CASE REPORT

Management of post-surgical cervical pseudomeningocele causing spinal cord compression: A case report

Mishkat Shehzad, Misbah Kaleem, Faizan Saeed, Ehsan Bari

Abstract

Major neurological deficits secondary to compressive cervical pseudomeningocele are rarely encountered and only a limited number of cases have been documented in the literature. This report presents the case of a 64-year-old man who had progressive upper and lower limb weakness for the last six months. Magnetic Resonance Imaging (MRI) of the cervical spine showed stenosis from C3 to C6 level. Laminectomy of vertebral level C3-C6 with lateral mass fixation was done. On the third post-operative day, the patient developed quadriplegia along with swelling at the operative site. MRI revealed collection of Cerebrospinal Fluid (CSF) at the surgical site, compressing the cervical spinal cord. Evacuation of the accumulated fluid and bedside debridement was performed and a lumbar drain was placed, leading to interval neurological improvement. This case shows that bedside debridement and lumbar drain placement is a successful treatment option as an alternative to surgical management of symptomatic pseudomeningocele.

Keywords: Compressive Pseudomeningocele; Laminectomy; Post-operative complication; Spinal cord compression.

DOI: https://doi.org/10.47391/JPMA.22359

Introduction

Pseudomeningocele is an abnormal collection of Cerebrospinal Fluid (CSF) that accumulates in the surrounding tissue of the spinal cord or brain. The collection is not lined by any membrane. It can be classified as traumatic, congenital, or iatrogenic.[1] The prevalence of pseudomeningocele as a post-operative complication is less than 2% and the prevalence of symptomatic cervical pseudomeningocele is even less than 0.12%. Earlier case reports that have been published reported management with surgical treatment under general anaesthesia.[2] We herein present a case of cervical pseudomeningocele that developed after cervical laminectomy, which was treated by minimally invasive technique. There is no proper algorithm for the management of compressive cervical pseudomeningocele.[3] Previous literature regarding the above-mentioned post-operative complication is inclined towards surgical treatment[2,3] and there is no previously published case that showed this minimally invasive technique as the first line of management.

Department of Neurosurgery, Aga Khan University Hospital, Karachi, Pakistan.
Correspondence: Misbah Kaleem. e-mail: dr.misbah.kaleem@gmail.com
ORCID ID: 0009-0005-5185-1854

Submission completed: 26-09-2024 **1st Revision received:** 25-03-2025
Acceptance: 11-02-2026 **Last Revision received:** 10-02-2026

Case Report

A 64-year-old man with hypertension and diabetes, presented at the Aga Khan University Hospital, Karachi, in May 2023, with progressive bilateral lower and upper extremity weakness for the last six months, which worsened in the lower limbs. Over the last two months before his presentation, weakness progressed and he was unable to ambulate. He had no bowel or urinary incontinence. There was no history of trauma, lumbar puncture, or tuberculosis. He denied any family history of malignancy. Motor examination revealed decreased power in the upper and lower extremities, bilateral dorsiflexion and plantar flexion 3-/5, bilateral Extensor Hallucis Longus (EHL) 3/5. Bilateral upper limbs proximal and distal muscle group power was 3/5. The deep tendon reflexes of the knee and ankle were decreased (+1 on the reflex grading scale) bilaterally. Plantar reflexes were up-going bilaterally. Sensation was noted to be decreased below the C5 level. Hoffman's and cerebellar signs were negative.

The baseline blood workup was within the normal range. Magnetic Resonance Imaging (MRI) of the cervical spine demonstrated cervical stenosis from vertebral levels C3 to C6 level (Figure 1). The patient underwent C3-C6

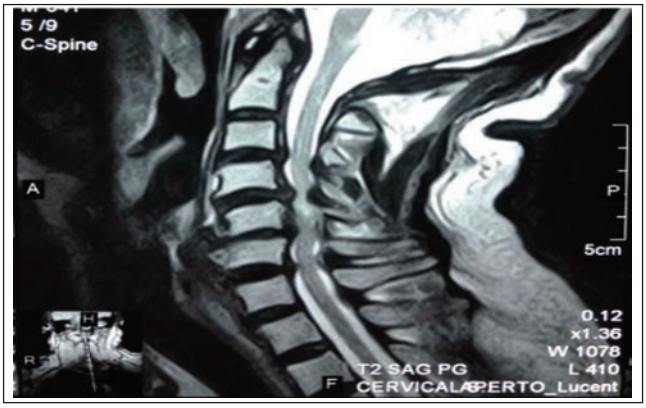

Figure-1: MRI of the cervical spine demonstrating cervical stenosis.

