doi: 10.2176/nmccrj.cr.2020-0144

NMC Case Report Journal 8, 189–194, 2021

Successful Full Endoscopic Surgery for L5 Radiculopathy Due to L4-5 Discal Cyst and Disc Herniation in a Professional Baseball Player

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Abstract

Discal cysts are rare intraspinal extradural cysts that communicate with the corresponding intervertebral discs, and the diagnosis is difficult to distinguish from other causes of low back pain and radiculopathy. Optimal management for this type of cyst has not been determined because of its rarity. Here, we report successful treatment of a discal cyst and lumbar disc herniation using full endoscopic surgery in a professional baseball player with a chief complaint of weakness in his left lower leg. He had been treated conservatively but symptoms did not improve. Discography helped us to differentially diagnose discal cyst from other cystic lesions. Conventional surgical treatment would have resulted in considerable loss of baseball playing time for the patient. We opted to perform minimally invasive transforaminal full endoscopic surgery under local anesthesia to treat the discal cyst and lumbar disc herniation simultaneously without resection of bone and ligament handling. We removed the discal cyst and disc herniation, which released tension on the left nerve root at the L5 level, and then performed thermal annuloplasty to avoid recurrence. Postoperative course was good and he returned to play baseball at his original competitive level 3 months later. To our knowledge, there have been no previous reports of successful full endoscopic surgery for discal cyst and lumbar disc herniation performed simultaneously in a professional baseball player. It can be difficult to decide on the proper treatment for discal cysts, but full endoscopic surgery for symptomatic discal cyst might be one good option especially for elite athletes.

Keywords: full endoscopic discectomy, local anesthesia, lumbar disc herniation, elite athlete

Introduction

Discal cysts are extremely rare intraspinal extradural cysts that communicate with the corresponding intervertebral discs, and the diagnosis is difficult to distinguish from other causes of low back pain and radiculopathy.[1)] In a report on discal cysts by Aydin et al.,[2)] mean patient age was 33.5 ± 12.6 years, most patients (91%) were males, the most commonly involved site was L4/5 (48%), and the group most commonly affected was young Asians. As such, the case presented here is relatively typical of discal cyst. However, the pathogenesis and etiology are unknown—Chiba et al.[1)] suggested vascular etiology, whereas Kono et al.[3)] proposed a degenerative one—and the ideal management remains controversial.

Conventional partial hemilaminectomy and microscopic resection are the most commonly reported surgical treatments for discal cyst.[2)] Full endoscopic discectomy (FED) is a minimally invasive surgical technique that avoids damage to the back muscles, requires only an 8-mm skin incision, and can be performed under local anesthesia. Postoperative rehabilitation is also faster and more straightforward after FED than after conventional open surgery. In this report, we describe successful treatment of a discal cyst using FED in an elite athlete.

