

Fracture of epidural catheter: A case report and review of literature

ABSTRACT

Epidural blocks are a very important part of the anesthetic armamentarium. Among some of the known complications, fracture of epidural catheter, though is extremely rare, is a well-established entity. When it happens, it leaves the anesthesiologist puzzled and worried. We describe the occurrence of such an event where epidural catheter broke during insertion since it will also add to such an under-reported complication of a very commonly performed procedure. A brief review is also done which will delineate the recommendations for the prevention and management of such an event.

Key words: Broken epidural catheter, fractured, retained, sheared

Introduction

The benefits of the epidural block have increased by several folds after the introduction of epidural catheters, permitting extension of neuraxial blockade for several hours including the postoperative period. However, like any other anesthetic technique, it is also not free of risks, of which fractured or sheared epidural catheter is an uncommon and a troublesome occurrence. A literature search reveals the first ever reported case of broken epidural catheter by Bonica *et al.*,^[1] since then isolated reports have been done by various authors. Our case is yet another attempt to increase the awareness regarding this complication.

Case Report

A 55-year-old, 70 kg, female (American society of anesthesiologists Grade I), was posted for Wertheim's hysterectomy under combined spinal epidural anesthesia. Under full aseptic precaution, in the sitting position, using

the loss of resistance to air technique, epidural needle was advanced in the L3–L4 interspace. The epidural space was identified at 4 cm and epidural catheter was advanced cephalad up to 15 cm at the hub of the needle. While injecting the test dose, resistance was felt, so we decided to relocate the space. The epidural needle with the catheter was tried to be removed by gentle traction, but the catheter sheared off around 1.5 cm from the tip [Figure 1].


The new epidural catheter was placed at L2–L3 interspace and fixed at 9 cm mark, keeping 5-cm length in the epidural space, confirmed by a negative aspiration for blood and cerebrospinal fluid (CSF). An epidural test dose of lignocaine 2% with adrenaline was administered. After that, spinal block was given at L4–L5 interspace, and bupivacaine heavy 0.5%, 3 ml with fentanyl 25 mcg given intrathecally. The neuraxial block was maintained with epidural top-ups and surgery ended after 4.5 h uneventfully. The new epidural catheter was left in place for 72 h for postoperative pain

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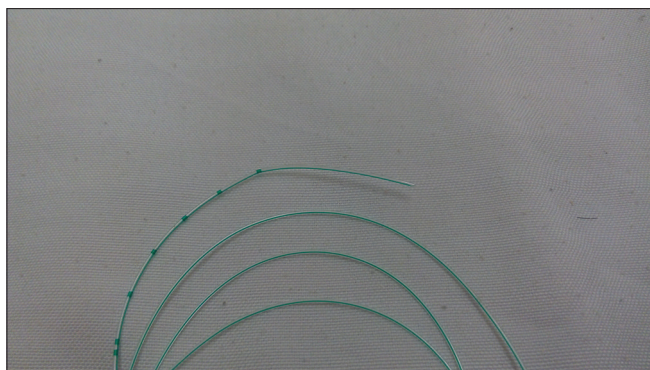


Figure 1: Sheared epidural catheter tip

management, after which it was removed in total. A check lumbosacral spine anteroposterior and lateral X-ray was done to locate the sheared tip of the epidural catheter. In the lateral view, the sheared tip was found at the level of L5 vertebral spine [Figure 2]. The surgeon and patient both were informed about the fractured catheter tip. The patient was followed up for the development of any complication such as backache, infection on the injection site, or neurological sequelae; she remained stable throughout till the day of discharge. The advice was also sought from the spine surgeon, and after a thorough discussion with the patient, it was decided to leave the broken catheter tip as such. The patient was given assurance about the inert nature of the catheter fragment. She was also advised to revert back if any complication develops.

Discussion

Literature review shows only sparse case reports of epidural catheter breakage, most of which occur during catheter removal. Breakage occurring during catheter insertion is very rare as was the case of ours. Except for few instances, breakage of the epidural catheter is a benign issue. We will briefly review the possible causes of sheared epidural catheter, preventive measures, and management options.

