Lumbar discal cyst: Diagnostic discography followed by therapeutic computed tomography-guided aspiration and injection

Yoshimi Endo[1*], Theodore T. Miller[1], Gregory R. Saboeiro[1], Paul M. Cooke[2]

1. Department of Radiology and Imaging, Hospital for Special Surgery, New York, USA

2. Department of Physiatry, Hospital for Special Surgery, New York, USA

* **Correspondence:** Yoshimi Endo, Department of Radiology and Imaging, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021, USA
(*endoy@hss.edu*)

Radiology Case. 2014 Dec; 8(12):35-40 :: DOI: 10.3941/jrcr.v8i12.2087

ABSTRACT

Discal cysts are extradural masses that communicate with the intervertebral disk and are a rare cause of lower back pain and lumbar radiculopathy. This case report describes a lumbar discal cyst, the diagnosis of which was confirmed on conventional discography, and which was treated with computed tomography-guided aspiration and steroid injection. Several reports have described this procedure, but only one in the radiology literature, and thus the purpose of this report is to remind the radiology community of the existence of this entity and propose a minimally invasive means of treatment.

CASE REPORT

CASE REPORT

A 51-year-old Caucasian male presented with a 2-year history of occasional right lower extremity pain and numbness which had worsened in the previous 2 weeks. Physical examination localized the symptoms to the right S1 distribution.

Imaging Findings

Magnetic resonance imaging (MRI) of the lumbar spine revealed a 1.9 (craniocaudal) x 1.3 (transverse) x 0.9 (anteroposterior) cm mass located in a right paracentral location, posterior to the L5-S1 intervertebral disk with caudal extension, which compressed the right S1 nerve root within the lateral recess and caused mass effect on the intrathecal right S2 nerve root (Fig. 1, 2, 3). This mass was hyperintense on the T2-weighted sequence (Fig. 1) and isointense to skeletal muscle on the T1-weighted sequence (Fig. 2), suggesting that it was a cyst. The L5-S1 intervertebral disk itself was mild-to-moderately degenerated, with diminished T2-weighted signal intensity of the disk and minimally diminished height of the disk, corresponding to Pfirrmann grade III (Table 1) [1]. Three weeks after the MRI, the patient underwent fluoroscopy-guided discography of the L5-S1 intervertebral disk. With the patient lying prone, the fluoroscopy tube was oriented parallel to the disk space and a 25-gauge spinal needle was advanced until its tip was in the nucleus pulposus. The trajectory of the needle was monitored, taking care to avoid the osseous structures such as the ipsilateral iliac crest and superior articular process of S1, and at the same time making sure that the needle is not advanced beyond the margin of the disk. Discography using iodinated contrast demonstrated communication between the cystic lesion and the disk (Fig. 4), confirming that the cyst is a discal cyst.

Management

Computed tomography (CT) scan was performed immediately after discography (Fig. 5). The iodinated contrast from the discography clearly opacified the cyst and thus its relationship with the nearby laminae. Because the CT scan showed a safe access window for needle placement, it was decided to proceed to CT-guided aspiration of the cyst.

Under CT-guidance, an 18-gauge spinal needle was advanced directly into the cyst through the right side of the L5-S1 interlaminar space (Fig. 6). Small amount of serosanguinous fluid was aspirated. Next, taking care not to breach the dural membrane, the posterior wall of the cyst was pierced multiple times with the same needle. Prior to needle removal, 30 mg of triamcinolone was injected into what remained of the cyst.

Follow-Up

Immediately after the procedure, the patient reported his symptoms to have improved. The patient's symptoms completely resolved in the following several weeks, and the patient remains symptom-free 6 months after the procedure.

DISCUSSION

Etiology & Demographics

Discal cysts are extradural masses that communicate with the intervertebral disk and are a rare cause of lower back pain and lumbar radiculopathy which tend to affect younger patients than those affected by degenerative lumbar disk disease [2], with the mean age of the affected population being 33.5 years of age. There is a striking male predisposition, with approximately 90% of reported cases affecting males [2], and majority of reported cases have been in Asia, with less than 10 cases reported in North America [3-9]. Nearly half of discal cysts occur at the L4-5 level [2], and all of the reported cases have been within the lumbar spine.

