Lumbar Intervertebral Discal Cyst: A Rare Cause of Low Back Pain and Radiculopathy. Case Report and Review of the Current Evidences on Diagnosis and Management

Francesco Certo¹  Massimiliano Visocchi²  Alessandro Borderi¹  Claudia Pennisi¹  Vincenzo Albanese¹  Giuseppe M. V. Barbagallo¹

¹ Division of Neurosurgery, Department of Neurosciences, Policlinico "G. Rodolico" University Hospital, Catania, Italy
² Department of Neurosurgery, Catholic University, Rome, Italy

Evid Based Spine Care J 2014;5:141–148.

Abstract

Study Design  Case Report and review of the literature.

Objective  The objective of the article is to report an illustrative case successfully treated by microsurgery and to review the literature on the current evidence on diagnosis and management of lumbar discal cysts.

Methods  A 43-year-old male patient presented with severe back pain, radiating down to the right leg, as well as with paraesthesias in the right L3 and L4 dermatomes. Magnetic resonance imaging of the lumbar spine revealed an intraspinal, extradural space-occupying lesion at the L3–L4 disc level, causing compression of the neural structures. The lesion was surgically removed and a diagnosis of lumbar discal cyst was made. Postoperatively, symptoms improved and the patient was discharged with no complications. A systematic review of pertinent articles published up to February 2014 was performed. Key articles were searched to identify studies describing the diagnosis and management modalities of lumbar discal cysts and the comparative effectiveness and safety of microsurgery versus endoscopic treatment.

Keywords

► discal cyst
► discography
► intervertebral disc
► intraspinal cyst
► lumbar spine

Conclusions  Discal cysts are rare causes of low back pain and radiculopathy. Few cases have been reported; however, conclusive information about their natural history is not available and the best mode of treatment remains controversial. We submit that lumbar intervertebral disc cysts, with their peculiar radiological and anatomic features, should be considered in the differential diagnosis among rare causes of low back pain and radiculopathy.

Introduction

Discal cysts are defined as intraspinal, extradural cysts with a distinct communication with the corresponding intervertebral disc.¹,² Unlike intracanalar cystic masses, such as synovial cysts,³ that arise from the ligamentum flavum⁴ or from the posterior longitudinal ligament⁵ and may involve any spinal segment, discal cysts have only been reported in the lumbar spine. These lesions, which are extremely rare among spinal pathologies and usually occur in the third or fourth decade of life, are more prevalent in male patients with a higher occurrence reported in Asian populations. Nevertheless, reliable evidence about
epidemiology and natural history of this pathological entity is not available, further accentuated by the lack of large series with longer term follow-up. Indeed, the definition of these lesions was a relatively recent one, with its formal description provided by Chiba et al in 2001.1

A review of the literature revealed 37 previously published articles on lumbar discal cysts; all reported cases demonstrate that the clinical picture determined by discal cysts is indistinguishable from other causes of low back pain and radiculopathy such as conventional disc herniations. Although early reports had recommended discography for presurgical diagnosis of discal cysts, advances in imaging techniques, particularly in magnetic resonance imaging (MRI), made the diagnosis easier and noninvasive.6 Moreover, a more accurate knowledge of their origin and pathoanatomical features has more recently become available.7,8 Although nearly all reported discal cysts treated by surgery are associated with a successful outcome, their rarity makes it impossible to draw clear conclusions about its natural course history and allow for meaningful recommendations regarding the clinical management. In this article, we provide a brief literature review regarding the management of lumbar discal cysts and describe a new case.

**Case Description**

A 43-year-old man presented with a 3-month history of severe back pain, radiating down to his right leg, with associated paraesthesias in the ipsilateral L3 and L4 dermatomes. Neurological examination revealed a slight weakness (4+/5 BMRC – British Medical Research Council) in thigh flexion as well as in the leg extension on the right side and hypomiotrophy of the right quadriceps femoris muscle. The right knee jerk was absent. The patient’s examination was otherwise unremarkable. Lumbar spine X-rays showed no deformities or overt degenerative changes. Lumbar MRI revealed a spherical, intraspinal, extradural cystic mass adjacent to the right dorsolateral side of the L3–L4 disc and extending into the ipsilateral recess. The cyst appeared hypointense on T1-weighted images and hyperintense on T2-weighted ones. After gadolinium infusion, the cyst wall was homogeneously enhanced. The L3–L4 disc showed clear signs of degeneration (►Fig. 1).

