

# Pseudomeningocele: The Post-Laminectomy Complication Revealed Through Imaging

## Case Report

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### Abstract

Pseudomeningocele, an abnormal accumulation of cerebrospinal fluid (CSF) outside the dural-arachnoid layer, is primarily iatrogenic and can occur following spinal surgery, particularly after incidental durotomy. While it is often asymptomatic, it can present with various symptoms. The exact incidence is uncertain but is estimated at 0.07–2% of lumbar surgeries. Recognizing and managing pseudomeningoceles is essential to preventing complications such as spinal cord compression and nerve root herniation. Here we describe a case of a giant pseudomeningocele that developed as a complication following post-laminectomy with discectomy.

**Keywords:** Pseudomeningocele; Post-Laminectomy; Meningocele

## Introduction

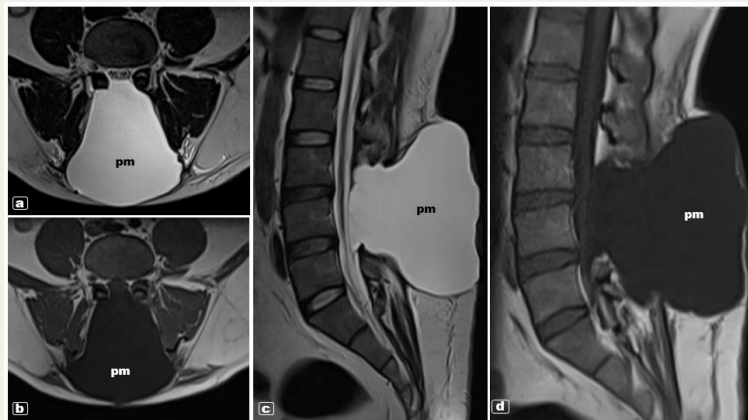
A pseudomeningocele is an abnormal collection of cerebrospinal fluid (CSF) outside the dural-arachnoid layer, which is usually caused by a communication between the dura-arachnoid layer and extradural tissue. Despite being frequently asymptomatic, pseudomeningoceles can present with a variety of symptoms, including postural headaches, back pain, muscular spasms, radicular syndromes, tinnitus, photophobia, neck stiffness, and gastrointestinal symptoms like nausea and vomiting.[1] Determining the exact incidence of post-laminectomy pseudomeningoceles presents challenges, largely due to their often-asymptomatic nature, resulting in many cases going unnoticed. However, they are reported to occur in approximately 0.07% to 2% of lumbar laminectomies and discectomies. This prevalence is higher in lumbar surgeries due to the elevated intrathecal pressure in this region and the frequency of procedures performed there. [2]

Even though they are more uncommon, pseudomeningoceles

can cause complications such as spinal cord compression, nerve root herniation, and radicular discomfort. This emphasizes how crucial it is to recognize and manage these kinds of cases appropriately. [3] We report a case of giant pseudomeningocele, which developed as a consequence of a laminectomy and discectomy.

## Case Report

A 43-year-old male patient presented to the neurosurgery department with complaints of low backache and bilateral lower limb pain for three weeks, which worsened over the past week. He also reported a severe headache for the past week. The patient had a history of re-exploration of L3 laminectomy with discectomy for recurrent L3-L4 disc prolapse two months prior. On examination, focal swelling was noted in the spine. An MRI of the spine was recommended to rule out post-surgical complications, such as CSF leaks. The MRI (Figure 1) revealed a large, relatively well-defined cystic lesion with CSF intensity measuring approximately 9.0 x 8.1 x 11.4 cm (AP x TR x CC) in the posterior aspect of the back from the L2-L5 disc levels and extending inferiorly. This lesion communicated anteriorly with the midline and



**Figure 1:** Axial section of T2-weighted MRI (a) and axial section of T1-weighted MRI (b) showing a giant pseudomeningocele (pm) with defect in posterior arch. Sagittal section of T2-weighted MRI (c) and Sagittal section of T1-weighted MRI (d) showing Giant pseudomeningocele (pm) extending from L2 to L5 vertebral level.

right side of the dorsal thecal sac at the L3 and L4 vertebral levels, and posteriorly, it was limited by the skin surface. Pedicle screws were noted at the L3 and L4 vertebrae, and the spinous processes of L3 and L4 was not visualized. These imaging findings were suggestive of a post-operative giant pseudo-meningocele. Subsequently, the patient underwent surgical exploration and repair. The procedure involved debridement and closure of the dural defect. The patient had a good postoperative recovery.

## Discussion

Pseudomeningoceles can arise through two primary mechanisms. In one scenario, there is a chronic cerebrospinal fluid (CSF) leaking due to a tear in both the dura and arachnoid layers. A pseudocyst develops as a consequence of this persistent leakage resulting from an aberrant connective tissue response in the paraspinal region. The second mechanism results in the development of a pseudomeningocele lined with arachnoid tissue as intact arachnoid tissue protrudes through a dural defect created during surgery. The formation of pseudomeningocele is primarily brought about by the first mechanism, however it is also occasionally caused by the second mechanism, that results in an arachnoid-lined pseudomeningocele. [3]

In 1946, Hyndman and Gerber first reported the existence of postoperative pseudomeningocele in a survey done on extradural cysts. [3,4] Other terms like “meningocele spurious,” “pseudocyst,” or “false cyst” have also been used to refer to pseudomeningoceles. While resembling a meningocele by containing CSF, a pseudomeningocele is distinguished by its cyst wall, which is made of scar tissue rather than a meningeal membrane. [3,5]

If a surgical procedure causes an accidental tear in the dura but leaves the arachnoid intact, the arachnoid may herniate through the defect into the epidural space, forming an extradural cyst. However, it is more common for both the dura and arachnoid to tear, leading to the leakage of cerebrospinal fluid (CSF) into the nearby paraspinal

soft tissues. Initially, the leaked CSF is easily absorbed. [3] However, as time progresses, a fibrous reaction develops, impeding reabsorption and causing CSF to accumulate in the paravertebral tissues, eventually resulting in the formation of a pseudomeningocele. The CSF may then be resorbed or encapsulated by fibrous tissue, resulting in the development of a pseudomeningocele. In some situations, nerve roots may protrude into the pseudomeningocele cavity. [3]

Pseudomeningoceles larger than 5 cm are commonly referred to as “large,” and those larger than 8 cm are called “giant”. Some cases have shown spontaneous resolution of giant pseudomeningoceles. This resolution is expected to occur gradually, probably as a result of the slow healing of the dural tear and gradual reabsorption of extradural CSF. [1] The diagnosis of pseudomeningocele is commonly established using magnetic resonance imaging (MRI), which reveals characteristic imaging features. Specifically, on T1-weighted images, pseudomeningoceles display low signal intensity, while on T2-weighted images, they demonstrate high signal intensity. [6]

Management of pseudomeningocele varies depending on clinical presentation. Asymptomatic cases can often be managed conservatively, with reports indicating spontaneous resolution in some cases of giant pseudomeningoceles. Persistent CSF leaks typically necessitate surgical intervention. The surgical approach involves repairing the dural defect and closing the dura-arachnoid layer. In certain instances, postoperative subarachnoid drainage may be employed to minimize the risk of recurrence. [2,7,8]

## Conclusion

Pseudomeningocele is a rare but significant complication of spinal surgery, primarily resulting from iatrogenic causes. While often asymptomatic, it can present with various symptoms and may require surgical intervention for persistent CSF leaks. Management strategies should be tailored to the individual patient, with careful consideration of the clinical presentation and imaging findings. Early recognition and appropriate management are essential for optimizing outcomes in patients with pseudomeningocele.

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