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CASE REPORT

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MRI findings in multiple spinal arachnoid cysts: A rare cause of acute paraplegia

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ABSTRACT

Background: Spinal arachnoid cysts (SACs) are rare benign lesions arising from the arachnoid membrane containing cerebrospinal fluid. They are usually solitary and asymptomatic and are often discovered incidentally. Symptomatic patients may develop progressive neurological deficits due to spinal cord or nerve root compression. The presence of multiple intradural arachnoid cysts is an exceptional finding, and very few have been reported in the literature. These lesions pose diagnostic and therapeutic challenges, particularly when they extend over several vertebral levels. Magnetic resonance imaging (MRI) is the gold standard for their identification, as it allows precise assessment of their number, size, location, and impact on adjacent neural structures.

Case Presentation: A 34-year-old woman with no relevant medical history developed sudden-onset paraplegia associated with urinary retention and sensory disturbances. Clinical examination confirmed thoracic sensory level and flaccid paraplegia. MRI of the spinal cord demonstrated multiple intradural extramedullary arachnoid cysts spanning several thoracic levels, causing significant spinal cord compression, with no associated hemorrhage or neoplastic lesion. There was no evidence of prior trauma, surgery, or infection.

Conclusion: Multiple intradural SACs are an uncommon but important differential diagnosis in patients with acute myelopathy. MRI plays a central role in their diagnosis, enabling not only detection but also differentiation from other cystic or neoplastic lesions. Recognizing this rare entity is essential for timely management and preventing unnecessary or inappropriate interventions.

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Introduction

Spinal arachnoid cysts (SACs) are uncommon lesions, accounting for a small fraction of spinal space-occupying conditions. Magnetic resonance imaging (MRI) has revolutionized the detection of these cysts by providing high-resolution multiplanar imaging with excellent contrast resolution [1]. The role of MRI extends beyond diagnosis, providing an assessment of the mass effect, differentiation from other cystic lesions, and evaluation of treatment response. Given their rarity, multiple intradural SACs pose a diagnostic challenge, requiring meticulous interpretation of imaging findings [2,3]. This case report focused on the MRI characteristics of multiple intradural SACs and their role in guiding clinical management.

Case Presentation

Patient history and clinical presentation

A 34-year-old woman with no known medical history presented to the emergency department with acute-onset paraplegia of the lower limbs associated with urinary retention and bowel dysfunction.

She reported no history of trauma, infection, or constitutional symptoms. Neurological examination revealed complete motor loss in the lower extremities, absent deep tendon reflexes, and sensory level at the thoracic region. Spastic hypertonia was also noted in the upper limbs.

Imaging findings

MRI of the entire spine revealed multiple extensive intradural extramedullary arachnoid cysts spanning

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the thoracic and lumbar spinal canal. There were three contiguous cysts extending from Th8 to S2 (Fig. 1). The two upper cysts were located dorsal to the spinal cord and caused severe cord compression, especially at the Th7-Th8 level (Fig. 2). The lower cyst was anterior to the spinal canal. These cysts were also responsible for spinal cord atrophy and vertebral scalloping (Fig. 2). There was also a syringomyelia upper to the cysts in the cervicothoracic spinal cord and a cerebellar tonsillar ectopia, suggesting an associated Chiari I malformation (Fig. 3).

Key MRI features of the cysts included hyperintensity on T2-weighted and STIR images with cerebrospinal fluid (CSF)-like signal intensity and isointensity to CSF on T1-weighted images, without hemorrhagic or proteinaceous content. There was no contrast enhancement on postgadolinium T1-weighted imaging, ruling out neoplastic or infectious etiologies (Fig. 4). We also did not detect hemosiderin deposition on susceptibility-weighted imaging (T2*), excluding hemorrhagic lesions. However, we highlighted a significant mass effect on the spinal cord, particularly at the Th7-Th8 level, with intrinsic cord compression. The absence of enhancement, restricted diffusion, or hemosiderin deposits helped confirm the diagnosis of multiple spinal arachnoid cysts.

Management and follow-up

The patient underwent surgical decompression, which also allowed for histopathological diagnosis. The surgical specimen consisted of a cystic wall measuring 11.5 × 4 × 0.3 cm. Histopathological examination revealed a morphological appearance consistent with a specified cyst, with no signs of a malignant tumor.

Discussion

Multiple intradural spinal arachnoid cysts (SACs) are a rare and poorly understood clinical entity.