Received May 12, 2020; Accepted September 1, 2020

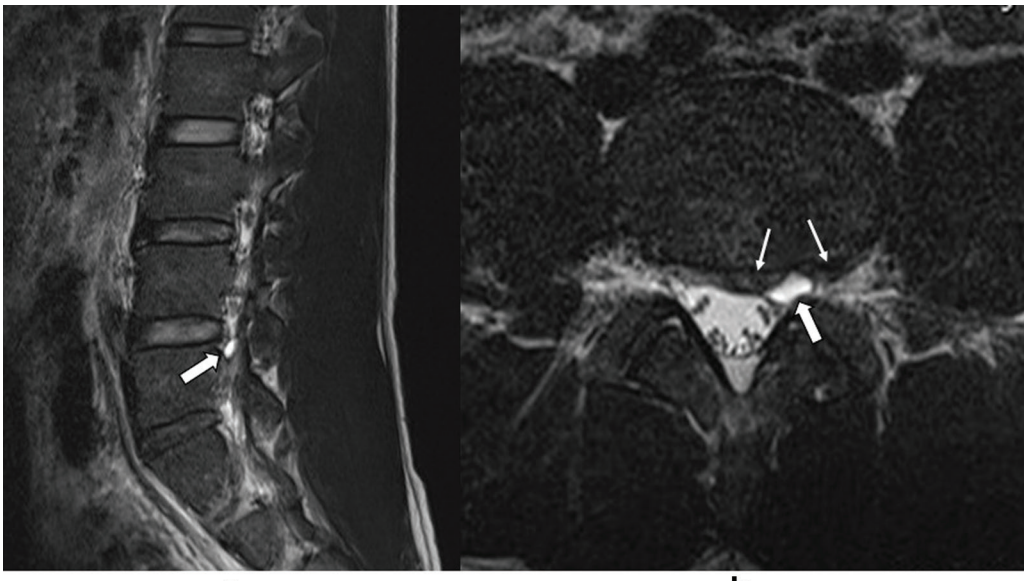

Fig. 1 Preoperative T2-weighted magnetic resonance images showing (a) a well-defined cystic lesion (arrow) with homogeneous high signal intensity at L4/5 in left paramedian sagittal view and (b) the cystic lesion (large arrow) and lumbar disc herniation (small arrows) on the left side through the L5 endplate. The lateral recess appears to be stenotic.

Case Report

The patient was a 22-year-old professional baseball player with a chief complaint of muscle weakness in his left lower leg. He had noticed low back pain and left leg pain during the baseball off-season. He had consulted a local doctor 1 month earlier because of gradually worsening symptoms. He was diagnosed as having lumbar disc herniation at L4/5 on magnetic resonance imaging (MRI). He was treated conservatively and the pain resolved almost completely. However, he subsequently developed muscle weakness in the left lower leg and had difficulty walking. He was referred to our department for further examination and treatment.

Neurological findings at the first visit to our hospital indicated left-sided muscle weakness (grade 3/5) in the tibialis anterior and left extensor hallucis longus. All deep tendon reflexes were normal and sensation was intact. The straight leg raise test was negative at 90°.

Plain radiographs showed no signs of spondylosis, deformity, or disc degeneration, such as narrowing of the intervertebral space or instability. Lumbar alignment was in the normal physiologic lordotic range. MRI revealed an intraspinal extradural space-occupying cystic lesion on the left side at L4/5 that was hypointense to isointense on T1-weighted images and hyperintense on T2-weighted images (Fig. 1). MRI also revealed mild disc bulging on the left side from inside to outside at L4/5. There was an evidence of lateral recess stenosis due to the cystic lesion and herniation on the left side. The low back pain and left lower leg pain were reproduced on injection of contrast medium into the intervertebral disc at L4/5 and his symptoms improved temporarily after infusion of local anesthesia. Discography and computed tomography (CT) discography confirmed flow of contrast into the cyst via connecting channels (Fig. 2). The diagnosis was lumbar disc herniation with discal cyst at the L4/5 level.

Surgical intervention

We planned FED at the left L4/5 level via a transforaminal approach under local anesthesia. With the patient in the prone position, an 8-mm skin incision was made 8 cm lateral from the midline. An 8-mm cannula was then inserted through the surface of the disc at L4/5.

First, we performed foraminoplasty to avoid irritation of the L4 exiting nerve root (Fig. 3a). We located the cyst, which had a distinct capsule consisting of whitish soft thick fibrous tissue in the left ventral aspect of the dura (Fig. 3b). The cyst ruptured easily on bipolar electrocautery (Fig. 3c), releasing a serosanguinous fluid (Fig. 4d). The discal cyst was curetted completely and the tension on the L5 nerve root was released. The disc herniation was completely removed using the outside-in technique (Fig. 3e). We also performed thermal annuloplasty using a bipolar device to avoid recurrence. The

