

Case Report



Massive Epidural Hematoma Caused by Percutaneous Epidural Neuroplasty: A Case Report

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Conflict of Interest

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ABSTRACT

Percutaneous epidural neuroplasty (PEN) has been used to manage chronic back pain or radicular pain refractory to other conservative treatments, such as medication, injection, and physical therapy. However, similar to all invasive treatment modalities, it has serious complications, such as dural tears, infections, and hematoma formation. Herein, we present a rare case of an 81-year-old female patient on dementia medication who developed paraplegia 5 days after PEN. This is the first report of a poor outcome in a patient with dementia who developed paraplegia after PEN despite an emergency operation for spinal epidural hematoma.

Keywords: Spinal epidural hematoma; Paraplegia

INTRODUCTION

Percutaneous epidural neuroplasty (PEN) is a minimally invasive therapy wherein a catheter is directly placed into the scar tissue compromising the nerve root.^{2,13)} Although rare, it has complications such as dura tears, infections, and hematoma formation.¹⁴⁾ Although spinal epidural hematoma is a rare complication of PEN, it may cause severe neurologic deficits.

Here, we report a rare case of paraplegia caused by a spinal epidural hematoma after PEN.

CASE REPORT

An 81-year-old female patient who was admitted in the nursing hospital due to dementia was transferred to our emergency room (ER) with paraplegia. She had no co-morbidities other than dementia. The exact time of symptom onset could not be confirmed, and the last normal period was about five days ago. Five days prior to transfer, she had undergone PEN at another hospital due to persistent radiating pain and numbness in both legs caused by multiple lumbar spinal stenosis (**FIGURE 1**). She walked independently before the procedure and was discharged to the nursing hospital on the same day of the PEN. At our ER, her vital signs were stable. On neurological examination, muscle strength of lower extremities below hip flexion was confirmed as grade 0. Urinary incontinence was identified, and anal tone was decreased. All deep tendon reflexes of both lower extremities were absent. The evaluation for sensory change could not be clearly confirmed due to severe dementia.

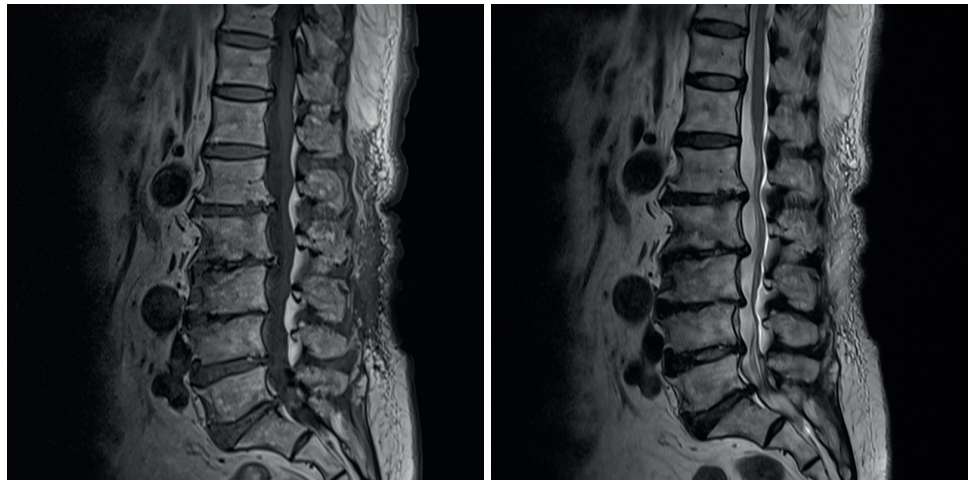


FIGURE 1. Pre-operative thoracolumbar magnetic resonance images revealed multiple spinal stenosis and degenerative disc changes such as intervertebral disc herniation with narrowing of the disc space.

Thoracolumbar spine magnetic resonance (MR) imaging revealed an epidural hematoma at the level of T12-S1, with concomitant severe cord compression (**FIGURE 2**). Despite the fact that clear MR images could not be obtained because the patient continued to move, the diagnosis of spinal epidural hematoma was very clear. Thus, an emergency surgery with skipped laminotomy at the T12, L2, and L4 levels was performed. After removing the spinous processes/laminae and ligamenta flava, the posterior epidural space was exposed, confirming the presence of an epidural hematoma at the thoracolumbar level. On the skipped laminotomy at each level, hematoma was gushed out. At the upper level, a hematoma that appeared to be hard was observed. However, on the lower level, a solid-liquid appearance was observed, suggesting an early subacute hematoma (**FIGURE 3**). A pediatric feeding tube was advanced from the laminotomy level, through which saline was irrigated.



FIGURE 2. Although clear MR images could not be obtained due to continuous movement, thoracolumbar spine MR images taken 5 days after percutaneous epidural neuroplasty revealed an extensive epidural hematoma at the T12-S1 level. This appeared in an early or subacute stage of hematoma on the T1-weighted sagittal view in iso-signal (mixed type) and T2-weighted sagittal view in the low signal (arrows). MR: magnetic resonance.