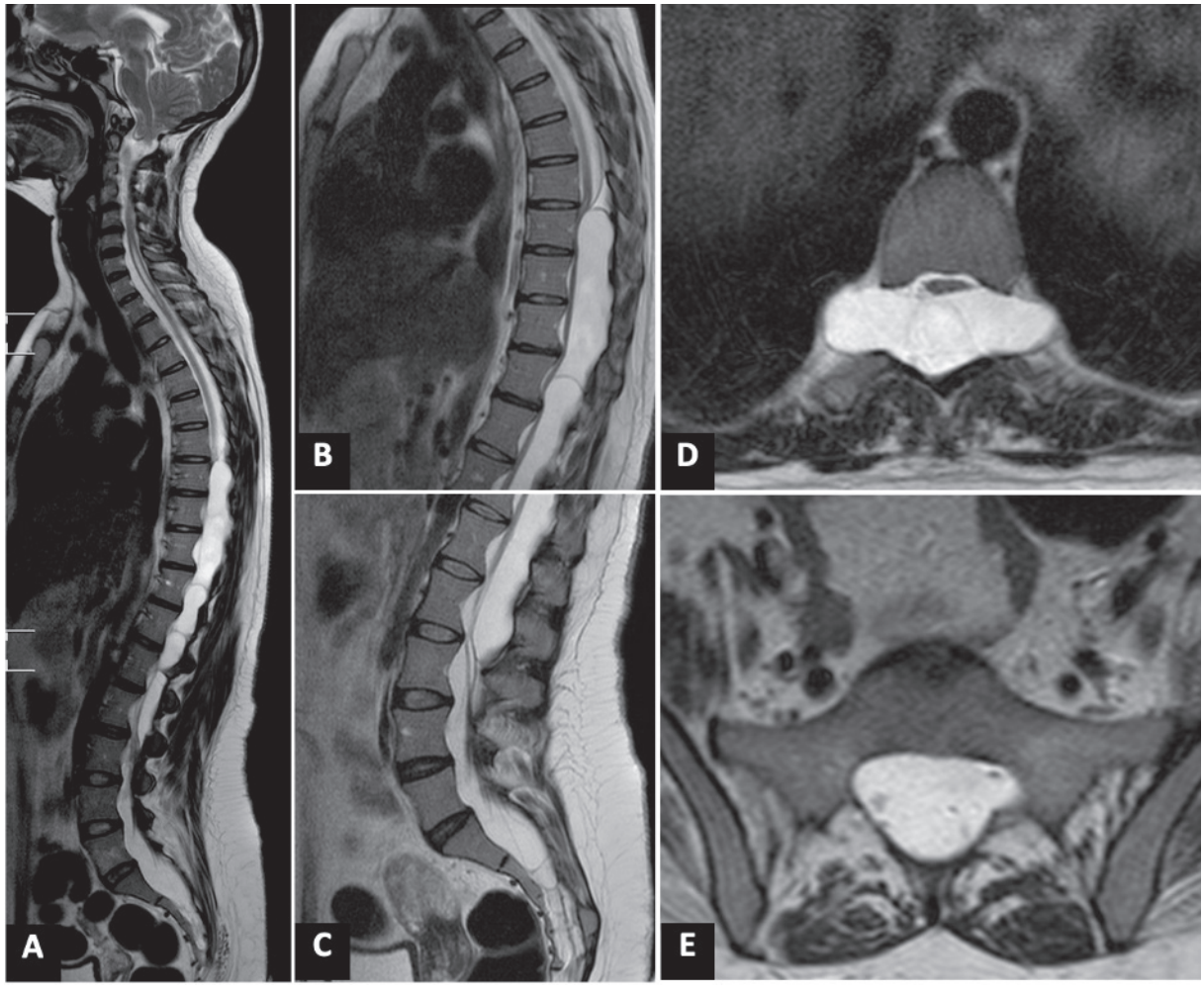


Figure 1. T2-weighted sagittal magnetic resonance imaging (MRI) sections of the whole (A), thoracic (B), and lumbar spine (C) with axial MRI at the Th9-Th10 (D) and S1 levels (E).