Figure-2: Operative site wound swelling with CSF leak.

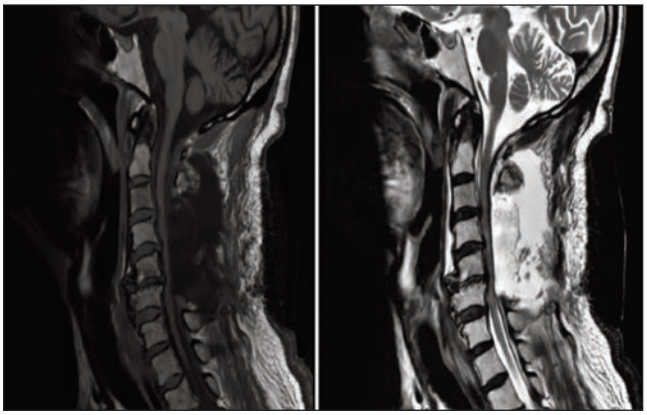

Figure-3: Post-operative CSF Collection MRI Sagittal View.

laminectomy with lateral mass fixation. No intra-operative complications occurred. Surgery went well and no CSF fluid leakage or dural tear was observed. Post-operative powers improved to -4 bilaterally in the upper and lower limbs.

After three days of surgery, the patient developed quadriplegia and swelling on the operative site with CSF leak (Figure 2). MRI of the cervical spine revealed the presence of 4.7×4.0×8.3 cm lobulated CSF intensity collection covering the laminectomy defect (Figure 3). The collection was extended craniocaudally from C2 to C4 level and antero-posteriorly from subcutaneous plane to dorsal aspect of the thecal sac, compressing the cord. It was diagnosed as cervical pseudomeningocele.

With a sterile bedside procedure, the wound was explored under local anaesthesia using 2% lidocaine without adrenaline, infiltrated in sub-cutaneous layers and 25–30 ml CSF was drained as per the flow. Using aseptic techniques, lumbar drain was inserted, free flow of CSF was observed and drain was secured. Post procedure, the power of upper and lower limbs was restored. The patient was kept on complete bed rest. Swelling subsided gradually and lumbar drain was removed after five days.

At the one-month follow-up visit, he was able to walk independently with the help of a cane and the power of upper and lower extremities improved to 4+/5.

Discussion

A pseudomeningocele is an extradural cerebrospinal fluid (CSF) collection that escapes into the surrounding soft tissues of the back due to a tear in the dura. "Pseudo" indicates that the collection lacks a true arachnoid-lining of the sac. The proposed pathophysiology behind the formation of pseudomeningocele is that during systole, CSF flows from spinal subarachnoid space into the pseudomeningocele cavity, passing through the cervical dural-arachnoid defect that functions as a one-way ball valve mechanism. During diastole, the reduced spinal subarachnoid pressure facilitates the functional closure of defect, preventing the CSF from returning to the subarachnoid space.[4]

Pseudomeningocele can be categorised into three main groups: congenital, traumatic, and iatrogenic, as the underlying causes. In the spine, iatrogenic pseudomeningoceles are frequently observed following laminectomy, involving cervical, thoracic, and most commonly the lumbar region.[1] The prevalence of durotomy during lumbar spine surgery is reported to range from 0.3% to 13%,[5] although according to literature, formation of pseudomeningocele in patients after lumbar laminectomy is much less and varies from 0.07% to 2%.[6] While according to Raudenbush, the prevalence of post-operative compressive pseudomeningocele resulting in major neurological deficit was 0.12% (3 out of 2,552) per decade of spinal surgery, in which one patient underwent cervical spine surgery, and two patients underwent lumbar surgery.[2] In addition, two cases of compressive pseudomeningocele involving thoracic region have been reported in the literature, as per our knowledge.[1]

