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A multilocular discal cyst extending from the spinal canal to the extraforaminal region: A case report

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ABSTRACT

Background: Lumbar discal cysts are intraspinal extradural cysts communicating with the intervertebral disc. The usual location and morphology are in the caudal ventrolateral epidural space of the spinal canal, without extension to the neural foramen or crossing the midline and described as a well-defined homogeneous oval or spherical cyst on low and high signal intensities observed in lumbar lesions on T1-and T2-weighted magnetic resonance imaging, respectively. We report an unusual lumbar discal cyst in terms of the lesion location and morphology.

Case presentation: A 33-year-old-man presented with lower back and right anterior thigh pain. Magnetic resonance imaging revealed multilocular cystic lesions in the cranial ventrolateral epidural space at L2-L3 with low and high signal intensities on T1-and T2-weigted magnetic resonance imaging, respectively. We performed a full-endoscopic transforaminal cystectomy under general anesthesia.

Conclusion: Lumbar discal cysts should be considered a differential diagnosis for multilocular intraspinal cystic lesion.

1. Introduction

Lumbar discal cysts (LDC) are rare intraspinal extradural cysts with a distinct connection to the corresponding intervertebral disc. [1,2] LDC predominantly occur in physically active Asian males aged 30–50 years [3]. LDC are usually located in the caudal ventrolateral epidural space of the spinal canal, without extension to the neural foramen or crossing the midline. [4] The usual morphology is described as a well-defined homogeneous oval or spherical cyst with low and high signal intensities observed in lumbar lesions on T1 and T2 weighted magnetic resonance imaging (MRI). [1,2,4] We were able to review 63 English articles published by December 2022, with a total of 175 cases of discal cysts. Of these, atypical location and morphology were reported on MRI in 3 cases: 1 extraforaminal, 1 bilateral, and 1 multiple and multilevel LDC. [5–7] This is the first report of a multilocular discal cyst extending from the spinal canal to the extraforaminal region. Their pathogenesis is controversial, with many theories proposed to explain cyst development and pathology [8]. Detailed information regarding the natural history of this lesion and the best treatment method also remains controversial. Here, we report a patient with an unusual LDC treated a full-endoscopic transforaminal cystectomy (FETFC).

2. Case report

A 33-year-old man presented with pain and numbness in the right anterior thigh. His symptoms temporarily improved after taking nonsteroidal anti-inflammatory drugs. One month later, the pain and numbness in the right anterior thigh recurred when he played soccer with his children.

He visited our outpatient department two months after symptom onset. He was 170 cm tall, weighed 89.2 kg. Physical examination revealed paresthesia in the right anterior thigh, no muscle weakness.

Preoperative MRI revealed a multilocular cystic lesion extending from the spinal canal to the extraforaminal region, which was in the cranial ventrolateral spinal space at L2-L3 and compressed the dural sac and right L2 nerve root. The signal intensities of the cyst contents were

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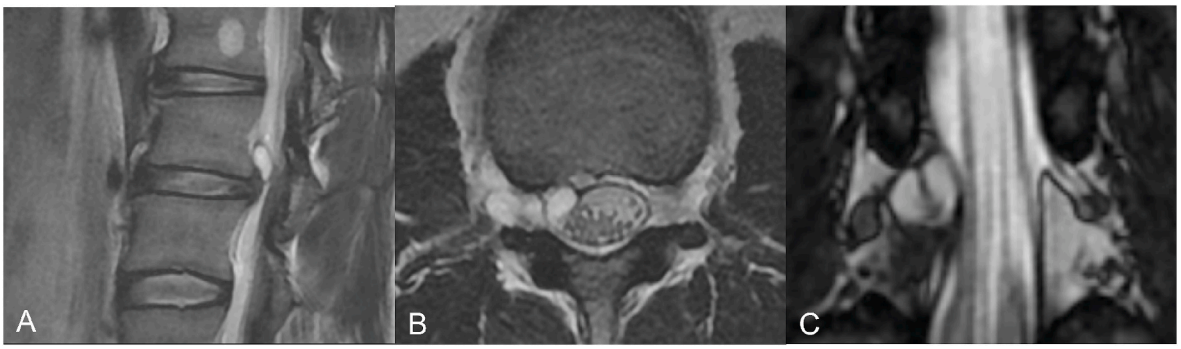

Fig. 1. Magnetic resonance imaging (MRI) on T2-weghted images: A, a cystic lesion extends cranially. B, a multilocular cystic lesion extends from the spinal canal to the extraforaminal region. C, a cystic lesion compresses the dural sac and the nerve root.

