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Case Report

Postoperative discal pseudocyst: Report of A case with an unusual complication after microlumbar discectomy and successful treatment by transforaminal endoscopic lumbar decompression

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Received: 05 November 2023
Accepted: 19 January 2024
Published: 23 February 2024

DOI
10.25259/SNI_892_2023

Quick Response Code:

ABSTRACT

Background: Lumbar discal pseudocysts are uncommon complications that can arise following lumbar spine surgery. It manifests as a fluid-filled sac near the intervertebral disc, causing pain and discomfort. Understanding its causes, symptoms, and management is crucial for patients and healthcare professionals involved in postoperative spinal care.

Case Description: A 35-year-old female developed a discal pseudocyst after undergoing laminectomy and discectomy for lumbar disc herniation. The patient presented with recurrent lower back pain, radiculopathy, and neurological deficit two months post-surgery. Imaging revealed a discal pseudo cyst causing compression of the traversing right L5 nerve root. Given the refractory nature of her symptoms, an endoscopic procedure was offered. Using the transforaminal endoscopic technique, the pseudo cyst was identified and removed, leading to immediate symptomatic relief.

Conclusion: This article reports the rare occurrence of discal pseudocyst and highlights the use of endoscopic techniques in its surgical management. Surgeons should be aware of the minimally invasive techniques, as they can offer less morbidity, shorter recovery times, and reduced healthcare costs compared to traditional open surgery.

Keywords: Endoscopic spine surgery, Failed back surgery syndrome, Lumbar spine, Postoperative discal pseudocyst, Radiculopathy, Transforaminal endoscopic lumbar decompression

INTRODUCTION

The field of spine surgery has advanced, improving patient's lives by addressing issues like herniated discs. Yet, there is a rare complication, postoperative discal pseudocyst, causing pain and neurological deficits, spurring the exploration of innovative treatment approaches, including minimally invasive methods. Discal pseudocysts, although rare, can significantly affect postoperative outcomes and patient quality of life. This case underscores the importance

of considering minimally invasive endoscopic techniques in diagnosing and managing such complications. Early recognition and intervention are crucial in achieving favorable outcomes, reducing patient discomfort, and minimizing the risk of additional surgical procedures.

CASE PRESENTATION

A 35-year-old homemaker presented with low back pain with the right lower limb radiculopathy two months after lumbar discectomy. Initially, she was diagnosed with lumbar disc herniation at L4–L5 and underwent laminectomy and discectomy for the same at some other center. During that procedure, no nerve root or dural injuries were reported. The symptoms were relieved immediately after the procedure. The patient was discharged on the 3rd postoperative day without any residual symptoms. Within two weeks after surgery, she started experiencing lower back pain, which partially subsided with medication and physiotherapy. However, five weeks after surgery, the patient had right lower limb radiculopathy with some gait disturbances along with low back pain. The patient presented to us eight weeks after surgery with failed conservative management. She described her pain as originating from the lower back and radiating down to the dorsum of the foot. Walking, prolonged standing, and forward bending aggravated the pain. There was no history of bladder or bowel dysfunction.

On examination, she had difficulty walking on the right heel. Right L5 Gore's sign,[5] right straight leg raising test was positive. The patient had a weakness (Medical Research Council grade IV) in her right extensor hallucis longus. Involvement of the sacroiliac joint was ruled out clinically.

The patient underwent a comprehensive panel of hematological and serological assessments to exclude the potential presence of infection.

Imaging

Given the new-onset pain and the weakness, a magnetic resonance imaging (MRI) scan was done [Figures 1 and 2]. The MRI demonstrated a fluid-filled lesion adjacent to the intervertebral disc extending into the epidural space. The lesion appeared as an oval fluid-filled sac with well-defined borders. It appeared as a hypointense signal in the T1-weighted image and hyperintense in the T2-weighted image, with clear communication with the nucleus pulposus. X-ray of the lumbar spine lateral view done in flexion and extension did not demonstrate any instability [Figure 3].

Diagnosis

The patient's history, clinical presentation, and radiological findings were suggestive of a possibility of the right-sided postoperative discal pseudocyst at the L4–L5 level.