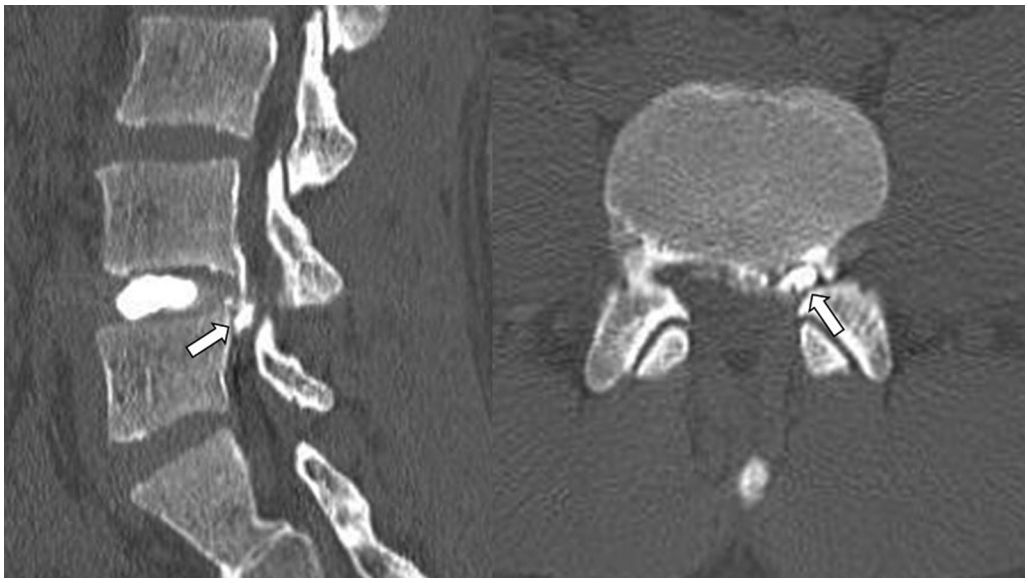

Fig. 2 Computed tomography scans after discography shows filling of the cyst by contrast medium in-flow (arrow). The cyst is located in the left ventrolateral extradural space.

