Spinal arachnoid cyst

Spinal arachnoid cyst may be either intradural (type III meningeal cyst) or extradural (type IA meningeal cyst).

Epidemiology

Spinal arachnoid cysts may present at any age. There is no gender predilection.

Almost always dorsal, most common in the thoracic spine.

Most are extradural and these are sometimes referred to as arachnoid diverticula - these may be associated with kyphoscoliosis in juveniles or with spinal dysraphism.

Spinal arachnoid cysts are less commonly in the children; they present with slowly progressive quadriparesis or neck pain. Surgical treatment is necessary for symptomatic spinal arachnoid cysts [1].

Spinal arachnoid cysts are rare in the pediatric population and found predominately in the thoracic and posterior spinal cord. Affected patients present with back pain, weakness, or gait instability [2].

In the literature, only 26 (17 children) cases had cysts anteriorly located in the cervical region, and the most frequent sign was quadriparesis. Previously, two pediatric patients presented with torticollis, neck pain, and paresis [3].

Classification

They are classified taking into account whether they are extra- or intradural, and nerve root involvement.

Spinal epidural arachnoid cyst

Spinal intradural arachnoid cyst

Spinal arachnoid web

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thoracic: 80%

cervical: 15%

lumbar: 5%

Etiology

They may be congenital or acquired. Secondary arachnoid cysts are usually due to trauma, haemorrhage, inflammation, surgery or lumbar puncture.

Associations

Spina bifida

Diastematomyelia

Pathology

As with any arachnoid cyst, spinal arachnoid cysts are CSF-filled sacs contained by the arachnoid mater. The degree of communication with the surrounding CSF space is variable with some cysts freely communicating and others not at all.

Clinical features

Most spinal arachnoid cysts are asymptomatic and are discovered incidentally. Clinical symptoms, if present, may include pain, weakness, numbness, and/or bladder/bowel incontinence. Symptoms may be exacerbated by postural changes and the Valsalva maneuver.

Expansion of the cyst, whether acute, subacute or chronic, leads to neural compression resulting in radiculopathy and/or myelopathy.

Diagnosis

CT

On CT myelography, the compressed cord is displaced anteriorly.

Most arachnoid cysts eventually opacify with contrast, although the rate at which they do so is variable.

In many instances, the cyst opacifies readily and as such, it may be challenging to diagnose with certainty. Early scanning is advisable, to 'catch' the cyst before it becomes isodense to CSF, while considering the need for more delayed scanning if appropriate CSF mixing is not achieved. This may necessitate the introduction of contrast on the CT table rather than at fluoroscopy.

MRI

As the cysts follow the intensity of CSF and their walls are generally not visible, they may not be identified unless the cord is displaced.

T1: CSF intensity

T2: CSF intensity, may even be brighter than CSF, since there is no signal loss from pulsation/flow

T1 C+ (Gd): no contrast enhancement

phase-contrast imaging: decreased CSF flow within the cyst

DWI: no evidence of restricted diffusion

Differential diagnosis

With a ventral cyst, consider a neurenteric cyst.

For intradural arachnoid cysts, a number of alternative diagnoses should be considered:

Thoracic idiopathic spinal cord herniation (ISCH): Patients with ISCH commonly had severe preoperative neurological deficit, Brown-Séquard syndrome and higher kink angle while patients with SAC had back pain, longer length of disease and altered CSF in the lesion [4].

Focal cord deformity

Phase-contrast MRI: absence of CSF flow ventral to the herniated cord and a normal CSF flow pattern dorsal to the cord can be challenging to distinguish; myelography may be helpful

spinal epidermoid cyst

bright on DWI (as in the brain, spinal epidermoids are differentiated from arachnoid cysts by their brightness on DWI)

spinal dermoid cyst most common location is the lumbar spine imaging characteristics are variable but usually resemble fat

spinal hydatid cyst most commonly extradural (intradural extramedullary lesions are extremely rare) usually multiloculated may show minimal enhancement spinal cysticercosis peripheral enhancement usually multiloculated Rarely, extradural cysts may be considered, although they are generally clearly not within the dura.

They include:

synovial cyst

ganglion cyst

cysts of ligamentum flavum

cysts originating from the intervertebral discs

Treatment

Incidental asymptomatic cysts are managed conservatively.

When indicated, treatment options include:

1. percutaneous procedures: may be done under MRI [5]. or CT guidance. CT guidance usually requires use of intrathecal contrast to delineate the cyst

A. needle aspiration.

B. needle fenestration.

2. open surgical resection or fenestration

An important component of surgical treatment of epidural cysts includes closure of the arachnoid defect, if any, which could become a source of CSF leak.