On computed tomography (CT), the lesion appeared as a hypodense, slightly hyperdense, round mass sited in the right lateral recess, which appeared enlarged, causing scalloping of the posterior vertebral body’s surface (►Fig. 2).

In surgery, we performed a partial, right-sided L3 and L4 laminectomy and medial facetectomy under microscopic magnification. After incising the ligamentum flavum, a thin-walled cystic lesion, containing gelatinous material,
was observed on the right ventrolateral surface of the dural sac (Fig. 3A). During dissection maneuvers, the cyst was fenestrated and a citrine gel-like material emerged. The cyst was completely removed by sectioning its connection with the annulus fibrosus. A connection between the cyst and the L3–L4 intervertebral disc, through a round defect in the annulus fibrosus, was identified. Although there was no evidence of disc herniation, a formal microdiscectomy was also performed to prevent the recurrence of the cyst and/or the extrusion of disc fragment from the opened annulus fibrosus (Fig. 3B). Histopathological examination of the cyst revealed dense fibrous connective tissue, with hemosiderin deposits, without lining cell layers and disc material. No perioperative complications were observed, and the patient was discharged with complete relief of complaints. A 6-month follow-up MRI scan showed the complete resection of the cyst, a good height of the degenerated disc, and a satisfactory decompression of nervous structures (Fig. 4). At the 2-year follow-up, the patient remains asymptomatic.

Discussion

In the second half of the 1990s, some cases of cysts within the spinal canal that communicated with the intervertebral disc were reported in the Japanese literature. These lesions were defined as cystic hematomas or premembranous hematoma. In 1997, Toyama et al first highlighted the communication between such cystic lesions and the intervertebral disc. Similarly, in 1999, Kono et al described the intraspinal extradural cysts as well-defined, homogeneous lesions located within the ventrolateral extradural space at a lumbar disc level, displacing the dural sac dorsomedially and typically communicating with the corresponding intervertebral disc. Two years later, Chiba et al proposed that disc cysts should encounter the following characteristics: (1) clinical symptoms related to a unilateral single nerve root compression; (2) lesions occurring at a slightly younger age and at a higher intervertebral disc level than typical disc herniation; (3) minimal degeneration of the involved disc on imaging studies; (4) communication between the cyst and the corresponding intervertebral disc;
The existing literature about discal cysts is summarized in Table 1. Overall, 104 patients have been reported. Of these, 16 underwent conservative therapies or percutaneous injection/ aspiration, and 88 underwent surgical microscopic or endoscopic procedures. According to the existing literature,7,16 the majority of patients are males, with few reported female patients; moreover, a large number of discal cyst cases are reported in the Asian population. The sex-related incidence rate could suggest a hormonal influence in the pathogenesis of discal cysts. The predominant incidence in Asia may be related to lifestyle, habits, or genetic factors. However, further demographic and genetic studies are required to explain such racial distribution.16

Some reports described medical treatment as the initial management of discal cysts in cases with tolerable pain and without neurologic deficits. In their literature review, Aydin et al6 showed that among 56 cases of lumbar disc cysts, 8 cases (14%) had been treated conservatively. Of these, spontaneous regression occurred in three patients (37.5%) (two after steroid injection, and one after S1 nerve block), whereas failure of medical therapies and subsequent surgical intervention was reported in five cases (62.5%). Conversely, Chou et al17 reported the spontaneous regression of a discal cyst 5 months after a routine steroid epidural injection and selective nerve root block. The real effectiveness and the mechanism of steroid injection are still unclear. Moreover, the percutaneous injection procedures are invasive and not totally free from risks.

An alternative option for management of discal cysts was proposed by Koga et al18 in 2003. They reported the successful management of a lumbar discal cyst by percutaneous CT-guided aspiration and steroid injection. Similarly, Kang et al19 applied this technique, without using steroid injection, on eight patients, reporting a good or excellent outcome in seven cases. However, one patient (11%) in Kang’s series experienced a recurrence of the cyst. Such a circumstance, together with the relapsing clinical symptoms, may support the need for a more radical management, that is, the surgical resection of the cyst.