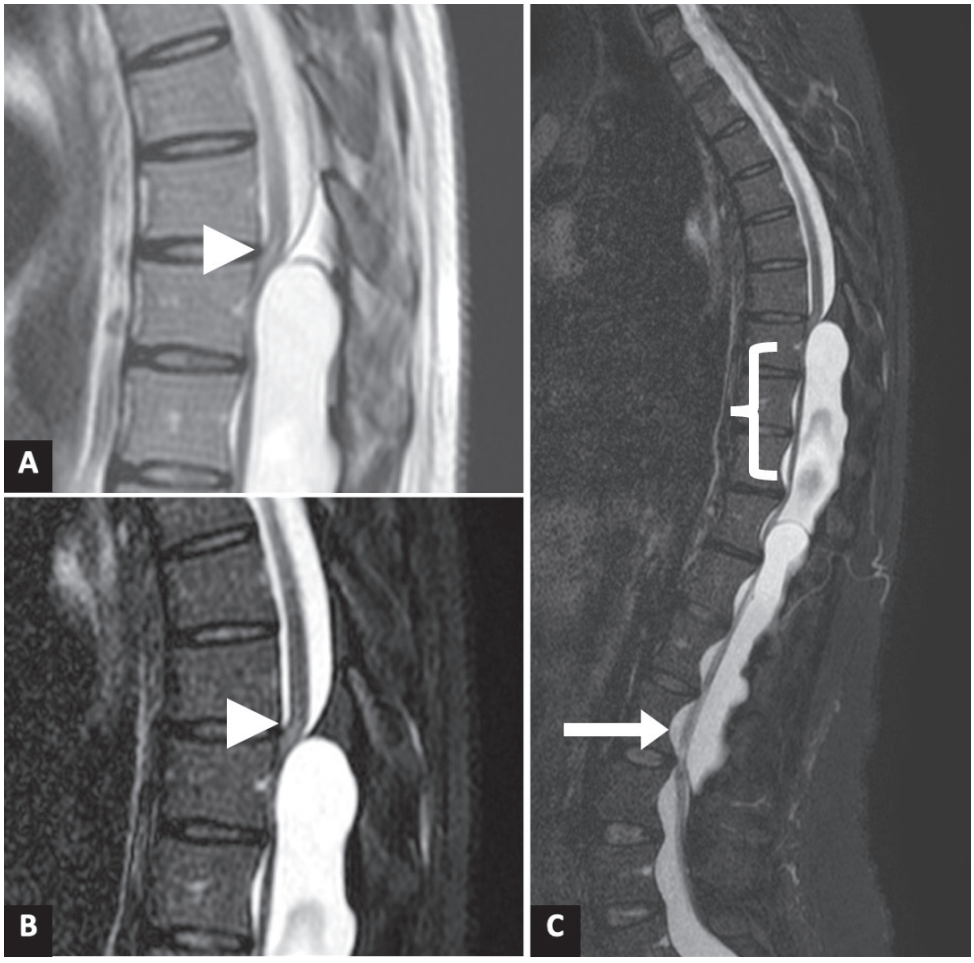


Figure 2. Sagittal MRI sections of the thoracic spine in T2-weighted (A) and STIR (B), with STIR of the whole spine (C), showing the spinal cord hyperintensity in T2 and STIR (arrow heads) and the spinal cord atrophy (bracket). The image also shows vertebral scalloping (single sided arrow).

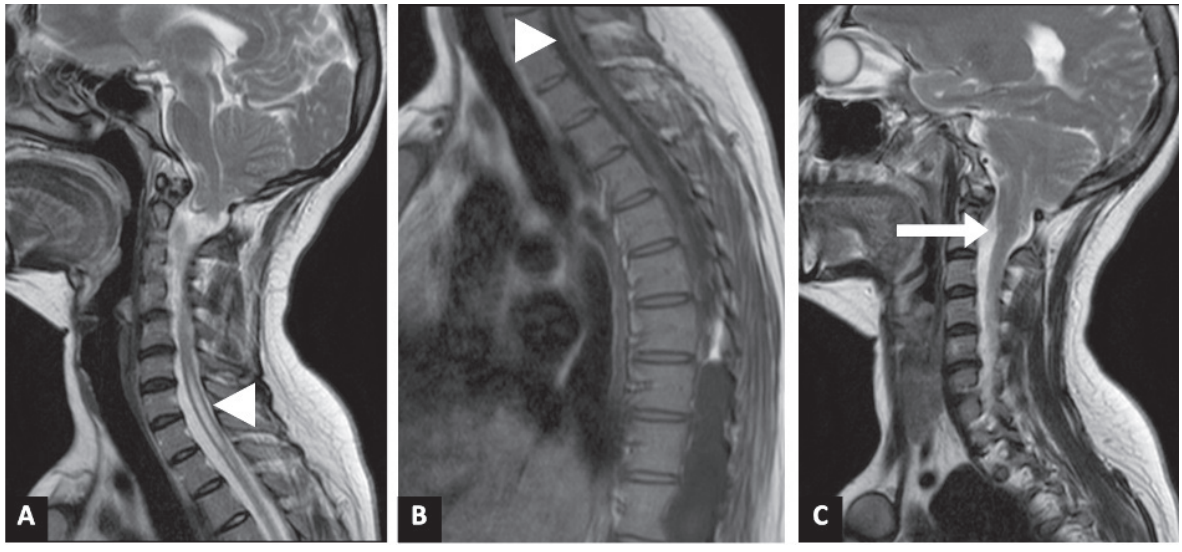


Figure 3. Sagittal MRI sections of the cervical and thoracic spine in T2-weighted (A and C) and T1 (B) images showing the syrinx extending from the C7 to Th3 levels in T1 and T2 CSF-like signals. The image also shows caudal descent of the cerebellar tonsil through the foramen magnum (single sided arrow).