Case series

Fam et al. from the University of Iowa Hospitals and Clinics, and Northwestern University, Feinberg School of Medicine, Chicago, Illinois, searched medical records for all spinal arachnoid cysts (SACs) in adults in the 10-year period ending in December 2016. Radiology and pathology reports were reviewed to exclude other spine cystic disorders. Recurrent or previously treated patients were excluded. Demographic variables (age, sex) and clinical presentation (symptoms, duration, history of infection or trauma, and examination findings) were extracted. Radiological features were collected from radiology reports and direct interpretation of imaging studies. Operative reports and media were reviewed to accurately describe the surgical technique. Finally, patient-reported outcomes were collected at every clinic visit using the SF-36.

They identified 22 patients with SACs (mean age at presentation 53.5 years). Seventeen patients were women, representing an almost 3:1 sex distribution. Symptoms comprised back pain (n = 16, 73%), weakness (n = 10, 45%), gait ataxia (n = 11, 50%), and sphincter dysfunction (n = 4, 18%). The mean duration of symptoms was 15 months. Seven patients (32%) exhibited signs of myelopathy. All patients underwent preoperative MRI; in addition, 6 underwent CT myelography. SACs were located in the thoracic spine (n = 17, 77%), and less commonly in the lumbar spine (n = 3, 14%) and cervical/cervicothoracolumbar region (n = 2, 9%). Based on imaging findings, the cysts were interpreted as intradural SACs (n = 11, 50%), extradural SACs (n = 6, 27%), or ventral spinal cord herniation (n = 2, 9%); findings in 3 patients (14%) were inconclusive. Nineteen patients underwent surgical treatment consisting of laminoplasty in addition to cyst resection (n = 13, 68%), ligation of the connecting pedicle (n = 4, 21%), or fenestration/marsupialization (n = 2, 11%). Postoperatively, patients were followed up for an average of 8.2 months (range 2-30 months). Postoperative MRI showed complete resolution of the SAC in 14 of 16 patients. Patient-reported outcomes showed improvement in SF-36 parameters. One patient suffered a delayed wound infection.

In symptomatic patients with imaging findings suggestive of spinal arachnoid cyst, surgical exploration and complete resection is the treatment of choice. Treatment is usually well tolerated, carries low risks, and provides the best chances for optimal recovery [6].

Case reports

2016

A patient presented primarily with posterior column dysfunction, subacute in onset and rapidly progressing. Images of the cervical spine showed a dorsal arachnoid cyst, causing significant cord compression and signal changes in the cord, with no scalloping of the vertebrae.

Pillai explains the mechanism of rapid expansion of an asymptomatic spinal arachnoid cyst, causing neural compression leading to fast progression of neurological deficits. The dorsal location of the cyst, explain the absence of radiculopathy, which is a common presenting feature of ventrally located intradural arachnoid cyst [7].

1)
Gezici AR, Ergün R. Cervical anterior intradural arachnoid cyst in a child. Acta Neurochir (Wien). 2008 Jul;150(7):695-8; discussion 698. doi: 10.1007/s00701-008-1603-0. Review. PubMed PMID: 18536993.
2)
Bond AE, Zada G, Bowen I, McComb JG, Krieger MD. Spinal arachnoid cysts in the pediatric population: report of 31 cases and a review of the literature. J Neurosurg Pediatr. 2012 Apr;9(4):432-41. doi: 10.3171/2012.1.PEDS11391. Review. PubMed PMID: 22462711.
3)
Rahimizadeh A, Sharifi G. Anterior cervical arachnoid cyst. Asian Spine J. 2013 Jun;7(2):119-25. doi: 10.4184/asj.2013.7.2.119. PubMed PMID: 23741550; PubMed Central PMCID: PMC3669697.
4)
Nakashima H, Imagama S, Yagi H, Kato F, Kanemura T, Sato K, Kawakami N, Kamiya M, Yoshihara H, Ito K, Matsuyama Y, Nishida Y, Ishiguro N. Clinical and Radiographical Differences Between Thoracic Idiopathic Spinal Cord Herniation and Spinal Arachnoid Cyst. Spine (Phila Pa 1976). 2016 Dec 6. [Epub ahead of print] PubMed PMID: 27926670.
5)
Takahashi S, Morikawa S, Egawa M, Saruhashi Y, Matsusue Y. Magnetic resonance imaging-guided percutaneous fenestration of a cervical intradural cyst. Case report. J Neurosurg. 2003 Oct;99(3 Suppl):313-5. PubMed PMID: 14563151.
6)
Fam MD, Woodroffe RW, Helland L, Noeller J, Dahdaleh NS, Menezes AH, Hitchon PW. Spinal arachnoid cysts in adults: diagnosis and management. A single-center experience. J Neurosurg Spine. 2018 Sep 28:1-9. doi: 10.3171/2018.5.SPINE1820. [Epub ahead of print] PubMed PMID: 30265227.
7)
Pillai MK. Dorsal cervical spinal arachnoid cyst (Type III) presenting with dorsal column dysfunction: A case report. J Spinal Cord Med. 2016 Nov 9:1-3. [Epub ahead of print] PubMed PMID: 27827559.