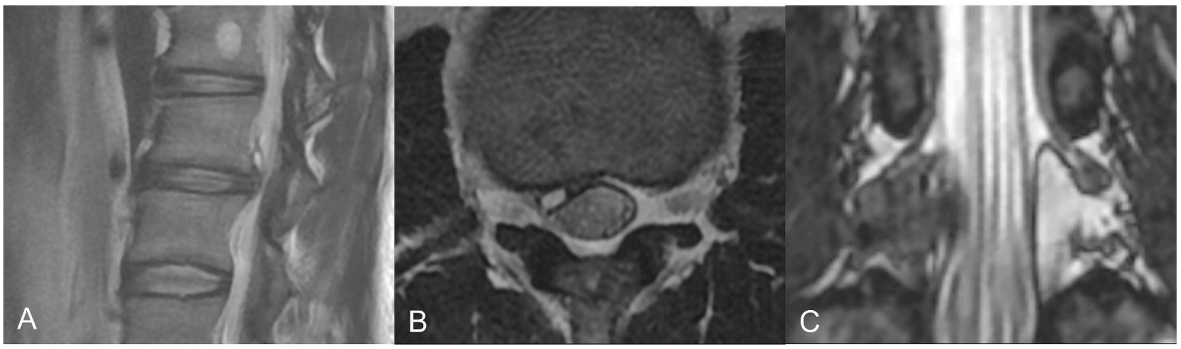

Fig. 2. MRI on T2-weghted images three months after the operation: A, B, C, the L2 nerve root and the dural sac are sufficiently decompressed.

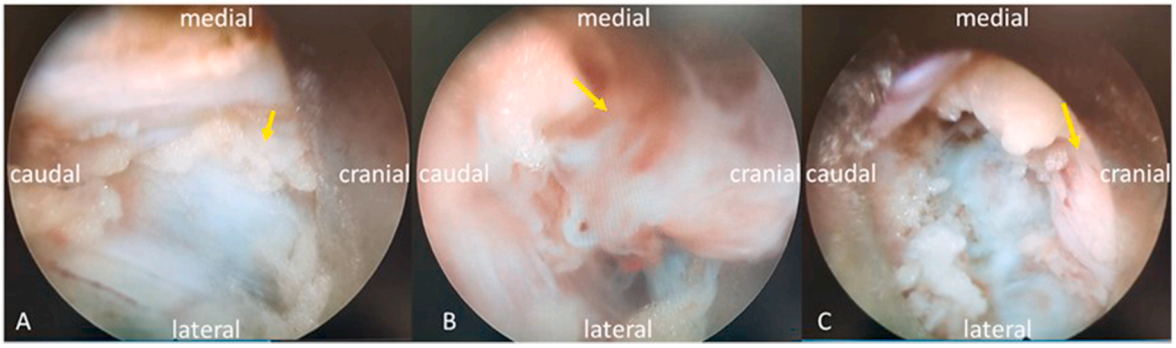

Fig. 3. Intraoperative findings: A, The cyst wall was stained blue with indigo-carmine dye.(yellow arrow) B, Granulation tissue (yellow arrow)was found. C, When the cyst wall were removed, the L2 nerve root (yellow arrow) appeared in the endoscopic visual field.