Two theories exist regarding the pathogenesis of discal cysts. Toyama et al., the first authors to describe discal cysts, theorized that a herniated disk causes rupture of the epidural venous plexus and formation of an epidural hematoma [10]. Incomplete resorption of the hematoma subsequently results in a discal cyst. Interestingly, a case report of an "epidural hematoma" exists with imaging features identical to that of a discal cyst, including communication with the intervertebral disk on discography [11], which would fulfill the current diagnostic criteria for a discal cyst. An alternative theory of the origin of discal cysts is that focal degeneration of a disk results in production and spillage of fluid content from the disk, which subsequently becomes encapsulated, analogous to the development of meniscal cysts adjacent to a degenerated meniscus in the knee [12]. Kono et al. favored the latter theory because of the absence of hemosiderin within the cyst wall during histological evaluation of their two cases [12]. According to Chiba et al., discal cysts are less likely to represent degeneration of extruded disk fragments because the adjacent disk from which the disk fragment must have originated are not as degenerated as one would expect [13].

Clinical & Imaging Findings

Clinically, discal cysts present with symptoms indistinguishable from those of disk herniations, mainly back pain or radiculopathy. On magnetic resonance imaging (MRI), they are well-marginated cystic masses in the anterior epidural space, located outside the thecal sac and adjacent to a degenerated intervertebral disk. The cyst should not opacify with myelography. The imaging hallmark of discal cysts is that they should opacify during discography because these cysts communicate with the degenerated intervertebral disk.

Treatment & Prognosis

Although the majority of the reported cases of discal cysts have been treated with surgical resection, computed tomography (CT)-guided aspiration has also been described [3, 4, 14, 15]. Kang et al. performed CT-guided aspiration of discal cysts in 8 patients without discography and without steroid injection, and prolonged pain relief from the procedure was achieved in 7 of 8 patients [14]. Koga et al. described a CT-guided aspiration and steroid injection after discography in a single patient and reported symptom relief for at least 6 months [15]. In the only such case report, to our knowledge, published in the radiology literature, Norman et al. also identified a discal cyst using discography and subsequently performed aspiration and steroid injection with good results [4].

Our procedure was identical to that described by Koga et al. and Norman et al. Although it adds an extra step to the procedure, we believe that discography is important for demonstrating communication between the intervertebral disk and the cyst, thus establishing the diagnosis of a discal cyst. In addition, spread of contrast into the cyst ensures maximal conspicuity and differentiation of the cyst from the thecal sac, allowing the radiologist to identify a safe route for needle aspiration and fenestration under CT-guidance without breaching the thecal sac.

We believe that corticosteroid injection into the cyst, in addition to the aspiration and careful piercing of the cyst wall, is important for minimizing the risk of recurrence. This is contrary to Kang et al., who performed the aspiration without steroid injection, although their study of 8 patients did not report any recurrence of the cyst [14]. There is no published study assessing the value of steroid injection for discal cysts. However, the effects may be analogous to facet joint cysts, which can be treated by aspiration and steroid injection [16, 17], rupture indirectly through the facet joint [18], or by direct puncture of the cyst [19]. It is important not to penetrate the dural sac, as inadvertent intradural steroid injection can cause septic or aseptic meningitis [20].

Differential Diagnoses

The differential diagnoses of discal cysts include other cystic masses in the epidural space, such as perineural or Tarlov cysts, arachnoid cysts, synovial cysts, ligamentum flavum cysts, and epidural hematomas. All of these can cause similar clinical symptoms including lower back pain and radiculopathy, although relevant history of anticoagulation, recent trauma, or recent spinal procedure may suggest an epidural hematoma. Tarlov cysts have a typical location along the lumbosacral nerve roots while arachnoid cysts are located posteriorly or posterolaterally along the thecal sac [21], and both communicate with the subarachnoid space during myelography [22]. Synovial cysts of the facet joint communicate with the facet joint, which is often detectable on

MRI, and ligamentum flavum cysts have a characteristic location in close relation to the ligamentum flavum either posteriorly in the midline or posterolaterally [23]. Epidural hematomas can be located anywhere in the epidural space, and while they are T2-hyperintense, they may not display low T1 signal intensity typical of other cysts depending on the acuity of the hematoma. None of these lesions in the differential diagnosis of discal cysts will communicate with the intervertebral disk upon discography.

