



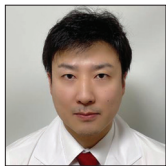
Case Report

Herniation of the cauda equina into the facet joint through a pseudomeningocele: A case report and literature review

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ABSTRACT

Background: Incidental durotomy is a well-known complication of spinal surgery. It can lead to persistent cerebrospinal fluid leakage resulting in significant secondary complications. Here, we present a case in which the cauda equina herniated into a pseudomeningocele that penetrated a facet joint, leading to lower extremity radiculopathy warranting surgical correction.

Case Description: One year ago, a 67-year-old male underwent a partial left L4-L5 laminectomy. At surgery, a durotomy was repaired with a nylon suture and reinforced with a fat patch. He subsequently presented with severe left lower extremity radiculopathy and a partial cauda equina syndrome. On MR, the cauda equina had herniated into a pseudomeningocele that penetrated the left facet joint. Once the defect was repaired at surgery, the patient's symptoms improved.

Conclusion: It is critical to correctly repair an intraoperative durotomy to avoid further neurological deficits that may include cauda equina herniation into pseudomeningoceles penetrating facet joints.

Keywords: Cauda equina, Incidental durotomy, Posterior spinal fixation, Pseudomeningocele

INTRODUCTION

Incidental durotomy occurs in 0.5–18% of spinal operations.^[4,6,10] Persistent cerebrospinal fluid (CSF) leakage/fistulas may result in pseudomeningoceles and multiple attendant complications; meningitis, intracranial hypotension, and in the lumbar spine, herniation of the cauda equina into pseudomeningoceles.^[1] Here, we report a case in which the cauda equina herniated into a pseudomeningocele that penetrated the left L4-L5 facet joint.

CASE PRESENTATION

Clinical findings

A year ago, a 67-year-old male presented with the acute onset of left-sided low back, hip, and left lower extremity pain for which he underwent a left-sided L4-L5 laminectomy. During surgery, there

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was a 2 mm left-sided durotomy that was repaired with a nylon suture and a fat patch graft. The subsequent MR examinations documented a persistent CSF leak that spontaneously resolved 3 months later. However, the patient again presented a year later with recurrent left-sided radiculopathy characterized by SLR 10 degrees, 3–4 motor function involving the iliopsoas, tibialis anterior, and extensor hallucis longus muscle distributions, and decreased left patellar and Achilles responses.

Radiological findings

The lumbar X-ray showed the prior operative defect at the L4–L5 level, while the MR documented a left-sided pseudomeningocele extending into the left L4–L5 facet joint [Figure 1]. The myelo-computed tomography further confirmed the presence of contrast in the left L4–L5 facet [Figures 2]. The patient underwent a left L4 selective nerve root block with 60% pain relief.

Secondary surgery

The patient underwent a secondary procedure 7 days later consisting of a L4–L5 facetectomy with posterior L4–L5 lumbar interbody fusion [Figure 3]. At surgery, we found that the cauda

equina had herniated into the pseudomeningocele that then penetrated the left L4–L5 facet joint [Figure 4]. Once the cauda equina was repositioned within the dural sac, the durotomy was repaired with a nylon suture, fascia patches, and fibrinogen containing factor XIII. Fourteen days postoperatively, the patient was discharged without any residual symptoms or signs and continued to do well up to 1 year later.

DISCUSSION

Patients who experience traumatic intraoperative dural tears during lumbar surgery may develop postoperative recurrent/persistent radiculopathy and/or cauda equina syndromes attributed to herniation of neural tissues into pseudomeningoceles.

In this case, the cauda equina herniated into a pseudomeningocele that extended into the left L4–L5 facet joint. Other authors have reported herniation of nerve roots/cauda equina through dural defects attribute to similar lumbar surgery (e.g., transdural cauda equina incarceration after microlumbar discectomy),^[5] nine cases of ventral and one case of dorsal nerve root entrapment, and extension into the intervertebral disc space [Table 1].^[2,3,5,8,9]



Figure 1: A persistent CSF leak and fluid within the left L4–L5 facet joint on MR.