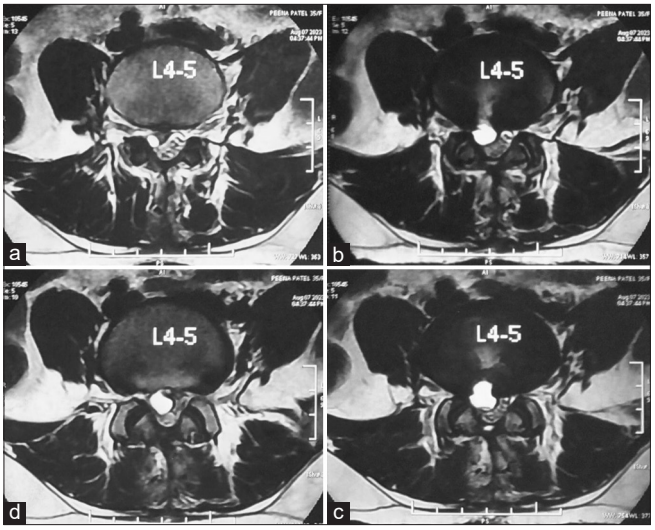

Figure 1: T2-weighted axial images at (a) L4 lower end plate; (b) upper discal margin; (c) mid-discal level; and (d) lower discal margin demonstrating the hyperintense lesion in the central and right paracentral location with direct communication to the intervertebral disc.

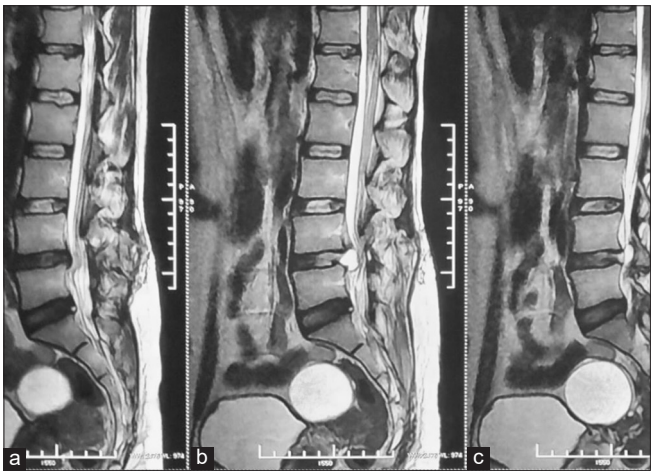

Figure 2: T2 weighted sagittal images of the lumbar spine demonstrating a hyperintense lesion which directly communicates with the nucleus pulposus in (b) central sagittal and (c) right para sagittal cuts. (a) left parasagittal cut.

TREATMENT

Planning

Given the failed conservative management, surgical option was offered to the patient. Only decompression was planned as there was no obvious radiological instability. Considering the more sagittal orientation of the facet joints, the compressive pathology being ventral to the thecal sac, and the possibility of encountering a laminectomy membrane in the interlaminar window, the transforaminal approach was planned. The FAPDIS score for the pathology was TF: IL 4.5:4.[12] The paracentral

location of the compressive pathology warranted the use of Postero Lateral- Tip of Spinous process (PL-TOSP) entry for the transforaminal endoscopic lumbar decompression.[11]

Procedure

The procedure was performed in a prone position under epidural analgesia. Using an image intensifier, PL entry was marked using the YESS geometric method,[15] the TOSP entry point was marked as seen on the lateral radiograph, and A point midway between the PL and TOSP was marked on the disc inclination line. The puncture needle was inserted into the cyst and confirmed under image guidance [Figure 4]. The cyst content was aspirated and sent for cytology.

The guide wire was then placed, and the cannula was inserted. A 4.3 mm working channel endoscope was then inserted. Primary foraminotomy was performed using a RIWO tip control burr. The cyst was found to compress the thecal sac and the traversing nerve root [Figure 5]. The cyst had a red outer covering consisting of dense, pliable, fibrous material. The sample was dispatched for histopathology and microbiological investigations. Decompression [Figure 6] was confirmed by sweeping a palpation hook below the traversing L5 root from the lower-end plate of the L4 vertebra to the middle of the L5 pedicle. 1 mL triamcinolone acetate was injected locally. The endoscope and cannula were withdrawn, and the wound was closed using one subcuticular suture by 3-0 monocryl. Ambulation using a lumbosacral

Figure 3: Dynamic X-ray lumbar spine done in (a) flexion and (b) extension does not show any evidence of instability.

