Thoracolumbar arachnoid cyst: case report and technique description

Quiste aracnoidal toracolumbar: relato de caso y descripción de la técnica

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Resumen

Introducción: El quiste aracnoideo espinal (QAE) tiene localización intradural, extradural o mixta, es raro y se reporta en la columna torácica, lumbar y lumbosacra. **Material y Métodos:** Masculino con pérdida súbita de la fuerza en pie izquierdo, incontinencia urinaria y alteraciones sensitivas en miembros inferiores. Resonancia magnética toracolumbar simple y contrastada con lesión quística intraespinal, extradural y extramedular de T12-L1 con efecto compresivo sobre la médula espinal. **Resultados:** Se realizó laminectomía descompresiva posterior de T12 a L2 e instrumentación posterolateral con tornillos transpediculares de T12 a L2 para evitar cifosis posquirúrgica. **Discusión:** El QAE puede debutar con déficit neurológico, con radiculopatía por compresión medular. No existe consenso sobre el tratamiento, por lo que sigue siendo controvertido. **Conclusiones:** El QAE es una patología rara y poco común que puede presentarse con evidencia de afectación neurológica ya sea con radiculopatía o compresión de la médula espinal. No existe consenso sobre su tratamiento, por lo que el tratamiento definitivo sigue siendo controvertido.

Palabras clave: Quiste aracnoideo espinal, laminectomía, descompresión microquirúrgica.

Abstract

Introduction: The spinal arachnoid cyst (SAC) has an intradural, extradural or mixed location, is rare and is reported in the thoracic, lumbar and lumbosacral spine. **Case report:** Male with sudden loss of strength in left foot, urinary incontinence and sensory disturbances in lower limbs. Simple and contrast thoracolumbar MRI with intraspinal, extradural and extramedullary cystic lesion of T12-L1 with a compressive effect on the spinal cord. We performed decompressive laminectomy of T12-L1, hemilaminectomy of L2 and posterolateral instrumentation with transpedicular screws from T12-L1. **Discussion:** The SAC can debut with neurological deficit, with radiculopathy due to spinal cord compression. There is no consensus about the treatment, so it remains controversial. **Conclusions:** SAC is a rare and uncommon pathology that can present with evidence of neurological involvement either with radiculopathy or spinal cord compression. There is no consensus on its treatment, so definitive treatment remains controversial.

Key words: Spinal arachnoid cyst, laminectomy, microsurgical decompression.

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Introduction

The spinal arachnoid cyst (SAC) has an intradural, extradural or mixed location. It is a rare pathology and can appear at all levels of the dural sac in order of greatest frequency. It is reported at the thoracic, lumbar, lumbosacral and thoracolumbar spine levels[1] and is It is located mainly in the posterior part of the spinal canal, moving the spinal cord forward. It comprises between 1% and 3% of tumor pathologies of the spine, most frequently affecting men in the second or third decade of life[2]. They can cause myelopathy, myeloradiculopathy or slowly progressive radiculopathy[3]. If they are not treated, these injuries can cause permanent damage to the spinal cord.[2] With the widespread use of MRI, many injuries are detected incidentally. MRI delineates the location and compression of the spinal cord; However, CT myelography is better for delineating the dural defect through which the extradural cyst communicates with the subarachnoid space[4].

We present the case of a thoracolumbar sac and the description of the surgical technique that we used to adequately resolve this rare entity.

Case report

29-year-old male, who began with a sudden loss of strength in the left foot, which progressed over 3 months to hanging foot and urinary incontinence and sensory alterations in the lower limbs. On neurological examination we found bilateral foot drop, hypoesthesia in dermatomes L4, L5 and S1 bilaterally, loss of proprioceptive, epicritic and vibratory sensitivity in L4 to S1, hypotonia and bilateral hypotrophy of both lower limbs, stretch reflexes of the patellar muscle and tendon. of Achilles 3/+++, marches with a step. Simple and contrasted thoracolumbar MRI with intraspinal, extradural and extramedullary cystic lesion with well-defined and regular borders of T12-L2 with direct compressive effect on the spinal cord suggestive of SAC (Figure 1).

