2):E6, 2007
3. Kikuta K, Hojo M, Gomi M, Hashimoto N, Nozaki K: Expansive duraplasty for the treatment of spinal extradural arachnoid cysts: case report. *J Neurosurg Spine* 4:251-255, 2006
4. Kim MS, Kim SH: Syringomyelia associated with a spinal arachnoid cyst. *J Korean Neurosurg Soc* 45:315-317, 2009
5. Myles LM, Gupta N, Armstrong D, Rutka JT: Multiple extradural arachnoid cysts as a cause of spinal cord compression in a child. *Case report. J Neurosurg* 91:116-120, 1999
6. Spiegelmann R, Rappaport ZH, Sahar A: Spinal arachnoid cyst with unusual presentation. *case report. J Neurosurg* 60:613-616, 1984
7. Takagaki T, Nomura T, Toh E, Watanabe M, Mochida J: Multiple extradural arachnoid cysts at the spinal cord and cauda equina levels in the young. *Spinal Cord* 2006,
8. Cloward RB: Congenital spinal extradural cysts: case report with review of literature. *Ann Surg* 1968.
9. Netra R, Min L, Shao Hui M, Wang JC, Bin Y, Ming Z: Spinal extradural meningeal cysts: an MRI evaluation of a case series and literature review. *J Spinal Disord Tech* 24.
10. Lee CH, Hyun SJ, Kim KJ, Jahng TA, Kim HJ: What is a reasonable surgical procedure for spinal extradural arachnoid cysts: is cyst removal mandatory? Eight consecutive cases and a review of the literature. *Acta Neurochir (Wien)* 154:1219-1227, 2012
11. Oh JK, Lee DY, Kim TY, Yi S, Ha Y, Kim KN, et al. Thoracolumbar extradural arachnoid cysts: a study of 14 consecutive cases. *Acta Neurochir (Wien)* 154:341-348, 2012
12. Lee CH, Hyun SJ, Kim KJ, Jahng TA, Kim HJ: What is a reasonable surgical procedure for spinal extradural arachnoid cysts : is cyst removal mandatory? Eight consecutive cases and a review of the literature. *Acta Neurochir (Wien)* 154: 1219-1227, 2012
13. Nabors MW, Pait TG, Byrd EB, Karim NO, Davis DO, Koberne AI, et al. : Updated assessment and current classification of spinal meningeal cysts. *J Neurosurg* 68: 366-377, 1988
14. Neo M, Koyama T, Sakamoto T, Fujibayashi S, Nakamura T. Detection of a Dural Defect by Cinematic Magnetic Resonance Imaging and Its Selective Closure as a Treatment

- for a Spinal Extradural Arachnoid Cyst. SPINE Volume 29, Number 19,
15. Miyamoto M, Kim K, Matsumoto R, Isobe M, Isu T: Utility of preoperative magnetic resonance imaging myelography for identifying dural defects in patients with spinal extradural arachnoid cysts: case report. *Neurosurgery* 2006, 59:E941
 16. Neo M, Koyama T, Sakamoto T, Fujibayashi S, Nakamura T: Detection of a dural defect by cinematic magnetic resonance imaging and its selective closure as a treatment for a spinal extradural arachnoid cyst. *Spine* 2004, 29:E426-430.
 17. Liu JK, Cole CD, Kan P, Schmidt MH: Spinal Extradural Arachnoid Cysts: Clinical, Radiological, and Surgical Features. *Neurosurgical Focus*; 2007;