TEACHING POINT

Discal cyst should be included in the differential diagnosis of an extradural cystic lesion adjacent to a degenerated lumbar disk, the diagnosis of which can be confirmed by discography. Although such cysts have traditionally been treated with surgical resection, CT-guided aspiration and injection is a minimally invasive treatment option.

REFERENCES

1. Pfirrmann CW, Metzdorf A, Zanetti M, Hodler J, Boos N. Magnetic resonance classification of lumbar intervertebral disc degeneration. Spine (Phila Pa 1976). 2001 Sep 1;26(17):1873-8. PMID: 11568697

2. Aydin S, Abuzayed B, Yildirim H, Bozkus H, Vural M. Discal cysts of the lumbar spine: report of five cases and review of the literature. Eur Spine J. 2010 Oct;19(10):1621-6. PMID: 20364391

3. Dasenbrock HH, Kathuria S, Witham TF, Gokaslan ZL, Bydon A. Successful treatment of a symptomatic L5/S1 discal cyst by percutaneous CT-guided aspiration. Surg Neurol Int. 2010 Aug 10;1. PMID: 20847922

4. Norman ER, Beall DP, Kitley CA, Ly JQ. Intervertebral disk cyst: a case report. J Comput Assist Tomogr. 2006 Mar-Apr;30(2):313-5. PMID: 16628055

5. Chou D, Smith JS, Chin CT. Spontaneous regression of a discal cyst. Case Report. J Neurosurg Spine. 2007 Jan;6(1):81-4. PMID: 17233298

6. Coscia MF, Broshears JR. Lumbar spine intracanalicular discal cysts: two case reports. J Spinal Disord Tech. 2002 Oct;15(5):431-5. PMID: 12394670

7. Jeong GK, Bendo JA. Lumbar intervertebral disc cyst as a cause of radiculopathy. Spine J. 2003 May-Jun;3(3):242-6. PMID: 14589206

8. Lin N, Schirmer CM, Proctor MR. Presentation and progression of a disc cyst in pediatric patient. J Neurosurg Pediatr. 2011 Feb;7(2):209-12. PMID: 21284469

9. Singleton A, Agarwal V, Casagranda B, Hughes MA, Rothfus WE. Lumbar discal cyst in an elite athlete. Radiology Case Reports [Online]. 2013;8(1). Available at: http://radiology.casereports.net/index.php/rcr/article/viewArticle/764/1091. Accessed January 11, 2014.

10. Toyama Y, Kamata N, Matsumoto M, Nishizawa T, Koyanagi T, Suzuki N. Pathogenesis and diagnostic title of intraspinal cyst communicating with intervertebral disk in the lumbar spine. Rinsho Seikei Geka 1997;32:393-400 [in Japanese].

11. Watanabe N, Ogura T, Kimori K, Hase H, Hirasawa Y. Epidural hematoma of the lumbar spine, simulating extruded lumbar disk herniation: clinical, discographic, and enhanced magnetic resonance imaging features: a case report. Spine (Phila Pa 1976). 1997 Jan 1;22(1):105-9. PMID: 9122773

12. Kono K, Nakamura H, Inoue Y, Okamura T, Shakudo M, Yamada R. Intraspinal extradural cysts communicating with adjacent herniated disks: imaging characteristics and possible pathogenesis. AJNR Am J Neuroradiol. 1999 Aug;20(7):1373-7. PMID: 10473000