We decided to perform decompressive laminectomy of T12-L1, hemilaminectomy of L2 and posterolateral instrumentation with transpedicular screws of T12-L1, with the purpose of stabilizing only the laminectomized segment and maintaining adequate sagittal balance, also with the intention of avoiding adjacent segment disease, which is more common to occur when performing long instrumentation and also trying to preserve the mobility of the distal lumbar segments. We subsequently resected the ligamentum flavum and epidural fat to visualize and differentiate the dura mater from the sac. With the support of transsurgical ultrasound, we outline the edges and visualize the pedicles associated with the SAC, which we tie with an absorbable suture (essential to reduce or avoid the risk of recurrence). Using a microsurgical technique, we resected the dural sac and surrounding nerve roots and finally removed the sac en bloc. We visualize the spinal cord, nerve roots, and proper flow of cerebrospinal fluid (CSF). Duroplasty was performed with dural substitute and 6-0 vascular Prolene and fibrin glue, checking the hermetic closure using a Valsalva maneuver (Figure 2). The resected piece was sent to the neuropathology service for study, reporting fibroconnective tissue covered by meningothelial cells, compatible with SAC (Figure 3). At 3 months of follow-up, the patient showed complete improvement in sensitivity in bilateral L4, L5 and S1 dermatomes and recovery of the posterior cords. He also completely recovered the function of the bladder sphincter, and the strength in the left foot improved 4/5 on the MRC scale, the left foot did not improve the motor deficit. Walks with the support of walking stick. He currently continues in physical therapy and rehabilitation sessions.

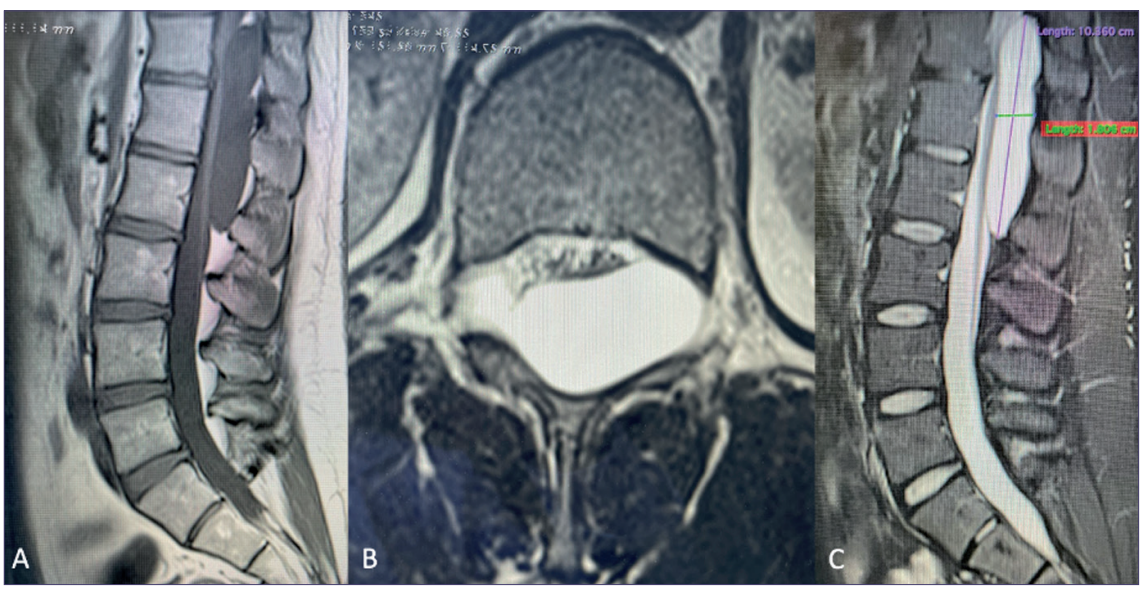

Figure 1. Magnetic Resonance of the Lumbar Spine: **A)** T1-weighted sagittal section showing a hypointense lesion, cystic in appearance, intraspinal, extradural, extramedullary; **B)** T2-weighted axial slice, showing ventral compression of the cauda equina; **C)** T2-powered sagittal section, hyperintense lesion with well-defined borders, measuring 10.3 cm x 1.8 cm.