Surgical techniques in the treatment of discal cysts include endoscopic and microscopic resection of the cyst. This literature review discovered that most cases of discal cysts (69 cases) were successfully managed by microscopic resection of the cyst. This is a simple technique with no reported related morbidity or mortality, good clinical results, and low rate of cyst recurrence.7 Chiba et al11 described eight patients with discal cysts, all of whom were surgically treated. Coscia and Broshears20 presented two more cases of discal cysts, also successfully treated surgically. More recently, Nabeta et al2 and Kim and Lee21 reported other small series of cases of lumbar discal cysts treated by microsurgical resection with good outcomes. Interestingly, Lee et al20 reported at 1-year follow-up one case of recurrence out of nine patients with discal cysts surgically resected. An endoscopic approach has also been proposed as another treatment modality of discal cysts. Ishii et al, in 2005, first proposed such therapeutic option.22 Recently, Matsumoto et al23 and Ha et al24 described the advantages of endoscopic techniques in resection of discal cysts.
| Author/ year | No. patients | Treatment | Main complications | Follow-up |
|-------------|--------------|-----------|--------------------|-----------|
| 1 Toyama et al (1997)\(^2\)  | 7  | Surgical resection | NA  | NA  |
| 2 Kono et al (1999)\(^3\)  | 2  | Surgical resection and discectomy | No  | NA  |
| 3 Demaerel et al (2001)\(^6\)  | 1  | Medical therapies | Spontaneous regression | |
| 4 Chiba et al (2001)\(^4\)  | 8  | Surgical resection and discectomy (in two cases) | No  | 3.9 years (mean)  |
| 5 Coscia and Broshears (2002)\(^5\)  | 2  | Surgical resection | No  | NA  |
| 6 Jeong and Bendo (2003)\(^10\)  | 1  | Surgical resection and discectomy | No  | 12 months  |
| 7 Koga et al (2003)\(^11\)  | 1  | Percutaneous CT-guided aspiration and steroid injection | No  | 6 months  |
| 8 Ishii et al (2005)\(^18\)  | 1 (the second case is a synovial cyst) | Microendoscopy resection | No  | NA  |
| 9 Norman et al (2006)\(^19\)  | 1  | Percutaneous CT-guided aspiration and steroid injection | No  | NA  |
| 10 Kishen et al (2006)\(^20\)  | 1  | Surgical resection and discectomy | No  | NA  |
| 11 Lee et al (2006)\(^21\)  | 9  | Surgical resection and discectomy | One recurrence  | NA  |
| 12 Tokunaga et al (2006)\(^22\)  | 2  | Surgical resection | No  | NA  |
| 13 Chou et al(2007)\(^23\)  | 1  | Epidural injection and selective nerve root block | No  | 5 months (spontaneous regression)  |
| 14 Nabeta et al(2007)\(^24\)  | 5  | Surgical resection and discectomy (in four patients) | No  | 31 months (mean)  |
| 15 Murata et al(2007)\(^25\)  | 1  | Surgical resection | No  | 30 months  |
| 16 Okada et al (2007)\(^26\)  | 1  | Surgical resection | No  | NA  |
| 17 Kanoke et al(2008)\(^27\)  | 1  | Surgical resection | No  | NA  |
| 18 Hwang et al (2008)\(^28\)  | 1  | Surgical resection | No  | NA  |
| 19 Kang et al (2008)\(^29\)  | 8  | Percutaneous CT-guided aspiration | One recurrent disc herniation  | 13 months (mean)  |
| 20 Marushima et al (2008)\(^30\)  | 1  | Surgical resection | No  | NA  |
| 21 Kim et al (2009)\(^31\)  | 1  | Percutaneous endoscopic interlaminar approach using a side-firing Ho:YAG laser | No  | NA  |
| 22 Kim et al (2009)\(^32\)  | 2  | Percutaneous endoscopic transforaminal approach | No  | NA  |
| 23 Dumay-Levesque et al (2009)\(^33\)  | 1  | Percutaneous fluoroscopic-guided steroid injection | No  | 1 year  |