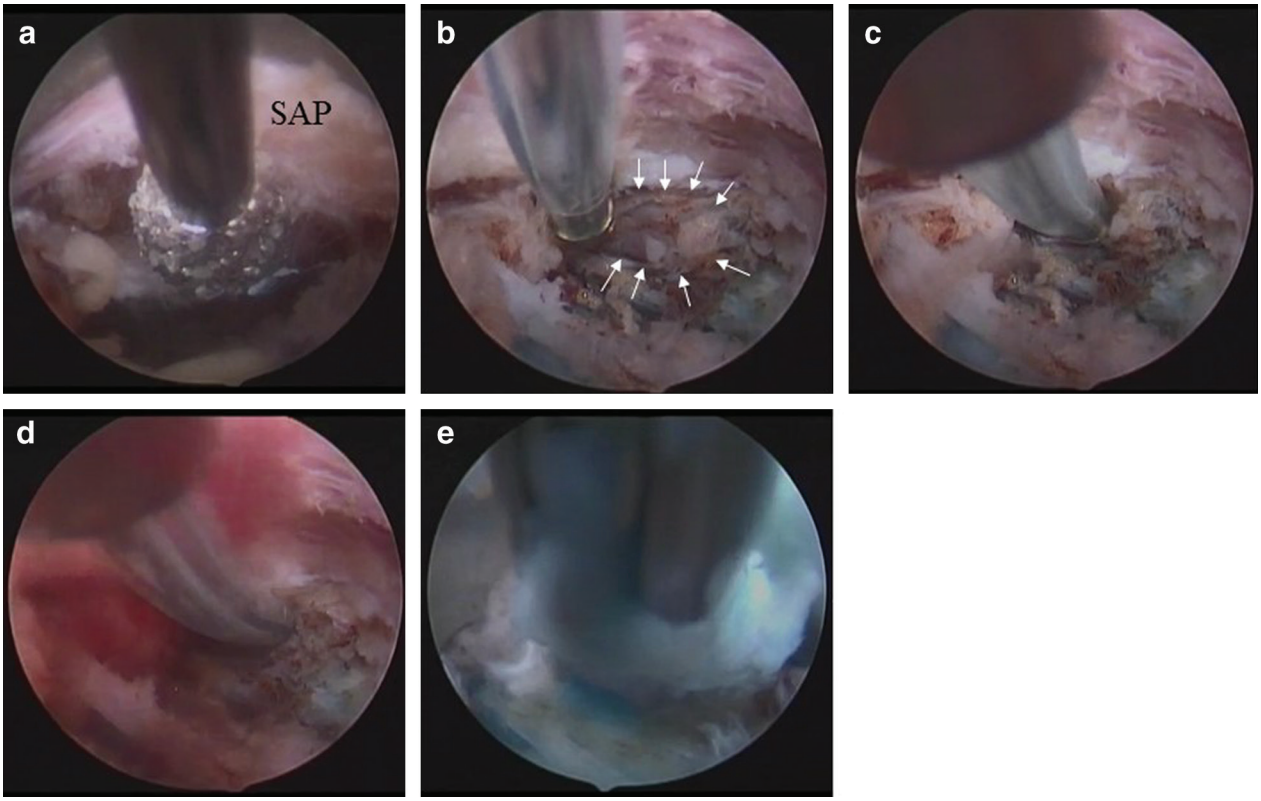

Fig. 3 Intraoperative transforaminal full-endoscopy findings. (a) Using a surgical bur, the superior articular process was drilled and the foramen was enlarged (foraminoplasty). (b) The cyst was exposed using a bipolar device (arrows). (c) Puncture with a bipolar device resulted in (d) discharge of serosanguinous fluid from the cyst. (e) Disc herniation (blue stain) was also completely removed. SAP: superior articular process.

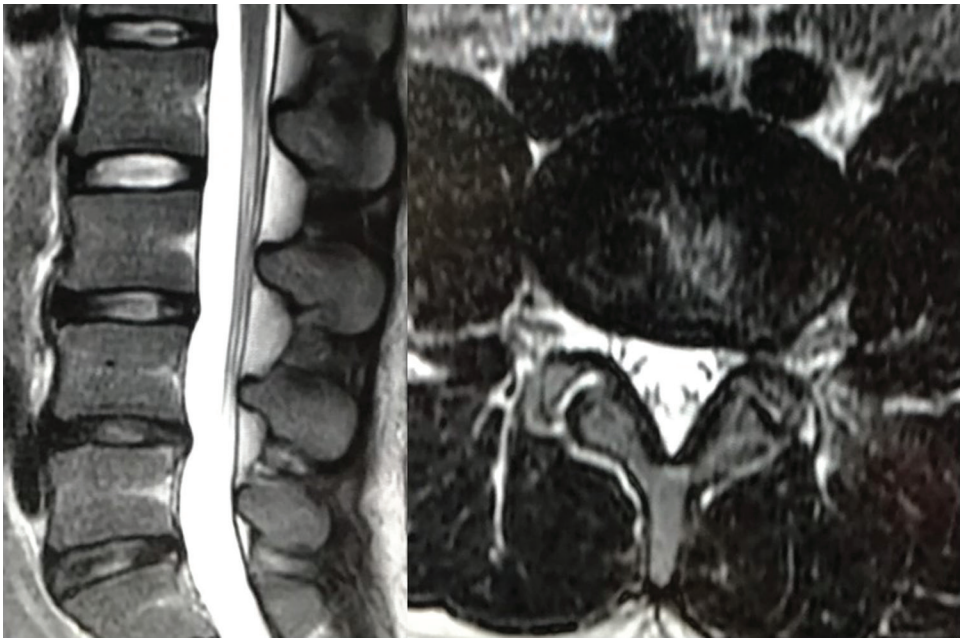

Fig. 4 Postoperative T2-weighted sagittal and axial magnetic resonance images confirm decompression and complete excision of the cyst.

patient reported improvement of muscle strength in his left leg during the surgery.

Total operative time was 70 min and the blood loss was too small to quantify. No complications such as nerve root injury, dural tear, hematoma, or infection were encountered during or after surgery. MRI after surgery confirmed that the discal cyst and herniated mass had been successfully removed endoscopically (Fig. 4).

Postoperative course

Two weeks after the surgery, the left tibialis anterior and left extensor hallucis longus muscle weakness had improved to grade 5. He was able to participate in spring training 2 weeks after the surgery, resumed stretching and core training of the trunk muscles, and then progressed to jogging and light ball throwing and catching. He finally returned to playing baseball at the catcher position 3 months after surgery. After 18 months of surgery, he played as a catcher in the first team without any symptoms.

Discussion

We experienced a case of discal cyst and lumbar disc herniation in a professional baseball player that was treated successfully by FED.