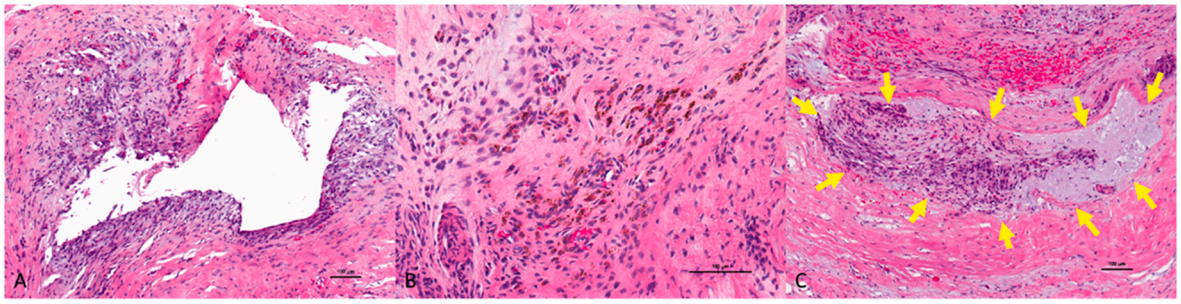

Fig. 4. A, Fibrous connective tissue and the granulation tissue were seen. B, Hemosiderin deposits were seen. C, The endplate cartilaginous tissue entered the fibrotic tissue in shape of slit. (yellow arrows) (Hematoxylin & Eosin, original magnification A, C × 100, B × 200).

low on T1-weighted images and high on T2-weighted images. (Fig. 1).

Approximately three months after the onset, we performed a FETFC under general anesthesia. Before endoscopic insertion, the intervertebral disc was punctured with a needle under fluoroscopy, and a mixture of contrast medium and staining solution was injected. The flow of the contrast medium into the cyst was confirmed.

Intraoperatively, the cyst wall was stained blue with indigo carmine dye. (Fig. 3A). When the cyst wall was removed, bloody contents leaked from the inside. (Fig. 3B). When the cyst wall were removed, the L2 nerve root appeared in the endoscopic visual field. (Fig. 3C, supplementary video 1).

An MRI performed three months after the operation showed a small resudial mass on the ventrolateral side of the dural sac, but the L2 nerve root and dural sac were sufficiently decompressed(Fig. 2A,B, and C).

Histopathological examination revealed fibrous connective tissue without an epithelial lining. (Fig. 4A). Hemosiderin deposits and cartilaginous tissue were also observed. (Fig. 4B and C) (see Fig. 4).

The pain was completely relieved; however, the numbness remained for three months after the operation. Two years after the operation, a questionnaire of the patient indicated no recurrence of pain.

3. Discussion

The pathogenesis of LDC formation is controversial, with many theories proposed to explain cyst development and pathology [8]. Toyama et al. [1] and Chiba et al. [2] proposed that an epidural hematoma is initially formed by hemorrhage from the epidural venous plexus resulting from an underlying disc injury. LDC develop due to incomplete hematoma resorption. Kono et al. [9] proposed mechanical stress-induced focal degeneration of the posterior disc wall, followed by fluid collection, reactive pseudomembrane formation around the fluid collection, and subsequent development of the LDC. Tokunaga et al. [10] confirmed the presence of cartilaginous tissue in the cyst wall and proposed that discal cysts develop during lumbar disc herniation (LDH) absorption. As cyst content was bloody and the onset was related with soccer in our case, the mechanism might be mechanical stress.

Intraspinal cystic diseases (ICD), such as synovial, ganglion, and perineural cysts, which present with clinical symptoms such as LDH, are frequently diagnosed as differential diagnoses of LDC. These cysts can be differentiated based on their location on an MRI. Lee et al. [4] documented the following MRI features of LDC: a ventrolateral extradural cyst attached to the lumbar disc, rim enhancement on contrast-enhanced MRI, and occasional extension into the lateral recess. However, Aydin et al. [3] reviewed reports on LDC and reported that MRI findings may not be applicable. Discography or computed tomography (CT) confirmed the diagnosis of LDC, which confirmed that the contrast medium flowed into the cyst. [1–3] However, discography and CT discography are invasive examinations and are not always necessary, and MRI should be sufficient. Although preoperative diagnosis of LDC is difficult, surgical excision can provide a diagnosis based on operative findings, such as communication between the corresponding intervertebral disc and the cyst [3]. Furthermore, discography can be performed at the beginning of endoscopic surgical excision. For these reasons, we did not perform preoperative examinations using contrast agents and confirmed the communication between the corresponding intervertebral disc and the cyst using intraoperative discography.

