Archives of Anesthesiology and Critical Care (In Press); x(x): xx-xx.

Available online at http://aacc.tums.ac.ir

Case Report

Management of a Retained Epidural Catheter Fragment of Indeterminate Location: A Case Report

Maria Teresita B. Aspi[1,2,3]*, Jesse Lance C. Jariel[2], Euner Carlo T. Murillo[3]

[1]Department of Anesthesiology, College of Medicine, University of the Philippines Manila, Manila, Philippines.

[2]Department of Anesthesiology, Philippine General Hospital, University of the Philippines, Manila, Philippines.

[3]Department of Anesthesiology, Pasig City General Hospital, Pasig, Philippines.

ARTICLE INFO

Article history:
Received 01 November 2025
Revised 24 November 2025
Accepted 08 December 2025

Keywords:
Epidural catheter fracture;
Foreign body;
Conservative management;
Cesarean section

ABSTRACT

Neuraxial anesthesia is widely used in obstetric practice due to its well-established benefits for both maternal and fetal outcomes. While spinal anesthesia is more commonly employed, epidural anesthesia remains a valuable alternative, especially when prolonged surgical duration is anticipated. Complications from epidural anesthesia are uncommon, with catheter fracture representing an exceedingly rare occurrence. Because of its rarity, this complication presents unique diagnostic and management challenges. This report details the case of a retained epidural catheter fragment in a parturient undergoing elective repeat cesarean section. During epidural placement, an inadvertent dural puncture occurred, followed by difficulty threading the catheter. Upon withdrawal, the catheter tip was found to be missing, prompting abandonment of the epidural technique and conversion to spinal anesthesia. Postoperatively, serial neurologic examinations revealed no deficits or signs of infection. Magnetic resonance imaging and ultrasound failed to localize the retained fragment, leading to a decision for conservative management. This report emphasizes comprehensive clinical and imaging evaluations in determining the suitable approach to a retained epidural catheter fragment. When a patient is asymptomatic with no radiologic evidence of a neuraxial fragment, observation with close follow-up is acceptable. On the other hand, when a patient develops symptoms or there is evidence of fragment retention within the spinal canal, surgical exploration may be necessary. Due to the risk for complications in the future, full disclosure, thorough documentation, and long-term monitoring are indispensable.

Introduction

Neuraxial anesthesia is the favored technique for obstetric procedures. It allows avoidance of airway manipulation in a pregnant woman who may potentially have a difficult airway due to physiological changes of pregnancy. For cesarean section, spinal anesthesia is usually employed because it provides a dense and reliable block for the length of the surgery. Alternatively, epidural anesthesia may be considered in cases where prolonged operative time is anticipated (e.g., in patients with probable dense postoperative adhesions or when the operating surgeon is still a trainee.)

Epidural catheter insertion is not without inherent risks and possible complications. While very rare, catheter fracture with retention of a fragment may occur in 0.002% of cases. [1] Clinical judgment plays a critical

The authors declare no conflicts of interest.

*Corresponding author.
E-mail address: mbaspi1@up.edu.ph

DOI:

role in determining whether conservative observation or surgical retrieval is the appropriate management. This case report underscores the decision-making process between the two approaches in a postoperative patient with a retained epidural catheter fragment.

Case Report

A 27-year-old, gravida 2 para 1 (G2P1), nonlaboring parturient at 38 weeks and 2 days of gestation by last menstrual period was admitted for an elective repeat cesarean section. Her medical history and physical examination were unremarkable. With no contraindication to neuraxial anesthesia, an epidural technique was planned, anticipating a prolonged operative time due to a previous abdominal surgery and the relative inexperience of the operating surgeon.

Vital signs before induction of anesthesia were normal. The patient was positioned in the left lateral decubitus position, and the lumbosacral area was aseptically prepared with 10% povidone-iodine. Following local infiltration with 2% lidocaine, a lumbar puncture was attempted at the L4–L5 interspace using an 18-gauge Perifix® Tuohy needle. An inadvertent dural puncture occurred on the first attempt. The needle was withdrawn, and a second attempt was made at the L3–L4 interspace, where loss of resistance to air was appreciated at a depth of 4 cm. Advancement of the catheter beyond 8 cm proved to be difficult, prompting concurrent withdrawal of the needle and catheter. On inspection of the epidural catheter, the blue distal tip was not seen. The fragment could not be found despite meticulous searching. The epidural technique was abandoned, and conversion to a subarachnoid block using 15 mg of hyperbaric bupivacaine and 0.1 mg of morphine sulfate was done. The cesarean section proceeded uneventfully under adequate anesthesia.

Postoperatively, serial neurologic examinations revealed no sensory or motor deficits. Daily inspection of the puncture site showed no erythema, swelling, pain, or palpable foreign body suggestive of a skin communication. Magnetic resonance imaging (MRI) of the thoracolumbar spine revealed a T2-weighted linear hypointense signal in the cutaneous–subcutaneous region overlying the L3–L4 vertebrae (Figure 1), which was inconclusive for a retained fragment versus a possible needle tract. In view of the patient's asymptomatic status and the indeterminate location of the suspected fragment, a conservative management plan was agreed upon by the anesthesiology and neurosurgery teams.