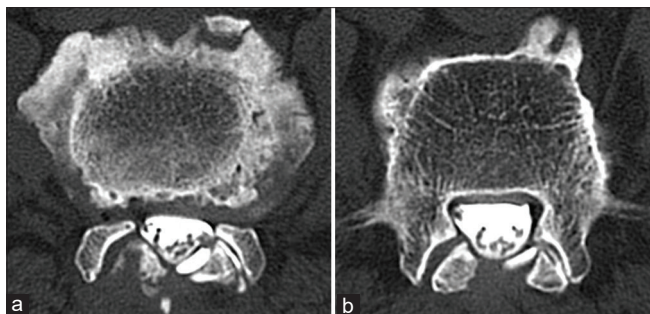


Figure 2: Contrast within the left L4–L5 facet joint. (a) L4–L5 level. (b) L5 upper edge level.

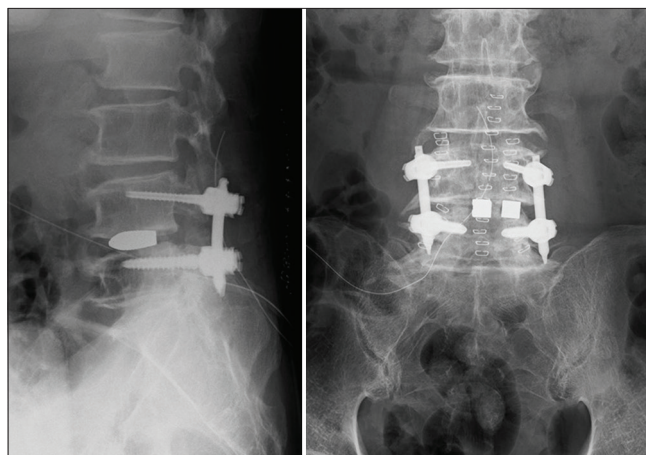


Figure 3: Posterior lumbar interbody fusion and decortication of the right facet joint was performed.

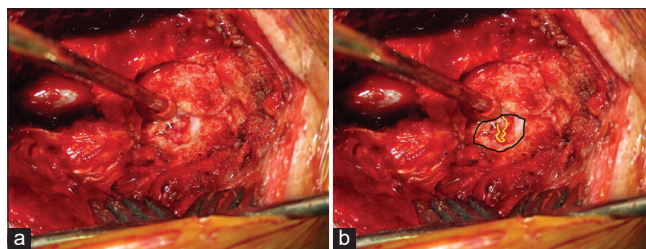


Figure 4: (a) The cauda equina had herniated into the left L4–L5 through the pseudomeningocele, and was red and flattened. (b) The facet joint is surrounded by black, the cauda equina is surrounded by yellow.

Table 1: Data of 11 cases of nerve root/cauda equina herniation caused by iatrogenic durotomy.

Number	Author	Age/sex	Initial operation	Interval	Surgical findings	Place of incarceration
1	Kim ^[3]	61/F	L4–L5 Disc	3 m	Ventral dura defect, nerve root herniation	Intervertebral disc space
2	Kim ^[3]	43/F	L3–L4 Disc	3 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
3	Choi <i>et al.</i> ^[2]	52/F	L4–L5 Disc	15 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
4	Choi <i>et al.</i> ^[2]	66/M	L2–L3 Disc	1 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
5	Choi <i>et al.</i> ^[2]	49/F	L4–L5 Disc	20 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
6	Choi <i>et al.</i> ^[2]	59/F	L1–L2 ALIF	2 m	Ventral dura defect, nerve root herniation	Intervertebral disc space
7	Kothbauer and Seiler ^[5]	60/F	L4–L5 Disc	1 d	Ventral dura defect, cauda equina herniation	Intervertebral disc space
8	Töppich <i>et al.</i> ^[7]	78/F	L4–L5 Disc	5 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
9	Töppich <i>et al.</i> ^[7]	62/F	L4–L5 Disc	4 d	Ventral dura defect, nerve root herniation	Intervertebral disc space
10	Pavlou <i>et al.</i> ^[8]	59/F	L4–L5 Disc	7 y	Dorsal dura defect, nerve root herniation	Defect in the dura mater of a pseudomeningocele
11	Nishi <i>et al.</i> ^[7]	63/M	L4–L5 Lam	9 d	Dorsal dura defect, nerve root herniation	Facet joint

