

## Successful management of a broken epidural catheter!!!

### ABSTRACT

Breakage of epidural catheter though rare is a well-known but worrisome complication. Visualization of retained catheter is difficult even with modern radiological imaging techniques, and active surgical intervention might be necessary for removal of catheter fragment. We report such a case of breakage of an epidural catheter during its removal which led to surgical intervention.

**Key words:** Breakage; epidural catheter; surgical intervention

### Introduction

Placement of an epidural catheter in epidural space is a routine practice for providing anesthesia/analgesia in many of the surgical procedures and painful conditions.<sup>[1]</sup> However, a range of complications including abscess, spinal hematoma, radiculopathy, breakage, migration, kinking, and knotting can occur as the catheter is inserted into the epidural space.<sup>[2,3]</sup> Although an epidural catheter is normally removed without complications, the catheter can break under conditions such as the impact on the catheter during insertion or removal.<sup>[3]</sup> For the period between 1957 and the present date, 15 articles reporting thirty cases of epidural catheter breakage were identified.<sup>[2]</sup> Due to the small number of cases found in the literature, it is controversial to decide whether to leave or remove indwelling catheter fragments. We report a successful surgical extraction of an epidural catheter which broke during a prior attempt to remove it by hand, along with a review of available literature regarding the prevention, management, and removal of a broken epidural catheter.

### Case Report

A 68-year-old, 65 kg male, fruit hawker by occupation was admitted with a diagnosis of bilateral inguinal hernia and was planned for bilateral inguinal hernioplasty under combined spinal epidural anesthesia. He was a known case of hypertension since 4 years; on regular treatment, tablet cilnidipine 10 mg + metoprolol 25 mg once a day. After confirming NBM status and written informed consent, the patient was taken for surgery. Under all aseptic precautions, an 18 gauge, 80 mm Tuohy needle (PORTEX Epidural Minipack System 1) was used to access the epidural space in L3–L4 intervertebral space with loss of resistance technique in the sitting position. The epidural space was encountered 5 cm from skin through a midline approach, and an 18-gauge radiopaque close-ended multihole epidural catheter advanced up to 9 cm after which a resistance was felt. Hence, the whole assembly both needle and catheter were simultaneously withdrawn and a fresh prick taken with the same needle through a paramedian approach

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in the same intervertebral space (L3–L4). The epidural space was encountered 6 cm from skin and the catheter was advanced cephalad and fixed at 12 cm. The placement of catheter in the epidural space was confirmed by meniscus sign, and no resistance was encountered while injecting the test dose. Furthermore, we did not find cerebrospinal fluid (CSF) or blood during aspiration. Subarachnoid block was then given by a 25-gauge spinal needle through a midline approach in L3–L4 intervertebral space with 3cc of 0.5% heavy bupivacaine and 60 µg injection buprenorphine as an additive after confirming free flow of CSF and negative aspiration of blood. Trendelenberg position was given to the patient, and after achievement of sensory level of up to T8 surgery was started which lasted 2 h. Surgery was uneventful, and patient was vitally stable throughout the procedure. While removing epidural catheter at the end of surgery, it was found that the catheter was broken from almost 15 cm mark [Figure 1]. Immediately, operating surgeons were informed about the event, and an urgent neurosurgery reference was sent for. The patient and his relatives were well informed and counseled regarding the complication. Patient had complete motor recovery after 4 h of spinal anesthesia. He remained asymptomatic in the postoperative period, and there was no feature of local infection, sepsis, or any neurological deficit. No abnormality was detected on neurological examination. It was not possible to detect the retained fragment on digital X-ray of thoracolumbar spine both in anteroposterior and lateral position. Computed tomography (CT) scan of dorsolumbar spine with sagittal and coronal reconstruction was done which revealed a 2–3 cm radiopaque fragment of the catheter near the L4 vertebral lamina outside the canal [Figure 2]. No catheter was seen at any other vertebral level or in the canal or in skin, subcutaneous, and muscle plane. However, since the part of the catheter which was suspected to be inside the patient's body was large (almost about 15 cm) and can be cause of infection in the epidural space, foreign body removal was scheduled by neurosurgeons next morning



Figure 1: The remaining part of the broken epidural catheter at almost 15 cm mark

with exploratory laminectomy under general anesthesia in prone position. A 5 cm incision was taken at the site of insertion of epidural (L3–L4 space). The surgeons gently removed the epidural catheter after dissecting through the layers of subcutaneous tissue, and catheter was found lying in paraspinal muscles [Figure 3]. A total length of 17 cm of epidural catheter was retrieved [Figure 4]. After surgery, the patient was discharged without significant neurological complications.

## Discussion

In general, epidural catheterization is a safe procedure and is associated with low complication rate. Breakage of the epidural catheter during insertion or removal in the epidural space is a rare complication, and only a few cases have been reported.<sup>[4]</sup>

The possible causes of shearing can be (a) while withdrawing a catheter through Tuohy needle, breaking the catheter into two fragments, (b) as it catches the barbs of an unsharpened needle due to application of force while withdrawing the catheter through the needle, (c) by heavy contact between the tip of the needle and a bony surface, if a part of the catheter was protruding from the tip, (d) due to weakness of the catheter produced by defects in manufacturing, (e) getting looped, knotted, or entangled by resistance encountered by anatomical obstacles on its path, i.e., nerve roots, vessels, fascia, posterior vertebral arches, vertebral processes, and facet joint, (f) excessive threading increases the likelihood of entanglement, and (g) kinking and twisting occurring anywhere between the skin and the epidural space.<sup>[1,4-6]</sup> In our case, there was no obvious cause for breakage. Most probably, it was kinked or curled along with migration of catheter.