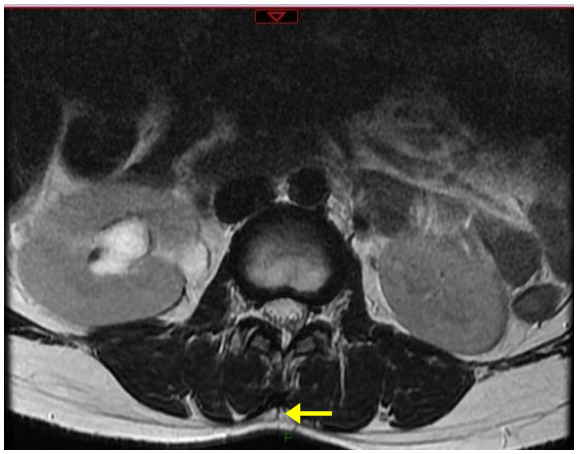

Figure 1– Suspicious signal in thoracolumbar spine MRI

The patient was discharged with advice for regular outpatient follow-up. A subsequent thoracolumbar ultrasound was also unable to localize the fragment. Given the lack of symptoms and reassuring findings, further imaging with a computed tomography (CT) scan was deferred. At one-year follow-up, the patient remains asymptomatic and without complications.

Discussion

Epidural catheter insertion is generally considered a safe procedure. However, one of its rare complications is catheter breakage during insertion or removal [2]. Reported causes include trauma during insertion [3], excessive catheter advancement, removal without the needle, advancing the needle over the catheter, pinching of the catheter between the needle tip and a bony surface, manufacturing defects [4], catheter entrapment within the spinal canal, procedural errors, poor technique, or excessive traction during removal [5]. In this case, most etiologies – excluding possible catheter pinching or manufacturing defect – were ruled out, as stringent catheter insertion and removal were done.

Critical in the prevention of catheter fracture is correct technique during both catheter insertion and removal. Routine inspection of epidural set allows detection of manufacturing flaws. To reduce the risk of coiling or knotting of the catheter, limiting the indwelling length of the catheter to 4-5 cm is recommended. In case reinsertion is needed, the needle and catheter should be withdrawn simultaneously, and the catheter checked for any shearing or damage [4]. All these precautions were observed in the present case.

During removal, the patient should be positioned similarly to the insertion position, especially when resistance is encountered. If with persistent difficulty, delaying succeeding attempts at removing the catheter for 15-30 minutes is suggested to allow the back to relax [4]. Only moderate traction (i.e., just enough force to cause

mild discomfort comparable to pulling of hair) should be applied [6]. Removal may be facilitated by applying even tension to the catheter (e.g., tying its distal end to a tongue depressor), or by injection of saline through the epidural space. When resistance to removal remains, previous studies have reported removal under local anesthesia with sedation or surgical extraction under general anesthesia with paralysis [4]. In this case, only moderate traction was applied, and the catheter was removed smoothly without resistance.

The optimal imaging modality for detecting retained epidural catheter fragments remains uncertain. MRI has been suggested as the initial test of choice because it is able to identify catheter fragments not seen on CT scans and can assess fibrosis-related stenosis [1,7]. However, the use of MRI as the first-line imaging study has been cautioned because it may cause thermal injury or dislodgement of wire-reinforced catheters. Studies have also mentioned its limited sensitivity in detecting epidural fragments, and its reduced spatial resolution compared to CT scans [8-10]. CT scans have been reported to be more sensitive, superior, and reliable for localizing retained epidural fragments [3,7,9,11-13]. For example, Palaria et al. successfully identified a broken segment using a lumbosacral CT scan with anteroposterior and lateral views [13]. The role of ultrasonography remains variable. While its utility is said to be limited by signal distortion from bone [1], it has been successfully used as the main imaging modality in a pediatric case [14].

In this case, preference for thoracolumbar MRI and ultrasound was mainly due to accessibility; however, both modalities failed to localize the retained fragment conclusively. Since neurological symptoms were absent, CT imaging was not pursued, and conservative management was opted over an invasive approach.

Complications from retained epidural catheters include radicular pain and weakness from nerve root irritation [15], abscess formation, and epidural/spinal hematoma. When patients develop low back pain, numbness, radicular pain, paralysis, urinary or bowel incontinence, local inflammation, headache, fever, or other signs of infection, immediate consultation and investigation are warranted [9].

The choice between conservative and surgical management remains debated. The inert nature of epidural catheter material precluding foreign-body reaction has been said to justify nonintervention [12]. Conservative management may be reasonable when imaging confirms the fragment to be outside the spinal canal, there is no skin communication that could serve as an infection portal, and patient remains asymptomatic [1]. Some have recommended surgical exploration only for symptomatic patients [4], while others favored surgical removal even in the absence of symptoms [16].