Figure 4. Sagittal MRI sections of the thoracic and lumbar region in T1-weighted pre- (A and B) and post-contrast fat-sat (C and D), showing no contrast enhancement of the cyst or its parietal wall.

Although solitary SACs are uncommon but documented, cases of multiple intradural SACs are exceedingly rare, with only a handful of case reports described in the literature. These lesions can be discovered incidentally or present with a spectrum of symptoms depending on their size, location, and degree of spinal cord compression. The increasing use of spinal MRI has improved the detection of such lesions, although the natural history remains unpredictable [2,4].

MRI remains the gold standard for the detection and characterization. Typical features of SACs include T1-isointensity and T2-hyperintensity similar to CSF, absence of contrast enhancement, lack of restricted diffusion, and no blooming on susceptibility-weighted imaging (SWI). These findings help differentiate SACs from other cystic or necrotic spinal lesions. For instance, epidermoid cysts restrict diffusion, dermoid cysts often contain fat and appear hyperintense on T1, and postinfectious cysts may show peripheral enhancement or surrounding inflammatory changes. Compression of the spinal cord is variable, but it constitutes the main mechanism underlying neurological deficits, especially when the cyst is large, septated, or multiloculated. In our patient, the cysts were associated with progressive neurological decline, likely due to the chronic mass effect rather than an acute inflammatory or ischemic insult [3].

Differentiation from other intradural extramedullary lesions is crucial. The main differentials include arachnoiditis-related pseudocysts, neurenteric cysts (which are typically ventral and may show proteinaceous content), cystic neoplasms (ependymomas, schwannomas), and rare infections, such as neurocysticercosis. The table of differential diagnoses based on location and MRI signal characteristics is particularly useful for narrowing the diagnostic possibilities [1,3].

Etiopathogenesis and the hypothetical mechanisms of the manifestation

The origin of multiple intradural SACs is speculative. Proposed mechanisms include congenital malformations (as part of the Nabors type III cysts), traumatic tears in the arachnoid membrane allowing one-way CSF flow ("ball-valve" mechanism), or inflammatory insults causing arachnoid adhesions and cyst formation. The recurrent and de novo formation of cysts, as reported by El-Hajj et al. [2], supports a dynamic process of CSF entrapment and cystogenesis rather than a purely static congenital anomaly.

Although the case reported by Awad et al. [5] described acute neurological decompensation following minor trauma in a child, such abrupt presentations are exceptional. Most SACs follow an indolent course, thereby making the timing of intervention challenging. The idea that trauma or microtrauma can trigger cyst expansion or formation is compelling but still hypothetical.

Management considerations

Treatment strategies are based on symptom severity and cyst characteristics. Although surgical decompression and cyst fenestration remain the standard for symptomatic cases, especially those with progressive myelopathy or sphincter disorders,

conservative management with regular MRI follow-up is often preferred in minimally symptomatic or incidental cases. Surgery aims to relieve the mass effect and restore CSF flow. Minimally invasive techniques such as endoscopic fenestration have been described with promising results, particularly in pediatric populations.

However, recurrence remains a significant challenge. In the case described by El-Hajj et al. the patient underwent two surgical procedures with transient relief, followed by recurrence and formation of new lesions over a 10-year period. This highlights the chronic and potentially relapsing nature of this entity. Long-term follow-up is essential, and the decision to reoperate should be individualized.

From a radiological perspective, close monitoring for new signal changes, cord compression, or increased cyst burden is critical for the successful treatment of cystic recurrence. MRI remains the modality of choice, but CT-myelography may be helpful in complex cases in which CSF flow dynamics are in question [5–7].

Conclusion

Multiple intradural spinal arachnoid cysts are a rare but important differential diagnosis of acute spinal cord syndrome. MRI is the imaging modality of choice, providing crucial information about lesion morphology, mass effects, and differential diagnosis. Advanced MRI techniques, such as DWI, can enhance diagnostic accuracy.

Although surgical intervention is warranted in progressive cases, conservative management with MRI surveillance may be appropriate in select patients. Recognizing the characteristic MRI features of SACs is essential for accurate diagnosis and optimal patient management.

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