13. Chiba K, Toyama Y, Matsumoto M, Maruiwa H, Masahiko W, Nishizawa T. Intraspinal cyst communicating with the intervertebral disc in the lumbar spine: discal cyst. Spine (Phila Pa 1976). 2001 Oct 1;26(19):2112-8. PMID: 11698889

14. Kang H, Liu WC, Lee SH, Paeng SS. Midterm results of percutaneous CT-guided aspiration of symptomatic lumbar discal cysts. AJR Am J Roentgenol. 2008 May;190(5):W310-4. PMID: 18430817

15. Koga H, Yone K, Yamamoto T, Komiya S. Percutaneous CT-guided puncture and steroid injection for the treatment of lumbar discal cyst: a case report. Spine (Phila Pa 1976). 2003 Jun 1;28(11):E212-6. PMID: 12782997

16. Bjorkengren AG, Kurz LT, Resnick D, Sartoris DJ, Garfin SR. Symptomatic intraspinal synovial cysts: opacification and treatment by percutaneous injection. AJR Am J Roentgenol. 1987 Jul;149(1):105-7. PMID: 3495967

17. Parlier-Cuau C, Wybier M, Nizard R, Champsaur P, Hir PL, Laredo JD. Symptomatic lumbar facet joint synovial cysts: clinical assessment of facet joint steroid injection after 1 and 6 months and long-term follow-up in 30 patients. Radiology. 1999 Feb;210(2):509-13. PMID: 10207437

18. Bureau NJ, Kaplan PA, Dussault RG. Lumbar facet joint synovial cyst: percutaneous treatment with steroid injections and distension - clinical and imaging follow-up in 12 patients. Radiology. 2001 Oct;221(1):179-85. PMID:11568337

19. Jacob JR, Weisman MH, Mink JH, et al. Reversible cause of back pain and sciatica in rheumatoid arthritis: an apophyseal joint cyst. Arthritis Rheum. 1986 Mar;29(3):431-5. PMID: 2938591

20. Chauvet E, Moineuse C, Navaus F, Constantin A, Cantagrel A, Mazières B, Laroche M. Pseudo-septic meningeal reaction after intradural glucocorticoid therapy

for sciatica. Joint Bone Spine 2002 Jan;69(1):95-6. PMID: 11858368

21. Rimmelin A, Clouet PL, Salatino S, Kehrli P, Maitrot D, Stephan M, Dietemann JL. Imaging of thoracic and lumbar spinal extradural arachnoid cysts: report of two cases. Neuroradiology. 1997 Mar;39(3):203-6. PMID: 9106295

22. Perret G, Green D, Keller J. Diagnosis and treatment of intradural arachnoid cysts of the thoracic spine. Radiology. 1962 Sep;79:425-9. PMID: 14485487.

23. Chan AP, Wong TC, Sieh KM, Leung SS, Cheung KY, Fung KY. Rare ligamentum flavum cyst causing incapacitating lumbar spinal stenosis: Experience with 3 Chinese patients. J Orthop Surg Res. 2010 Nov 4;5:81. PMID: 21047439