In this case, the imaging modalities did not reveal a neuraxial location of the retained fragment and the patient remained free of symptoms, justifying the adoption of a conservative approach with close follow-up. Follow-up visits were scheduled one month after the incident, then semiannually to annually, as long as the patient remained asymptomatic. Encapsulation of retained fragments in fibrous tissue within three weeks have been reported [2], with delayed complications arising months or years later [3]. Thus, regular surveillance remains essential. More than one year after the incident, the patient remains asymptomatic, with continued structured follow-up in place.

Conclusion

A retained epidural catheter fragment is a rare but potentially alarming complication of neuraxial anesthesia. Preventing the occurrence of a retained epidural catheter fragment requires stringent insertion and removal techniques, which include inspecting the catheter set before use, limiting catheter advancement, and avoiding excessive traction. When a fracture is suspected, management must be guided by prompt imaging and interdisciplinary collaboration.

If neurological symptoms are absent and imaging does not demonstrate a neuraxial location, conservative management with close follow-up can be a safe and reasonable approach as reported in this case. The decision between adopting a conservative approach versus an invasive strategy requires careful assessment of the patient's symptoms and risk factors for infection or neurological compromise, and thorough consideration of imaging findings.

While most retained fragments remain inert and do not cause noticeable symptoms, long-term clinical surveillance is warranted since delayed onset of complications can still occur. An individualized approach to the management of complications, coupled with full transparency and thorough documentation, is crucial in safeguarding the well-being of patients and minimizing medicolegal risks for practitioners. Lastly, continued reporting of a rare complication, such as a retained epidural catheter fragment, is instrumental in refining recommendations and developing standardized management algorithms to guide clinical practice.

References

[1] Gompels B, Rusby T, Slater N. Fractured epidural catheter with retained fragment in the epidural space-a case study and proposed management algorithm. BJA Open. 2022; 4:100095.

[2] Hippalgaonkar AV, Kudalkar AG, Gaikwad SM, Modak S, Gupta HB, Tendolkar BA. Successful management of a broken epidural catheter!!! Saudi J

Anaesth. 2017; 11(2):228-231.
[3] Shah P, Rana S, Mahajan M, Chaudhary U, Chauhan V, Verma A. Retained and broken epidural catheter: a case report. IOSR J Dent Med Sci. 2019; 18(7):70–2.
[4] Reena, Vikram A. Fracture of epidural catheter: A case report and review of literature. Saudi J Anaesth. 2017; 11(1):108-110.
[5] Kumar S, Mahajan S, Kumar V, Gandhi KA. Broken epidural catheter: individualize your management. Ain-Shams J Anesthesiol. 2023; 15:100.
[6] Anwari JS, Al-Wahbi Y, Al-Nahdi S. A broken catheter in the epidural space. Neurosciences (Riyadh). 2014; 19(2):138-41.
[7] Kriti K, Arun N, Kumar M, Pankaj S. Retained broken epidural catheter: what to do? J Indira Gandhi Inst Med Sci. 2020; 6(1):90-91.
[8] Mitra R, Fleischmann K. Management of the sheared epidural catheter: is surgical extraction really necessary? J Clin Anesth. 2007; 19(4):310-4.
[9] Tan KT, Balashanmugam D, Shah MM, Pazil AH, Amir AS, Jawahir H, et al. Retained epidural catheter: an update. Malays J Anaesthesiol. 2023; 2(2):146-54.
[10] Sheehan C, Sodhi V. Retained epidural catheter tip. Int J Obstet Anesth. 2012; 21(4):389-90.
[11] Staats PS, Stinson MS, Lee RR. Lumbar stenosis complicating retained epidural catheter tip. Anesthesiology. 1995; 83(5):1115-8.
[12] Sardana DK, Panaych K, Samra T. Broken epidural catheter: an anesthesiologist's dilemma. J Case Rep. 2017; 7(1):116-8.
[13] Palaria U, Das A, Jakhund C. Broken epidural catheter: What next to do. Indian J Clin Anaesth. 2018; 10:289-91.
[14] Yagihara M, Uemura A, Wakuda C, Sugimura S, Nakajima Y. A Pediatric Epidural Catheter Fracture Suspected to Be Caused by a Glue. Cureus. 2024; 16(5):e60524.
[15] Blanchard N, Clabeau JJ, Ossart M, Dekens J, Legars D, Tchaoussoff J. Radicular pain due to a retained fragment of epidural catheter. Anesthesiology. 1997; 87(6):1567-9.
[16] Ugboma S, Au-Truong X, Kranzler LI, Rifai SH, Joseph NJ, Salem MR. The breaking of an intrathecally-placed epidural catheter during extraction. Anesth Analg. 2002; 95(4):1087-9.