(Continued)
| Author/ year                  | No. patients | Treatment                                           | Main complications | Follow-up               |
|------------------------------|--------------|-----------------------------------------------------|--------------------|-------------------------|
| 24 Kim and Lee (2009)         | 14           | Surgical resection (using CO₂ laser)                | No                 | 20.1 months (mean)      |
| 25 Kobayashi et al (2010)     | 2            | Surgical resection and discectomy                   | No                 | 2 years                |
| 26 Matsumoto et al (2010)     | 7            | Microendoscopic resections                          | No                 | 27.9 months (mean)      |
| 27 Dosenbrock et al (2010)    | 1            | Percutaneous CT-guided aspiration                    | No                 | 19 months              |
| 28 Aydin et al (2010)         | 5            | Surgical resection and discectomy                   | No                 | 16 months (mean)        |
| 29 Aydin et al (2010)         | 1            | Surgical resection and discectomy                   | No                 | NA                     |
| 30 Takeshima et al (2011)     | 1            | Conservative therapy                                | No                 | 5 months (spontaneous regression) |
| 31 Lin et al (2011)           | 1            | Surgical resection and discectomy                   | No                 | NA                     |
| 32 Hyung-Jun et al (2011)     | 1            | Surgical resection and discectomy                   | No                 | 2 years                |
| 33 Prasad et al (2011)        | 1            | Medical therapies                                   | No                 | NA                     |
| 34 Shibata et al (2011)       | 1            | Surgical resection and discectomy (unilateral approach for bilateral cyst) | No | 3 months |
| 35 Lame et al (2011)          | 1            | Surgical resection (one level treated in a multilevel case) | No | 10 months |
| 36 Khalatbari and Moharamzad (2012) | 1 | Surgical resection | No | 7 years |
| 37 Ha et al (2012)            | 8            | Endoscopic resection and discectomy                 | Persistence of symptoms in one case | 6 months |
| 38 Present case               | 1            | Surgical resection and discectomy                   | No                 | 24 months              |

Abbreviation: NA, not available.
Note: Total number of cases: 105.
cysts. Overall, 19 patients who underwent endoscopic treatment were found in the literature. One of these, in Ha’s series, experienced the persistence of symptoms.

It remains unclear whether or not the corresponding intervertebral disc in connection with the cyst should be excised. Even in cases with uncertain preoperative differential diagnosis, surgery has to be performed to relieve the compression of neural structures, regardless of its origin. In such cases, the intraoperative finding of an obvious connection between the corresponding intervertebral disc and the cystic lesion is useful and important to differentiate discal cysts from other intraspinal cysts.

However, this point also remains controversial as highlighted by Marshman, who critically commented on the pathogenetic hypotheses and anatomopathological features of discal cysts as distinct pathological entities.25

In the present case, we preferred to excise the discal cyst and also perform a microdiscectomy, as we thought that a more radical excision might decrease the risk of recurrence. At the 2-year follow-up, the patient remains asymptomatic with no MRI evidence of discal cyst recurrence. It is difficult to draw evidences on the best treatment of discal cysts as the natural history and the long-term prognosis remain unclear. More cases with longer follow-up are needed to provide therapeutic guidelines.

The thorough analysis of previously reported data on the management of discal cysts suggests that MRI should be considered as the preferred diagnostic tool; discography, followed by CT scan, is essential to definitely demonstrate a communication between the cyst and the disc space. Traditional myelography and CT myelography play a marginal role in the diagnosis, confirming the extradural location of the cyst, but these studies do not add relevant information relative to MRI scans.

In conclusion, we report a new case of lumbar discal cysts with symptoms and findings resembling a typical lumbar disc herniation, which was successfully treated by microsurgical resection. Although it is a rare pathological entity, lumbar discal cysts should be considered in the differential diagnosis of low back pain and lower limb weakness.

We submit that the operative indications and management strategy of discal cysts are likely to be similar to those applied to lumbar disc herniations; moreover, microsurgical resection appears to be the best treatment for discal cysts in patients with severe pain and neurological impairment.

Disclosures
Francesco Certo, none
Massimiliano Visocchi, none
Alessandro Borderi, none
Claudia Pennisi, none
Vincenzo Albanese, none
Giuseppe M. Barbagallo, none