FIGURES

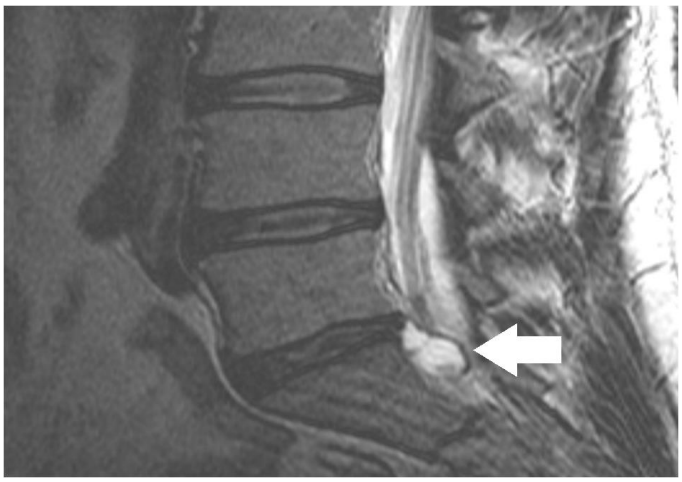

Figure 1: 51 year old male with lumbar discal cyst. Sagittal T2-weighted magnetic resonance imaging (MRI) sequence demonstrates a 1.9 x 1.3 x 0.9 cm cystic mass with a narrow neck abutting the L5-S1 disk, representing a discal cyst (arrow) with diminished signal intensity and minimally diminished height of the L5-S1 disk corresponding to Pfirrmann grade III changes. (GE 1.5 Tesla magnet. TR=2417, TE=125; No contrast was administered.)

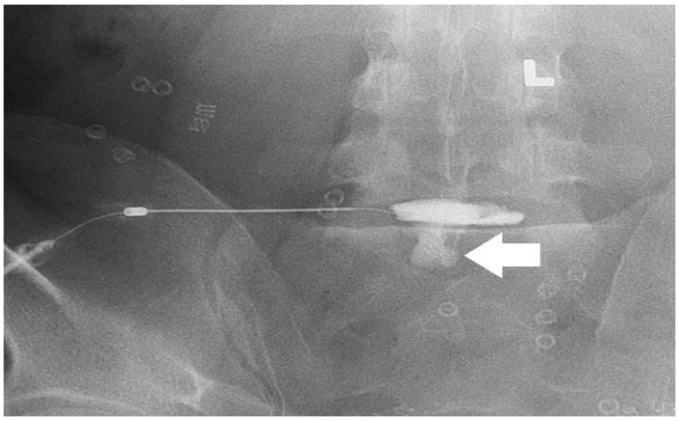

Figure 2: 51 year old male with lumbar discal cyst. Sagittal T1-weighted MRI sequence shows that this cystic mass (arrow) is isointense to skeletal muscle. (GE 1.5 Tesla magnet. TR=550, TE=18; No contrast was administered.)

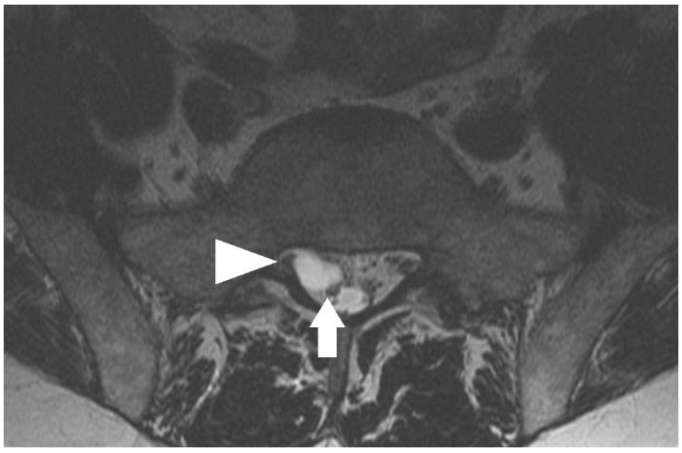

Figure 3: 51 year old male with lumbar discal cyst. Axial T2-weighted MRI sequence shows that this cyst compresses the right S1 nerve root (arrowhead) and posteriorly displaces the right S2 nerve root (arrow). (GE 1.5 Tesla magnet. TR=3333, TE=123. No contrast was administered.)

Figure 4 (left): 51 year old male with lumbar discal cyst. AP radiograph obtained during discography demonstrates the cyst (arrow) extending caudal to the disk space opacified by contrast injected into the L5-S1 disk, confirming that this cyst is a discal cyst.