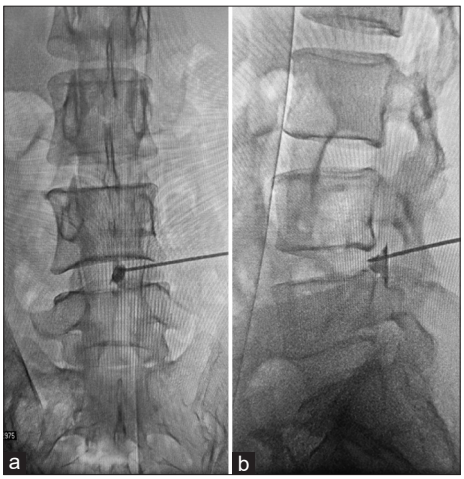

Figure 4: Intraoperative fluoroscopy imaging in (a) anteroposterior and (b) lateral view demonstrating the needle placement confirmation by injecting a radiopaque dye (note: The dye delineates the pseudocyst).

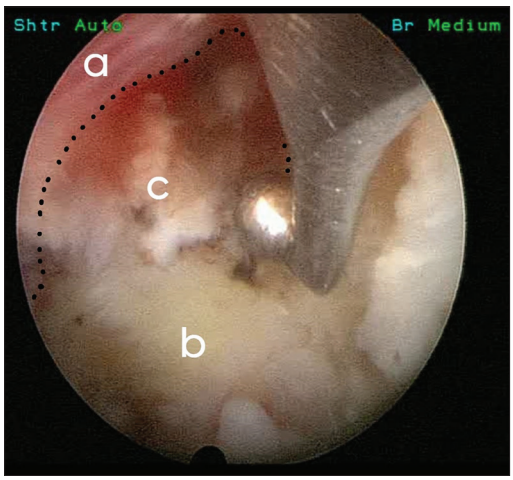

Figure 5: Right L4-L5 Transforaminal Endoscopic view demonstrating the (c) cyst compresing the (a) Traversing L5 root. (b) Annulus Fibrosus. (Note: Cyst wall represented by the dotted line)

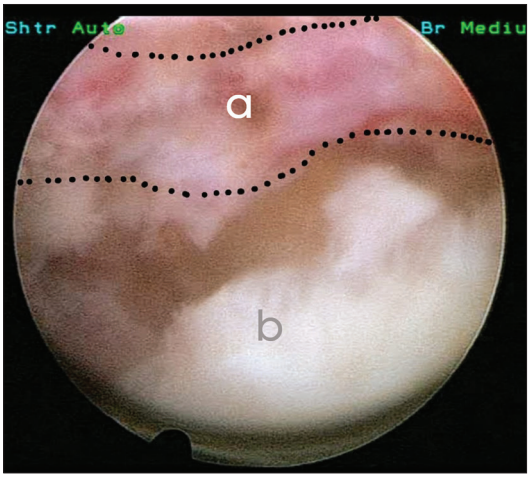

Figure 6: Right L4-L5 Transforaminal Endoscopic view after decompression demonstrating the dorsal and ventral margins of the (a) Rt L5 nerve root delineated with dotted line. (b) Annulus fibrosus .

belt was started two hours after the procedure. Ankle pump, static quadriceps, and static hamstring exercises were started.

Cytology

Cytological examination of aspirated fluid from the discal pseudocysts reveals the predominant presence of serous fluid, sparse erythrocytes, and the absence of epithelial cells.

Follow-up

The patient was reviewed in the outpatient department at two weeks, six weeks, and three months. Good healing of the surgical wound and a total absence of pain symptoms were noted. The postoperative MRI scan does not demonstrate any residual compressive element [Figures 7 and 8].

DISCUSSION

Lumbar discal pseudocysts, a rare but clinically significant complication of spine surgery, have gained recognition in recent years for their potential to cause persistent pain and neurologic deficits in postoperative patients. The clinical symptoms result from the mass effect produced by the growth of the pseudocyst, mimicking that of a recurring disc extrusion.