Causes of fractured epidural catheter: (a) During insertion: (1) When excessive length of the catheter has been inserted. (2) When excessive force is used to advance the catheter against resistance. (3) When catheter is withdrawn without moving the Tuohy needle. (4) When Tuohy needle is advanced over the catheter. (5) When the catheter gets damaged due to getting pinched between the tip of needle and a bony surface. (6) In two levels CSE, the catheter may get sheared off by spinal needle.^[2] (7) Microlesions caused to the catheter by the suture used to fix it.^[3] (b) During withdrawal: (1) When excessive force is applied to remove a knotted, kinked, or entrapped catheter. (2) When the catheter has taken a circuitous course around any tissue such as bone, fascia,



Figure 2: Lumbosacral X-ray lateral view showing retained catheter fragment

ligament, or nerve and an excessive pulling force is applied. (3) Weak catheter due to manufacturing defect.

Recommendations to prevent epidural catheter fracture:

(a) During insertion: (1) Only 4–5 cm of catheter length is sufficient in the epidural space. Excessive insertion should be avoided to prevent coiling, knotting, and entrapment of catheter.^[3,4] (2) On encountering resistance, the catheter should never be withdrawn through the needle. Both should be removed as a single unit. (3) Catheter should be checked for manufacturing defects and sharp bevel tip should be ruled out. (4) Avoid applying sutures to the epidural catheter, unless absolutely necessary.^[3]

(a) During catheter removal: (1) If resistance or stretching of the catheter occurs while attempting withdrawal, it is recommended to place patients in the same position as they were at the time of insertion.^[3,5] (2) A flexed lateral decubitus position is reported to be more effective than the sitting position, with withdrawal forces being as much as 2.5 times greater in the sitting position.^[6] (3) In the event of a difficult catheter removal, it has been suggested that the efforts at removal be discontinued for 15–30 min allowing tissue relaxation,^[6] or that a tongue depressor be tied to the distal end in the hope that this will provide gentle traction.^[7] (4) Epidural catheter saline injection with simultaneous slow but firm traction to be applied in difficult catheter removal cases.^[8] (5) Removal of the catheter by the anesthesiologist or trained personnel is the conduct recommended in literature for cases of difficult catheter removal.^[4] (6) In difficult removal situation, one can choose between incision under local anesthesia with sedation and general anesthesia with muscle relaxants. In the later situation, if the catheter has formed a loop around the nerve root, nerve root avulsion can occur which will get unrecognized under anesthesia. It is

recommended to remove such an entrapped catheter under direct vision doing exploratory laminectomy.^[9]

Management

All patients with retained epidural catheter fragment should undergo proper imaging studies to know its exact location. It is also necessary for documentation purposes and to encourage asymptomatic patients for timely follow-up so that earliest possible diagnosis of symptoms can be made. Of these radiographies, computed tomography, magnetic resonance imaging, and ultrasonography all have been used with variable results. In our case, we could easily locate the broken segment in the lumbosacral spine X-ray lateral view [Figure 2]. Since our patient was asymptomatic, we did not order further investigations as the patient decided against surgery, knowing the inert nature of the fragment. The patient was closely followed up at regular intervals; till now, she has not developed any complication, a time period of roughly 1 year. Surgical removal is indicated only in complicated cases such as leaking CSF through the catheter whose tip is either placed or migrated to intrathecal space and is now acting as a wick;^[10] or either the patient develops infection or radicular pain due to nerve entrapment;^[11] or when the broken end of the catheter is emerging out of the skin, acting as a portal of entry for infection. A rare complication of the development of spinal stenosis due to the formation of reactive scar tissue around the broken catheter piece in the epidural space has also been described.^[12] One case report recently mentioned the development of delayed onset subdural hematoma following epidural catheter breakage after 18 years of its placement.^[13] It is clear that all patients with broken epidural catheter should be closely followed up; surgical management is required for the symptomatic patients.

Conclusion

Breakage of epidural catheter puts the anesthetist in a dilemma. To avoid such an event, it is imperative to stick to the usual guidelines for epidural insertion and removal. Despite precautions, if at all this occurs, the patient should

be informed about it. The management of asymptomatic case is conservative which includes imaging studies to document the location of the broken fragment and regular follow-up to identify the complications which may develop months or years later. Surgery is reserved for symptomatic cases.

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Conflicts of interest

There are no conflicts of interest.

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