In the present case, the morphology was multilocular and located in the cranial ventrolateral epidural space of the spinal canal, extending from the spinal canal to the extraforaminal region and compressing the nerve root from the axilla to the cranial side. However, in ICD, those showing morphology or location are also reported as synovial cysts and ganglion cysts, but not as perineural cysts. [11,12] Therefore, a differential diagnosis is required. Synovial cysts develop from degenerated facet joints and occur in the elderly. Multilocular cysts can also occur. They are characterized by the presence of epithelial-lining cells on pathological examination. Synovial cysts are continuous with degenerative facet joints and are easily distinguishable from other ICD on MRI. Ganglion cysts are mostly diseases that occur on the dorsal side of the wrist joints; however, they have also been reported to occur in the spinal region, originating in the posterior longitudinal ligament and ligamentum flavum. Histopathological examination revealed a cystic wall-like structure composed of fibromyxoid tissue, but there was no lining epithelium [11]. The contents were characterized by a clear, jelly-like fluid. It has been reported that it is difficult to distinguish ganglion cysts from discal or synovial cysts on MRI [1,2]. Most perineural cysts are multiple and asymptomatic, but they are found in the sacral region rather than the lumbar intervertebral spaces. Symptomatic perineural cysts are enhanced on contrast-enhanced MRI and are, therefore, easily distinguished from other paraspinal cystic lesions [13].

In our case, the histopathological findings supported those reported by Tokunaga et al. [10], confirming the presence of cartilaginous tissue in the cyst wall. Depending on the degree of damage to the annulus fibrosus and the degree of degeneration of the intervertebral disc, there may be differences between cyst formation and herniation.

However, the optimal treatment for LDC remains controversial. Aydin et al. [3] showed that among 56 cases of LDC, eight (14%) had been treated conservatively; of these cases, spontaneous regression occurred in three patients (37.5%), whereas failure of medical therapies and subsequent surgical intervention was reported in five cases (62.5%). Conversely, Chou et al. [14] reported spontaneous regression of LDC five months after routine epidural steroid injection and selective nerve root block. However, the effectiveness and mechanism of steroid injections remain unclear. Microsurgical resection of the cyst is the recommended treatment, as reported in many published cases. However, the removal of the corresponding disc along with the cyst remains controversial. Certo et al. [15] reported that among 104 cases of LDC, 88 underwent surgical microscopic or endoscopic procedures. Based on this information, they preferred to excise the discal cyst and perform a microdiscectomy, predicting that a more radical excision might decrease the risk of recurrence. Their patient did not experience any cyst recurrence at the 2-year follow-up. In contrast, Park et al. [16] reported that among 126 patients with LDC, 76 (60%) were treated with cystectomy without discectomy. Of these cases, one discal cyst (1%) recurred one year after surgery. Performing a discectomy in young patients might jeopardize their spine biomechanics and cause future instability of the vertebral column. Therefore, they suggested that removal of the cyst wall alone might be sufficient for the effective treatment of LDC. We supported Park's opinion and performed only a cystectomy; there was no recurrence at the two-year follow-up. An MRI performed three months postoperatively showed a partial remnant of the cyst wall without compression of the surrounding nerve structures. Based on these results, it is important to open the cyst wall surgically and widely to prevent recurrence.

If conservative treatment does not improve the condition, surgical treatment should be considered. FETFC is one of the surgical treatments for ICD, it has limitation for total removal of all cystic lesion. But FETFC is possible not only to open the cyst wall but also to observe the cyst under clear operative visual field under saline irrigation. This helps different diagnosing of ICD keeping a minimally invasive.

Ethical statement

The patient was informed that their data and images would be submitted for publication and gave their consent.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.joscr.2023.09.006.

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