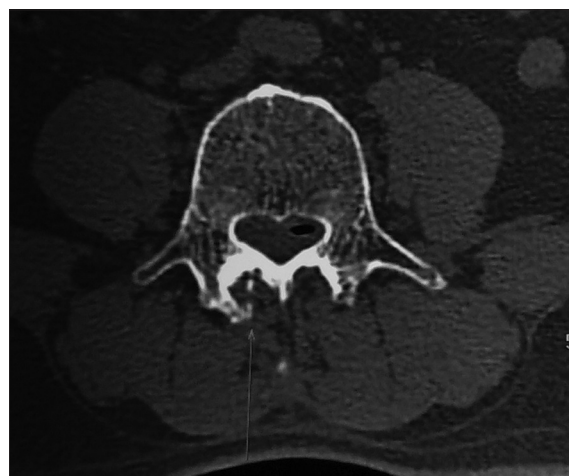
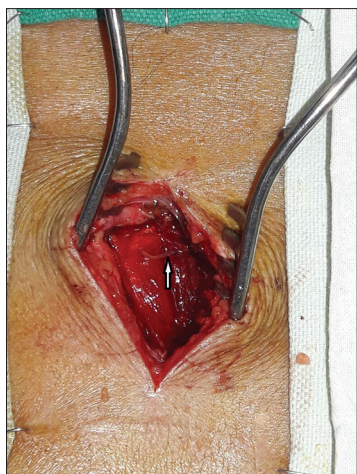


Figure 2: 2–3 cm radiopaque broken fragment of catheter seen near the L4 vertebral lamina outside the canal



**Figure 3: The broken catheter found lying in paraspinal muscles during exploratory laminectomy**

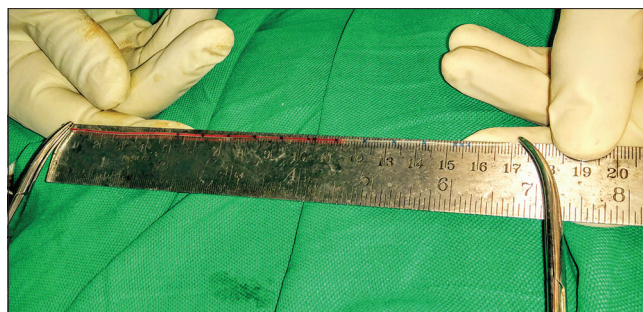
Radiological imaging tests are not very helpful in locating the retained catheter even though the catheter is radiopaque. The reason may be small thickness of the epidural catheter and the fact that surrounding tissue is highly radiodense,<sup>[4]</sup> so catheters should be manufactured with materials that improve their visualization.<sup>[2]</sup> In accordance with the data, we also could not appreciate the catheter in digital X-ray and only a small fragment (2–3 cm) was seen on CT plates.

If the epidural catheter breaks during removal, the presence of retained catheter fragment should be properly documented and should also be conveyed to the surgical team as well as to the patient. The patient must be assured that occurrence of neurological sequel is rare and must be informed about treatment options available in such cases.<sup>[2,4]</sup>

Although the neurological consequences of a broken catheter are rare, many reports still advocate surgical removal be considered first.<sup>[2,7]</sup> The other possible options being (a) leaving a retained epidural catheter in place in adult patients, (b) providing patient education regarding “red flags” to watch out for, and (c) consultation of neurosurgeons for cases of sheared catheter.<sup>[1,7]</sup>

The broken fragment usually becomes walled off by fibrous tissue within the epidural space after about 3 weeks. However, symptoms can arise when the catheter impinges a nerve, causes traction on it, a superimposed infection occurs, or on rare occasion if patient presents with low back ache due to foraminal stenosis. Surgical intervention becomes a rule for the removal of catheter in such cases.<sup>[4]</sup>

According to the norm of “prevention better than cure,” literature suggests the following recommendations for



**Figure 4: A total 17 cm of epidural catheter retrieved after surgical exploration**

prevention of catheter breakage: (a) needle should be checked for unsharpened barbs and the catheter for manufacturing imperfections before insertion; (b) using slow continuous force at all times; (c) discontinuing application of force if the catheter stretches and applying traction few hours later; (d) placing of the patient in the same position as insertion; (e) placing the patient in the lateral decubitus position as this results in least force of extraction; (f) attempt removing in flexion if the previous efforts are not efficacious; (g) attempting removal after injection of normal saline through the catheter; (h) considering CT scan to identify the reason of entrapment; (i) complete relaxation with general anesthesia with muscle relaxation; (j) catheter should not be inserted more than 4–5 cm into the epidural space to avoid the complication of kinking, curling, coiling, and knotting of epidural catheter.<sup>[1,2,7,8]</sup>

According to literature, regarding the puncture site, most cases reported epidural insertion between L<sub>2</sub> and L<sub>5</sub> spaces, probably because the frequency of lumbar epidural is much greater. Material used for catheters may also play a part; nylon or polyurethane catheters are more tougher than Teflon or polyethylene catheters and 19-gauge catheters have a tendency to break at a fixed site near the tip.<sup>[2]</sup>

## Conclusion

In spite of all the above-mentioned facts, catheterization of the epidural space is an acclaimed technique in anesthesiology, and cases of catheter breakage are rare. To prevent the catheter breakage during its removal, the usual guidelines for insertion and removal of a catheter should be strictly followed.

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## Conflicts of interest

There are no conflicts of interest.

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