M: Male, F: Female, Disc: Discectomy, ALIF: Anterior lumbar interbody fusion, Lam: Laminectomy, y: Year, m: Month, d: Day

However, only rarely has the nerve root herniated into a pseudomeningocele that then extended into a facet joint (e.g., in Nishi *et al.* the nerve root herniated into a large pseudomeningocele [10 mm]).^[7]

Here, a pseudomeningocele developed due to an inadequately repaired dural tear during a lumbar discectomy and resulted in cauda equina herniation into the resultant pseudomeningocele that then extended into the facet joint. In the future, such dural repairs should avoid nylon sutures; rather, it is best to 7-0 Gore-Tex sutures or its equivalent where the needle is smaller than the suture itself, and the suture/knot will not “unfur!” Further, it muscle patch grafts not fat grafts should supplement dural closures, as a fat graft shrink/resorb, thus failing to maintain occlusion the leakage site.

CONCLUSION

During a left L4–L5 laminectomy, a durotomy resulted in the cauda equina herniation into a left-sided L4–L5 pseudomeningocele with extension into the left L4–L5 facet joint. Once the pseudomeningocele was repaired, the patient’s recurrent radiculopathy/cauda equina syndrome was repaired.

Ethical approval

This study was approved by the Medical Ethics Board of Noshiro Kosei Medical Center (approval number YD-057).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Alshameeri ZA, El-Mubarak A, Kim E, Jasani V. A systematic review and meta-analysis on the management of accidental dural tears in spinal surgery: Drowning in information but thirsty for a clear message. *Eur Spine J* 2020;29:1671-85.
2. Choi JH, Kim J, Jang J, Lee DY. Transdural nerve rootlet entrapment in the intervertebral disc space through minimal dural tear: Report of 4 cases. *J Korean Neurosurg Soc* 2013;53:52-6.
3. Kim YJ. Incarceration of spinal nerve root through incidental durotomy as a cause of sciatica. *Korean J Spine* 2017;14:103-5.
4. Kogias E, Klingler JH, Jimenez PE, Vasilikos I, Sircar R, Scholz C, *et al.* Incidental durotomy in open versus tubular revision microdiscectomy: A retrospective controlled study on incidence, management, and outcome. *Clin Spine Surg* 2017;30:E1333-7.

5. Kothbauer KF, Seiler RW. Transdural cauda equina incarceration after microsurgical lumbar discectomy: Case report. *Neurosurgery* 2000;47:1449-51.
6. McMahon P, Dididze M, Levi AD. Incidental durotomy after spinal surgery: A prospective study in an academic institution. *J Neurosurg Spine* 2012;17:30-6.
7. Nishi S, Hashimoto N, Takagi Y, Tsukahara T. Herniation and entrapment of a nerve root secondary to an unrepaired small dural laceration at lumbar hemilaminectomies. *Spine (Phila Pa 1976)* 1995;20:2576-9.
8. Pavlou G, Bucur SD, van Hille PT. Entrapped spinal nerve roots in a pseudomeningocele as a complication of previous spinal surgery. *Acta Neurochir (Wien)* 2006;148:215-9; discussion 219-20.
9. Töppich HG, Feldmann H, Sandvoss G, Meyer F. Intervertebral space nerve root entrapment after lumbar disc surgery. Two cases. *Spine (Phila Pa 1976)* 1994;19:249-50.
10. Tsutsumimoto T, Yui M, Uehara M, Ohta H, Kosaku H, Misawa H. A prospective study of the incidence and outcomes of incidental dural tears in microendoscopic lumbar decompressive surgery. *Bone Joint J* 2014;96:641-5.

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