The precise pathogenesis of postoperative discal pseudocysts (PDP) remains undetermined; however, the existing literature posits three primary hypotheses to elucidate this phenomenon:

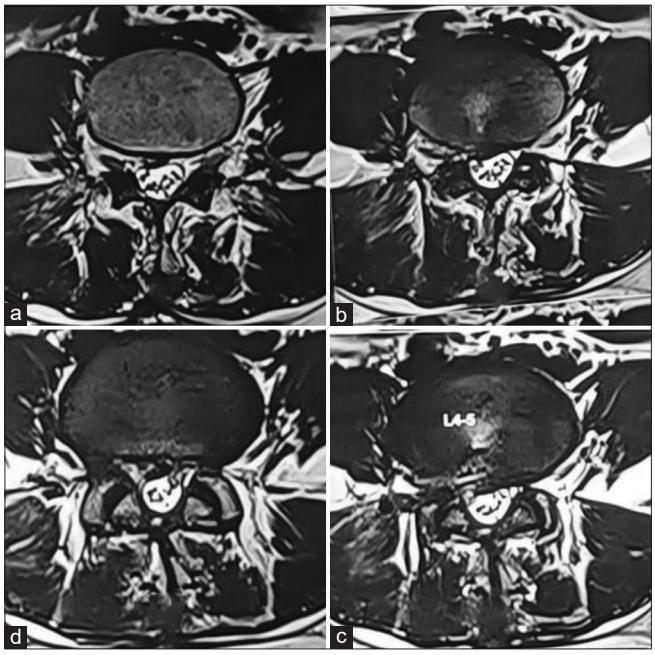

Figure 7: Postoperative T2-weighted axial Magnetic resonance imaging demonstrating the decompression at (a) L4 lower-end plate, (b) upper discal margin, (c) mid-discal level, and (d) lower discal margin.

response to epidural hematoma, pseudomembrane formation after local annulus fibrosus tear and disc degeneration; and inflammatory response to protruding nucleus pulposus. The epidural hematoma hypothesis by Chiba *et al*. states that epidural venous plexus hemorrhage followed by reactive inflammation leads to cyst formation. Hemosiderin deposits found in the cyst wall support this hypothesis.[2] However, if the cyst is the result of an epidural blood vessel rupture rather than an annulus fibrosus tear, there should be no communication between the disc and the cyst. According to the reactive pseudomembrane theory proposed by Kono *et al*., the local disc degenerates, and fluid leaks into the epidural space, causing an inflammatory reaction and, finally, the formation of a pseudomembrane.[8] Chung *et al*. assumed that the axial load pumps the liquid and blood of the mildly degenerated intervertebral disc through the annulus fibrosus fissure to the posterior space, resulting in a pseudocyst.[3]

The difference between PDP and intervertebral disc cysts is that the cyst wall of PDP is incomplete, hence the name "pseudocyst." Histologically, the wall of PDP mainly consists of dense fibrous connective tissue without epithelial lining, with serous or mucinous fluid inside.[1] In our case, the histopathology of the cyst wall showed fibrous tissue hyperplasia and local glassy changes, which supports the third hypothesis by Chung *et al*.[3]

Till now, 37 cases of PDP are shown in[3,4,6,7,9,10,13,14,16] [Table 1]. In the literature, after discectomy, the mean time to recurrence of radiculopathy was 23.3 days (range 9–38 days). This variability may depend on the physiological condition of each respective individual. The interval between a discectomy and pseudocyst detection through MRI was 31.2 days (range, 14–60 days) in the series of Chung *et al*.,[3] and 53.7 days (range, 11–118 days) in the series of Kang and Park.[7] In our case, this interval was 25. Out of the 37 reported cases, 56.7% (21 cases) were treated conservatively, 40.6% (15 cases)