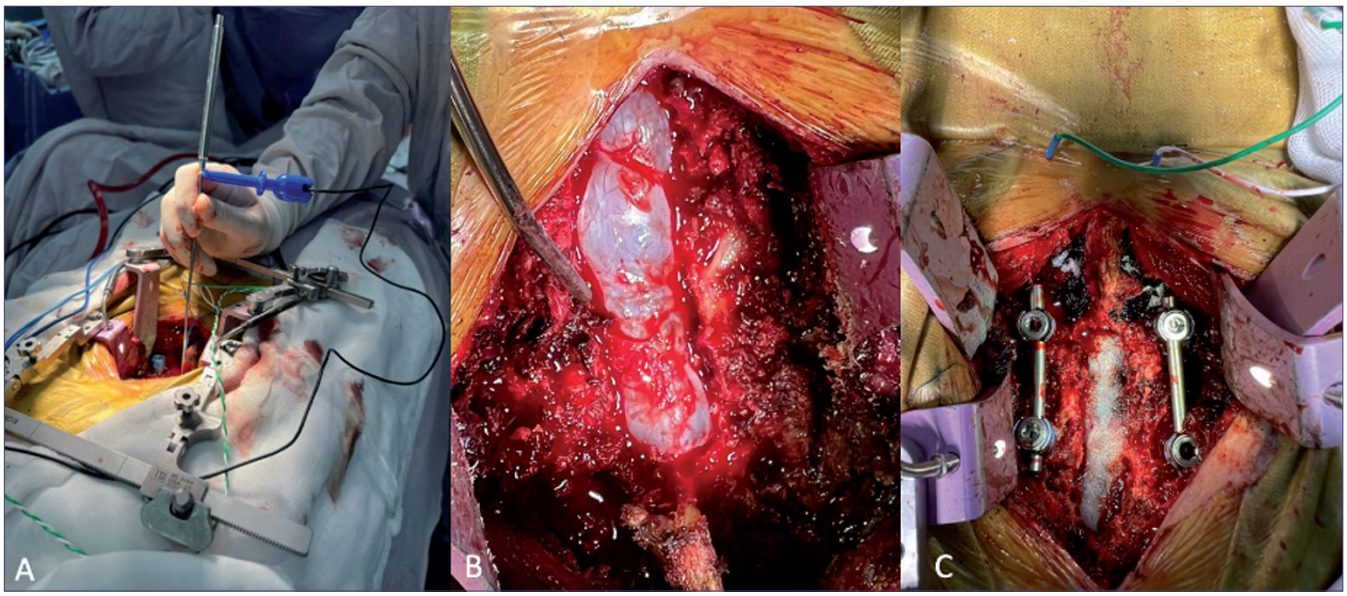

Figure 2. Microsurgical resection of the cyst and posterolateral arthrodesis of T12-L1: **A)** Intraoperative neuromonitoring for T12 and L1 transpedicular screw placement; **B)** Intraoperative macroscopic view of the arachnoid cyst; **C)** Final view of short arthrodesis to T12-L1, T12-L1 laminectomy, L2 hemilaminectomy, complete microsurgical resection of the arachnoid cyst, and dura mater substitute patch and fibrin glue.

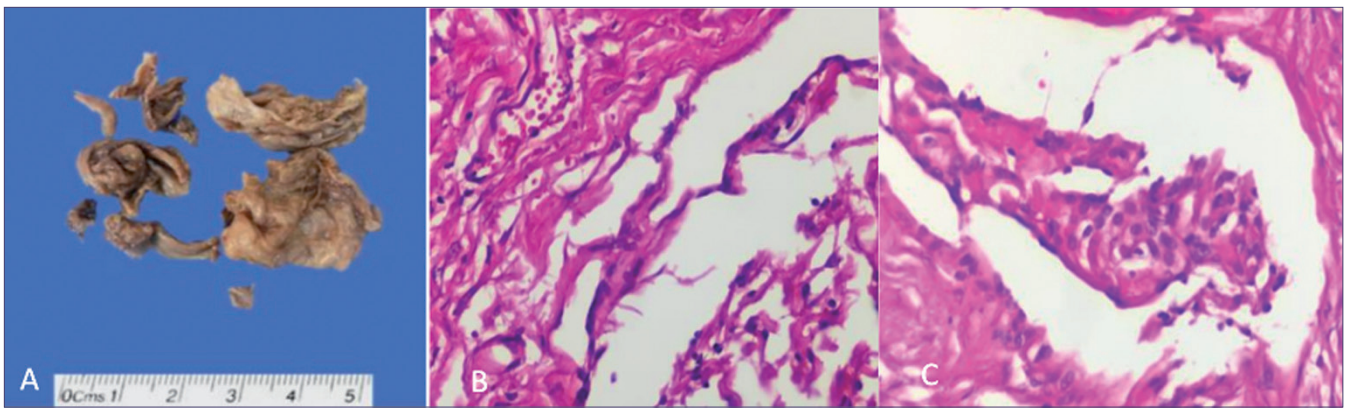

Figure 3. Result of neuropathology analysis: **A)** Tumor resection product; **B)** Cystic wall of fibro-connective tissue lined by meningothelial cells, H&E 400X; **C)** The Meningothelial Cells are polygonal and cohesive with wide cytoplasm, H&E 400X, typical of SAC.