Figure 5: 51 year old male with lumbar discal cyst. Sagittal reformation of computed tomography (CT) scan performed immediately after discography shows the cyst (arrow) extending caudal to the disk communicating with the L5-S1 disk. (Phillips Axial CT, 325 mAs, 120 kV, 1 mm slice thickness, no intravenous contrast administered)

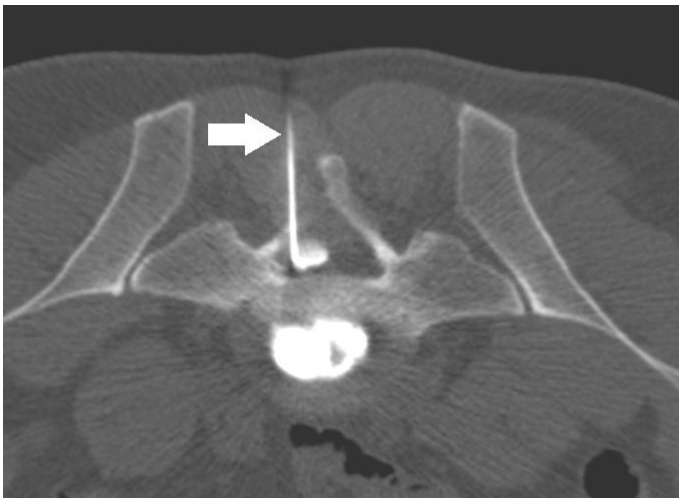

Figure 6: 51 year old male with lumbar discal cyst. Axial CT scan shows needle (arrow) placed into the cyst during CT-guided aspiration.

Grade	Disk structure	Distinction between nucleus and annulus	Signal intensity of disk	Height of disk
I	Homogeneous, white	Clear	Hyperintense, isointense to cerebrospinal fluid	Normal
II	Inhomogeneous, +/- horizontal bands	Clear	Hyperintense, isointense to cerebrospinal fluid	Normal
III	Inhomogeneous, gray	Unclear	Intermediate	Normal to slightly decreased
IV	Inhomogeneous, gray to black	Lost	Intermediate to hypointense	Normal to moderately decreased
V	Inhomogeneous, black	Lost	Hypointense	Collapsed

Table 1: Classification of disk degeneration based on Pfirrmann et al. [1]

Etiology	Unknown, but 2 theories: resorption of an epidural hematoma caused by a herniated disk or spillage of fluid content from a degenerated disk.
Incidence	Rare (less than 10 cases reported in North America)
Gender ratio	90% male, 10% female
Age predilection	Mean age 33.5 years old
Risk factors	Young active males of Asian race
Treatment	Surgical resection or CT-guided aspiration +/- cortisone injection
Prognosis	Good
Imaging findings	Cystic mass in the anterior epidural space communicating with the intervertebral disk

Table 2: Summary table of discal cyst

Differential diagnosis	Clinical features	MRI features	Features on other imaging modalities
Discal cyst	Lower back pain and radicular symptoms indistinguishable from herniated disk	Cystic (T1-hypointense, T2-hyperintense) epidural mass abutting the disk, anterior or anterolateral to the thecal sac	Communication with an intervertebral disk on discography
Tarlov/perineural cyst	Usually asymptomatic, but can cause back pain and radiculopathy	Cystic mass in typical location along the lumbar or sacral nerve roots	Communication with the subarachnoid space on myelography
Arachnoid cyst	If large, can cause symptoms from cord or nerve compression	Cystic extradural mass, located posterior or posterolateral to the thecal sac	Communication with the subarachnoid space on myelography
Facet joint synovial cyst	Lower back pain and radiculopathy	Cystic mass communicating with the facet joint	No opacification with either discography or myelography, but will opacify after contrast injection into the facet joint
Ligamentum flavum cyst	If large, can cause back pain and/or radiculopathy	Cystic mass in close relation to the ligamentum flavum, midline posterior or posterolateral to the thecal sac	No opacification with either discography or myelography
Epidural hematoma	Relevant history such as anticoagulation, recent trauma, or recent spinal procedure	Less well-defined than discal cyst; T2 hyperintense but could be of variable signal intensity on T1	No opacification with discography or myelography

Table 3: Differential diagnosis table for discal cyst

ABBREVIATIONS

CT - Computed Tomography
MRI - Magnetic Resonance Imaging

KEYWORDS

discal cyst; disc cyst; lumbar spine; discography; computed-tomography guided aspiration