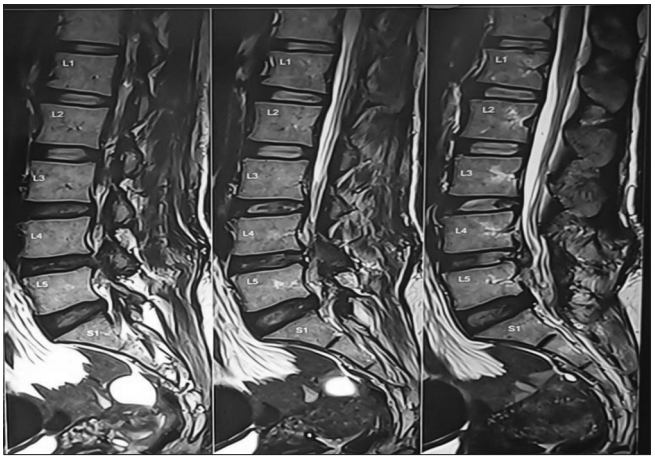

Figure 8: Postoperative T2-weighted sagittal magnetic resonance imaging demonstrating the decompression.

Table 1: Reported cases with pseudocyst after lumbar discectomy.

Studies	Patients	Age	Gender	Previous Operation	Country	Days till symptom aggrevation (d)	Days till MRI detection (d)	Treatment of PDP
Young *et al*., 2009	2	60 38	M	MED Partial discectomy	US	30 60	390 420	No treatment Conservative
Kang & Park, 2011	15	Mean 22.5	M	PELD	Korea	N/A	53.7	5 Surgical (1 OC, 4 PELC), 10 conservative
Chung *et al*., 2012	12	Mean 22.5	11 M 1 F	8 MED,3 PELD 1 MED	Korea	Mean 23.3 (range, 9–38)	Mean 31.2 (range, 14–60)	5 surgical (UA); 7 conservative
Jha *et al*., 2016	2	16 18	M F	MED MED	Japan	7 7	30 60	Conservative
Prasad & Menon, 2017	1	30	M	Discectomy	India	25	25	OC
Shiboi *et al*., 2017	2	14 27	F M	PELD PELD	Japan	30 20	30 20	PELC MED
Manabe *et al*., 2019	1	21	M	PELD	Japan	42	42	PELC
Fu *et al*., 2021	1	23	M	PELD	China	40	40	Conservative
Lutèce Ontsi Obame *et al*., 2023	1	43	F	Discectomy	Morocco	8	10	Surgery
Present case	1	35	F	MLD	India	35	60	TELD

M: Male, F: Female, PDP: Postoperative discal pseudocyst, MED: Micro-endoscopic discectomy, PELD: Percutaneous endoscopic discectomy, MEC: Micro-endoscopic cystectomy, PELC: Percutaneous endoscopic cystectomy, OC: Open cystectomy, UA: Unknown approach, TELD: Transforaminal endoscopic lumbar decompression, N/A: Not available

underwent some kind of operative intervention, and 2.7% (1 case) did not require any kind of intervention.

The management of PDP typically involves a combination of conservative and surgical approaches, depending on the severity of the condition and the patient's symptoms. In cases of small, asymptomatic pseudocysts, observation with regular monitoring through imaging may be a suitable approach. Non-steroidal anti-inflammatory drugs and analgesics can be prescribed to manage pain and discomfort. Physical therapy and rehabilitation exercises can help improve mobility and alleviate symptoms. Epidural steroid injections can provide temporary relief from pain and inflammation. For larger pseudocysts, percutaneous aspiration can be considered. This is typically followed by the injection of a corticosteroid to reduce inflammation.

In some cases, microdiscectomy may be necessary to remove the pseudocyst and decompress the affected nerve roots. In centers equipped with endoscopic instrumentation, the decompression can be performed using either an interlaminar or transforaminal approach. In severe cases, removal of the pseudocyst with fixation and fusion may be considered.

CONCLUSION

This article highlights the rarity but importance of discal pseudocysts, advocating for endoscopic techniques due to their ability to reduce morbidity, hasten recovery, and lower healthcare costs compared to open surgery. Embracing these advances can improve patient care and optimize healthcare resource utilization.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the

writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Patgaonkar PR, Kokate SK, Subith S, Borole PS. Postoperative discal pseudocyst: Report of A case with an unusual complication after microlumbar discectomy, and successful treatment by transforaminal endoscopic lumbar decompression. Surg Neurol Int. 2024;15:56. doi: 10.25259/SNI_892_2023