In most patients, post-operative CSF leaks are asymptomatic and tend to resolve spontaneously.[7] But when signs and symptoms arise, it is due to mass effect on the cord manifesting as back pain, headache, and sometimes with motor deficits and sphincter dysfunction. Delayed infection has also been reported.[5] In diagnosing post-operative pseudomeningocele, it is crucial to consider clinical information and imaging findings. Although imaging characteristics may resemble those of a seroma, they can also bear similarities to a developing liquefied haematoma or, to a lesser degree, an abscess. Therefore, correlating the imaging findings with the patient's clinical presentation is essential for an accurate diagnosis.[2] Post-operative epidural haematoma is a well-recognised cause of neurological deficits following surgery. MRI plays a crucial role in differentiating the more common haematoma from the rarer compressive pseudomeningo-

cele lesion.[2] On MRI, haematomas are typically isointense to hypointense on T1-weighted images and heterogeneously hyperintense on T2 sequences, often with layering or internal septations. In contrast, pseudomeningoceles typically appear hypointense on T1 and homogeneously hyperintense on T2, consistent with fluid signal.

Different treatment approaches for managing post-operative pseudomeningoceles, depending on the size and patient's symptoms have been described in the literature. These include close observation for spontaneous resolution, conservative measures such as complete bed rest, lumbar drainage, application of an epidural blood patch[8] and definitive surgical repair of dural tear.[9] Ten patients with craniotomy site pseudomeningocele have been managed successfully with lumbar drains,[6] while no case has been mentioned in literature that showed lumbar drain as a management option for cervical pseudomeningocele. For symptomatic pseudomeningocele, combined treatment protocol involving open revision surgery for aspiration of pseudomeningoceles, dural closure, and insertion of lumbar drain has been mentioned in studies as preferred management.[1,6,8] Our patient underwent local drainage of cervical pseudomeningocele and insertion of lumbar drain, and showed interval resolution of neurological symptoms.

Conclusion

Based on the findings of this case report, it is recommended that the initial approach for managing symptomatic pseudomeningoceles should prioritise minimally invasive methods with close observation. It is not only cost effective but also the complications and morbidity associated with surgical management of pseudomeningoceles can be prevented.

Consent: Consent for publication was provided by the patient.

Disclaimer: None.

Conflict of Interest: The authors declare that the article content was composed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Funding disclosure: None.

References

1. Macki M, Lo SF, Bydon M, Kaloostian P, Bydon A. Post-surgical thoracic pseudomeningocele causing spinal cord compression. J Clin Neurosci 2014;21:367-72. doi: 10.1016/j.jocn.2013.05.004.
2. Raudenbush BL, Molinari A, Molinari RW. Large Compressive Pseudomeningocele Causing Early Major Neurologic Deficit After Spinal Surgery. Global Spine J 2017;7:206-12. doi: 10.1177/2192568217694145.
3. Dustur S, Parenrengi MA, Suryaningtyas W. Management of pseudomeningocele following posterior fossa tumor surgery with absence of hydrocephalus: A case report. Int J Surg Case Rep 2022;98:107552. doi: 10.1016/j.ijscr.2022.107552.
4. Benedetto N, Cagnazzo F, Gambacciani C, Perrini P. Subdural fluid collection and hydrocephalus following cervical schwannoma resection: hydrocephalus resolution after spinal pseudomeningocele repair: case report. J Neurosurg Spine 2016;25:762-5. doi: 10.3171/2016.5.SPINE16153.
5. Poe LB. Pseudomeningocele. [Online] 2017 [Cited 2023 May 17]. Available from URL: https://radsource.us/pseudomeningocele/
6. Gupta R, Narayan S. Post-operative Pseudomeningocele after Spine Surgery: Rare Cause of Failed Back Syndrome. Iran J Neurosurg 2016;2:15-8.
7. Sakamoto Y, Taniguchi N, Iwaisako K. Communicating Hydrocephalus Secondary to Pseudomeningocele following Cervical Spine Surgery: A Case Report. JMA J 2025;8:302-5. doi: 10.31662/jmaj.2024-0179.
8. Schartz DA, Ismail RF, Rahman AA, Bender MT, Westesson PL, Mesfin A, et al. Management of postoperative cervical pseudomeningocele with percutaneous aspiration and epidural blood patch. Interv Neuroradiol 2024;30:137-42. doi: 10.1177/15910199221113714.
9. Kim KW, Cho JH. Iatrogenic giant pseudomeningocele of the cervical spine: A case report. World J Clin Cases 2021;9:9686-90. doi: 10.12998/wjcc.v9.i31.9686.

Author Contribution:
MS: Literature search, study design, concept and writing.
MK: Literature search, writing and data collection.
FS: Editing.
EB: Editing and review.