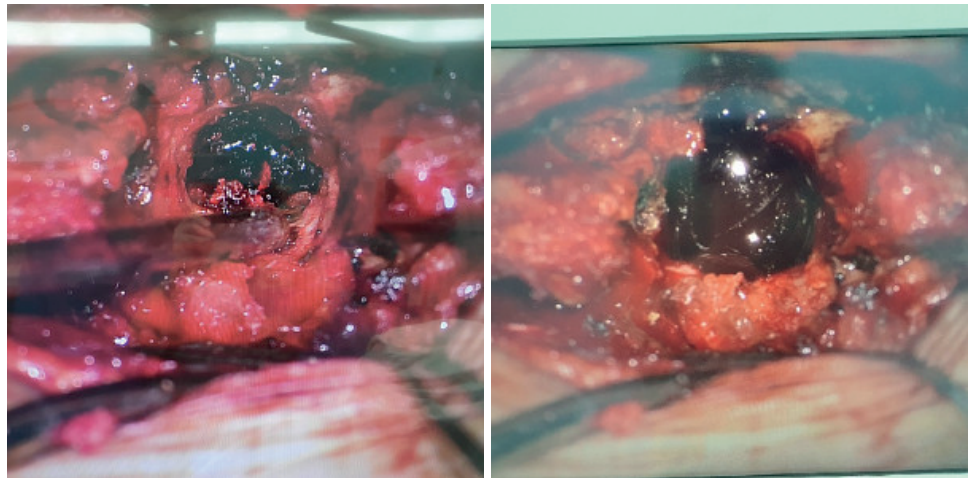


FIGURE 3. After removal of the spinous processes/laminae and ligamenta flava, the posterior epidural space was exposed. This confirmed the presence of an epidural hematoma on the T12-L1 and L4-5 levels, with a hard appearance (left) and a solid-liquid resolved appearance (right).

There was no complication after the surgery, but there was no improvement in lower extremity muscle strength and urinary symptoms on three months in spite of an emergent hematoma removal.

DISCUSSION

PEN has been used to manage chronic back pain or radicular pain that is refractory to other conservative treatments.^{2,13)} The adhesion and inflammation in the epidural space stimulates the nerve roots, and it cause severe pain. PEN is removing the cause of adhesion and reducing the inflammation. PEN allows for the placement of the catheter tip within the target area using the sacral hiatus approach including the use of a wire-bound catheter for mechanical adhesiolysis with steroid injections.^{6,8)} Like all invasive procedures, PEN can cause complications such as bending of the needle tip, catheter shearing, blood aspiration and bleeding in the epidural space, misplacement or blocking of the catheter, hypotension, migration of the catheter/penetration of the dura, paresthesia, headaches, infections, epidural abscess, and meningitis.¹⁴⁾ These complications may lead to cauda equina syndrome, myelopathy, and even death. This highlights that once neurological symptoms occur due to neural compression, irreversible neurological damage can be caused.

Kreppel et al.¹⁰⁾ reported that spinal and epidural anesthetic procedures alone can be rare cause of spinal hematoma. Most spinal hematomas are localized dorsally to the spinal cord at the level of the cervicothoracic and thoracolumbar regions after spinal injection. However there are two main blood vessels which can cause hematoma during PEN. One, internal vertebral venous plexus which are located behind the posterior longitudinal ligament can be damaged when the needle approaches to the anterior epidural space. And another is radicular artery that runs alongside the spinal nerve root.^{3,12)} Horlocker et al.⁷⁾ found the following to be risk factors for spinal hematoma in neuraxial blockade: anatomic abnormalities of the spinal cord and vertebral column, difficult or repeated spinal puncture, larger needle size, older age, and the use of an indwelling epidural catheter as opposed to “single shot” injection. Most hemorrhagic complications associated with percutaneous procedures were relatively

small in volume and self-limited in the clinical course.^{1,9)} If neurological deficits occur due to spinal hematoma, the less severe the preoperative symptoms and the more quickly surgical decompression performed, the better are the chances for complete recovery.^{4,5,11)}

In this case, the patient presented to the ER five days after the PEN procedure. In some cases, the cause of spinal epidural hematoma is not clearly confirmed, and there is a considerable gap between the procedure and the time of symptom identification, so it may be difficult to conclude that PEN caused the hematoma in this case. However, considering the pattern of the hematoma identified during surgery and the condition of the patient who had difficulty expressing symptoms, it is assumed that the hematoma that occurred after PEN progressed. We performed skipped laminotomy because it can reduce the operation time and the risk of instability instead of extensive multi-level laminectomy. Although we performed surgery as soon as the diagnosis was made, delays in identifying the symptoms resulted in poor outcomes. This implies that when complications occur, rapid diagnosis and treatment are required. However, there are some variables to consider. The patient's symptoms can be monitored to detect complications that occur after the procedure. However, an inability to complain of symptoms in time may lead to adverse outcomes. Since the patient had severe dementia, she could not readily express her symptoms. The patient's prognosis might have been better if she had been able to express her symptoms.

CONCLUSION

We report a rare case of spinal epidural hematoma that induced paraplegia after PEN. Early detection and treatment of the complications are important to minimize the risk of adverse outcome. This study highlights that providing adequate care and attention to non-cooperative patients, especially those with dementia or mental retardation, is as important as prompt diagnosis and management.

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