Diagnosis

MRI demonstrates the nature of a cystic lesion and its relationship to the corresponding disc. A discal cyst is hypointense on T1-weighted imaging and hyperintense on T2-weighted imaging,[1,3] and the surrounding rim and contents of the cyst may show enhancement on contrast-enhanced MRI.[4] These features are key to differentiating discal cyst from lumbar disc herniation. Discography reveals the connection between the corresponding disc and the cyst. However, it is controversial whether discography is necessary in all patients with an intraspinal cyst (which includes synovial, arachnoid, perineural, ligament flavum, and ganglion cyst) because surgical removal of the cyst improves symptoms regardless of its origin.[1]

In our patient, discography helped us to differentiate the discal cyst from other cystic lesions and to plan full endoscopic surgery. Ha et al.[5] reported that CT discography was essential when planning an endoscopic approach for removal of a discal cyst because it provides information about the location, shape, volume, and anatomic relationship of the cyst as well as determines the direction of the working cannula when accessing the cyst.

Treatment plan

Several treatment options for discal cysts have been reported, but optimal management has not been established. Although there have been a few reports of spontaneous regression of a discal cyst with conservative treatment,[6,7] most symptomatic discal cysts can be treated successfully by partial hemilaminectomy and microscopic resection.[2] In our patient,

however, this treatment strategy would have caused considerable loss of playing time. CT-guided aspiration is the most minimally invasive surgical treatment for a discal cyst, as first reported by Koga et al. in 2003,[8] and enabled a professional American football player to return to play without symptoms 3 days after treatment.[9] There is a downside to this option though, because recurrence is more likely than after other surgical treatments. Kang et al. reported that one of eight patients who underwent CT-guided aspiration for a discal cyst experienced a recurrence 3 months later and subsequently underwent surgical treatment.[10] In our patient, CT-guided aspiration alone would also have been inadequate because of the lumbar disc herniation.

Minimally invasive surgery

We opted to perform minimally invasive transforaminal full endoscopic surgery to treat the discal cyst and lumbar disc herniation simultaneously in this case. Kim et al.[11] first reported a case of transforaminal full endoscopic surgery for discal cyst and successful decompression of the traversing nerve root in 2009. Transforaminal full endoscopic surgery is minimally invasive and can be performed under local anesthesia without resection of bone or ligament tissue. Furthermore, the operative time is short and postoperative rehabilitation is rapid and uneventful.[12] Given these advantages, transforaminal full endoscopic surgery may be preferable to conventional surgery for discal cyst. Maeda et al.[13] reported that all five professional baseball players they treated were able to return to play at their original competitive level within 3 months of transforaminal full endoscopic surgery. Full endoscopic surgery was a good choice in our patient, who was a professional athlete, because it allowed easy rupture of the discal cyst with a bipolar device, complete removal of the disc herniation, and release of the tension on the L5 nerve root. At the end, we could also perform thermal annuloplasty.

Recurrence

In this case, we might not be able to remove completely the cyst and the fistulous connection between the disc and cyst, although we were sure that we could remove them completely endoscopically. Although the recurrence rate of discal cysts after surgery is not exactly known, it is generally believed that this type of cyst may recur if it is only partially removed. Therefore, our patient may be at high risk of recurrence. Several reports suggest that the risk of recurrence may be reduced by an additional partial discectomy to decrease the total volume of the nucleus pulposus.[5,14,15] This option is controversial in young patients because of the biomechanical impact of the corresponding discectomy. However, we believe that additional partial discectomy should be performed to prevent re-herniation of the nucleus pulposus and recurrence of the discal cyst in the future. Furthermore, thermal annuloplasty using radiofrequency coagulation to stabilize the nucleus pulposus may reduce the risk of recurrence.[16] Our patient was able to return to the same competitive level as baseball catcher 3 months after surgery. After 18 of surgery, he played baseball as a catcher in top level without any evidence of recurrence.

If he will have recurrence in future, full endoscopic surgery would be performed. Yamashita et al. reported that repeat full endoscopic surgery for recurrence of lumbar disc herniation is possible and effective even if the recurrence of herniation occurs at the ipsilateral and same level.[17] They mentioned that there was little adhesion in the epidural space after transforaminal full endoscopic surgery.

To our knowledge, this is the first report of successful full endoscopic surgery in a professional baseball player with discal cyst and lumbar disc herniation. Although decision-making about appropriate treatment for discal cysts can be difficult, minimally invasive surgery such as FED is an option for symptomatic discal cyst, especially when the patient is a young athlete with a high level of physical activity. To establish an appropriate indication of minimally invasive surgery for discal cyst, cumulative database and reports using much more patients who underwent minimally invasive surgery would be needed.

Conflicts of Interest Disclosure

All authors have no conflict of interest.

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