References
1 Chiba K, Toyama Y, Matsumoto M, Maruiwa H, Watanabe M, Nishizawa T. Intraspinal cyst communicating with the intervertebral disc in the lumbar spine: discal cyst. Spine (Phil a Pa 1976) 2001; 26(19):2112–2118
2 Nabeta M, Yoshimoto H, Sato S, Hyakumachi T, Yanagibashi Y, Masuda T. Discal cysts of the lumbar spine. Report of five cases. J Neurosurg Spine 2007;6(1):85–89
3 Boviatsis EJ, Stavrinos LC, Kouyialis AT, et al. Spinal synovial cysts: pathogenesis, diagnosis and surgical treatment in a series of seven cases and literature review. Eur Spine J 2008;17(6):831–837
4 Taha H, Bareksei Y, Albanna W, Schirmer M. Ligamentum flavum cyst in the lumbar spine: a case report and review of the literature. J Orthop Traumatol 2010;11(2):117–122
5 Marshman LAG, Benjamin JC, David KM, King A, Chawda SJ. “Disc cysts” and “posterior longitudinal ligament ganglion cysts”: synonymous entities? Report of three cases and literature review. Neurosurgery 2005;57(4):E818
6 Lee HK, Lee DH, Choi CG, et al. Discal cyst of the lumbar spine: MR imaging features. Clin Imaging 2006;30(5):326–330
7 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;19(10):1621–1626
8 Kobayashi S, Takeno K, Uchida K, et al. Pathogenesis of the discal cysts communicating with an adjacent herniated disc. Histological and ultrastructural studies of two cases. Joint Bone Spine 2010; 77(2):184–186
9 Nishizawa T, Koyanagi T, Toyama Y, et al. Three cases of intraspinal cyst whose symptoms resembled lumbar disc herniation. Seikei Geka 1995;46:1353–1357
10 Tokutani S, Katano H, Ichikawa S, et al. Intraspinal cyst (premenbranous hematoma): a case report. Rinsho Seikei Geka 1996; 31:1195–1198
11 Chatani K, Kamata Y, Shirokura M, et al. Intraspinal cystic hema- toma associated with lumbar disc herniation. J Jpn Orthop Assoc 1996;70:5316
12 Toyama Y, Kamata N, Matsumoto M. Pathogenesis and diagnostic title of intraspinal cyst communicating with intervertebral disk in the lumbar spine. Rinsho Seikei Geka 1997;32:393–400
13 Kono K, Nakamura H, Inoue Y, Okamura T, Shakudo M, Yamada R. Intraspinal extradural cysts communicating with adjacent herni- dated disks: imaging characteristics and possible pathogenesis. AJNR Am J Neuroradiol 1999;20(7):1373–1377
14 Hwang JH, Park IS, Kang DH, Jung JM. Discal cyst of the lumbar spine. J Korean Neurosurg Soc 2008;44(4):262–264
15 Ogawa Y, Kumanino K, Hirabayashi S, Aota Y. A ganglion cyst in the lumbar spinal canal. A case report. Spine (Phila Pa 1976) 1992; 17(11):1429–1431
16 Jeong GK, Bendo JA. Lumbar intervertebral disc cyst as a cause of radiculopathy. Spine J 2003;3(3):242–246
17 Chou D, Smith JS, Chin CT. Spontaneous regression of a discal cyst. Case report. J Neurosurg Spine 2007;6(1):81–84
18 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) 2002;28(11): E212–E216
19 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;190(5):W310–4
20 Coscia MF, Broshears JR. Lumbar spine intracanalicular discal cysts: two case reports. J Spinal Disord Tech 2002;15(5): 431–435
21 Kim JS, Lee SH. Carbon dioxide (CO2) laser-assisted ablation of lumbar discal cyst. Photomed Laser Surg 2009;27(6):837–842
22 Ishii K, Matsumoto M, Watanabe K, Nakamura M, Chiba K, Toyama Y. Endoscopic resection of cystic lesions in the lumbar spinal canal: a report of two cases. Minim Invasive Neurosurg 2005;48(4): 240–243
23 Matsumoto M, Watanabe K, Tsuji T, et al. Microendoscopic resec- tion of lumbar discal cysts. Minim Invasive Neurosurg 2010;53(2): 69–73
Editorial Perspective

EBSJ appreciates the detailed case report on intradiscal cysts and the balanced commentary by Dr. Moisi and colleagues.

These contributions underscore the importance of collecting small series or rare occurrence disorders in a centralized database with an attempt at a consistent treatment protocol to maximize the possibility for scientific insight. The emerging AOSpine Knowledge Forum for degenerative spine disorders could provide such a platform. Alternatively, a region like AOSpine Asia-Pacifica might be interested in starting a larger data collection effort given the much higher prevalence of this condition in that particular region.

In the case of discal cysts, we really seem to need just about everything: imaging morphology, clinical symptomatology, natural course history, and intraoperative pathology, using consistent staining techniques and details of surgical techniques—whether a formal discectomy should be preferably added, as recommended by the case-report authors, or if a simple cyst resection suffices, as recommended by Moisi et al in their commentary. Hopefully, this case report will stimulate creation of a rare case database for these types of disc pathology and raise the awareness of the global AOSpine surgery community to this entity. Of course, any further thoughts or experiences with the diagnosis or treatment of this pathology are welcome.