Discussion

Theories regarding the pathogenesis of these cysts suggest that they arise from diverticula in the posticum septum or from ectopic arachnoid granulations, however, this has not been proven. In most cases, the initial cause of SAC is not identified and it is considered idiopathic. They can also have a congenital origin[5], develop from arachnoid adhesions after trauma, due to infectious causes, after various procedures, such as lumbar myelography, laminectomy and vertebroplasty. The most common sites for the ostium of the cyst are the entry point of the dorsal root to the dural sac and the dural midline with communication to the subarachnoid space through a pedicle, as occurred in our case and which we consider to be of idiopathic origin[5,6]. Inflammatory adhesions within the arachnoid are known to form arachnoid webs that can cause direct cord compression and myelopathy and form a one-way valve that traps the flow of cerebrospinal fluid, ultimately resulting in the formation of a SAC[7].

According to the classification described by Nabors[3], extramedullary cysts of the spinal canal can be divided into three main groups: the first group is meningeal cysts, which can be classified into subgroups such as type 1, extradural meningeal cysts that do not contain neural tissue; Type 2, extradural meningeal cysts containing neural tissue; Type 3, intradural meningeal cysts. The second group is non-meningeal epidural cysts, which include non-neoplastic lesions such as juxta-articular cysts, pigmented villonodular synovitis and, rarely, disc herniations, as well as dermoid neoplastic lesions, nerve sheath cystic lesions and metastases. The third group is neuroenteric cysts[8]. Various surgical techniques have been developed to treat extradural arachnoid cysts, but there is still no consensus on their management[9].

Various surgical treatments have been reported for symp-

tomatic patients with thoracolumbar arachnoid cysts. There are many surgical options such as simple bone decompression through laminectomies, laminotomies and laminoplasties, subtotal or total resection of the cyst, incision and drainage, and marsupialization of the cyst[6,8,10,11]. Simple drainage of the cyst contents may only result in temporary relief, so total resection of the SAC is most recommended, followed by airtight closure of the fistula by suture. If complete resection is difficult because the cyst adheres firmly to nerve tissue or dura mater, or due to intraoperative bleeding from epidural venous plexuses, leaving a small part of the cyst wall does not promote recurrence, since the accumulation of CSF and Recurrence of symptoms after initial removal of the cyst is rare[5]. According to Novak[12], the use of intraoperative ultrasound helps to delimit the upper and lower borders of the cyst with respect to the epidural fat, which is why we decided to use it during surgery and we consider it to be a useful tool for the adequate delineation of the SAC. If the cyst is attached to the dorsal wall of the dura mater, a fenestration or complete resection can be performed with part of the dura mater attached for subsequent closure with a dural patch, fascia lata and/or dural sealants. In ventral adhesions, fenestrations or derivations are recommended to avoid irreparable dural defects[6]. As in our case, once we have dissected and exposed the posterior wall of the SAC, which is a dense layer of translucent arachnoid membrane within which we observed pulsatility of the turbulent flow of the CSF, we make an incision in the posterior wall to then look for the dural defect (pedicle) which connects the interior of the SAC with the subarachnoid space. The dural defect is commonly located at the mid level or above the mid level of the SAC[1,5]. Duroplasty can be performed with Prolene 5-0, 6-0, or 7-0[1,13]. Other techniques include cystoperitoneal bypass, especially in cases where the dural ostium is long and irreparable, percutaneous aspiration guided by images and minimally invasive endoscopic surgeries, but currently there is no standardized minimally invasive approach[14]. We believe that in cases of SACs that cover several vertebral levels, it is advisable to perform laminectomy as widest possible in order to completely resect the cyst, avoid missing the fistula and identify any adhesion or fistula between the cyst and the dura mater and thus ensure optimal dural repair. Subsequently, it is advisable and sometimes mandatory, as in the case we present where the SAC is located in the thoracolumbar transition, to perform posterolateral instrumentation to avoid deformities[15]. Complications include hematomas, dural fistulas, cyst recurrence, and neural lesions. The recurrence rate of these cysts is more related to closure of the dural defect than to removal of the cyst. There is a 2% recurrence in patients with closure of the dural defect and 10% in those without dural closure[16,17].

Conclusions

SAC is a rare and uncommon pathology that can present with evidence of neurological involvement either with radiculopathy or spinal cord compression. There is no consensus on its treatment, so definitive treatment remains controversial. In our case we performed laminectomy, microsurgical decompression of the neural structures, complete resection of the cyst and short instrumentation with transpedicular screws to stabilize the spine, with the support of intraoperative neuromonitoring, obtaining an excellent surgical result and a good neurological evolution despite the sequelae, due to the long evolution time prior to surgery. As it is a technique widely known by neurosurgeons and spine surgeons, we consider that it can be a successful option for the definitive treatment of this rare and disabling injury.

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