When radiology determines the success of removal of a retained epidural catheter: A case report

ABSTRACT
The epidural block is an anesthetic procedure that can have possible complications upon insertion or removal. Epidural catheter retention is a rare complication; its etiology may come from lateral migration with kinking of the catheter or from involvement with bone, ligamentous, muscular, vascular structures, or nerve roots. Up until today, there is not a standard approach to this complication; however, there are some recommendations for the management of retained epidural catheters. Here, we describe a case report of epidural catheter retention, in which we followed the published recommendations. Although computed tomography scanning may be the best option to visualize the anatomical position of the distal extremity of an epidural catheter, with this case report we intend to reinforce the fundamental contribution of the contrast radiograph in the successful catheter removal. Posteriorly, a protocol for clinical orientation of epidural catheter retention was developed in our institution.

Key words: Contrast radiography; epidural catheter retention; imagiology

Introduction

The epidural block is a widely used anesthetic procedure that can have possible complications such as injuring the dura mater, hematomas, abscesses, neurological injuries, or catheter misplacement.[1] Epidural catheter retention is a rare event, 1 in 20,000–30,000 procedures. It remains an area of dilemma to the practicing anesthesiologist.[2] Several mechanisms may be associated with this intercurrence, namely, lateral catheter migration or involvement with bone, ligament, muscle, vascular, or nerve roots.[3] Although muscle tension is a possible mechanism, it is less likely in patients with reduced muscle mass or in those where the median approach was used.[3] Up until today, although there are some recommendations for the management of retained epidural catheters, there is not a standard approach to this complication. Here, we describe a case of epidural catheter retention to reinforce the fundamental contribution of imagiology to successful catheter removal. Informed consent to publication was obtained from the patient.

Case Report

A 35-year-old female, American Society of Anesthesiologists (ASA) classification II, was admitted for abdominal hysterectomy for which we proposed a combined anaesthesia: general anaesthesia and epidural block. The procedure was initiated with standard ASA monitoring, on right lateral decubitus with flexion of the vertebral column and lower limbs; because of the surgical area, the chosen intervertebral

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space was L3–L4, and the epidural space was approached through paramedian with a Tuohy 18G needle and loss of resistance with air was found at 7 cm. The epidural catheter (Perifix 20G) was introduced 5 cm in the cephalic direction. The patient had no symptoms throughout the procedure. On the intraoperatory period, there were no other complications, either surgically or anesthetically. The patient was transferred to the infirmary with epidural analgesia that elapsed smoothly until 36 h postop, when analgesia could not be administered through the epidural catheter because of elevated pressure on injection. At this time, there was consideration of removing the catheter and switching to endovenous analgesia. However, even though there were associated neurological symptoms, multiple failed attempts were made to remove the epidural catheter, even by positioning the patient on right lateral decubitus (as it had been inserted), or in sitting position with flexed column. The next step was to radiograph the lumbar column from posterior–anterior and side views [Figure 1], administering non-ionic contrast through the catheter.

With this approach, we were able to identify the location of the catheter: paravertebral lumbar space, without kinking, or involving structures such as nerve roots, vascular, or bones. At this point, we decided to try again and remove the catheter from the paravertebral space, positioning the patient on right lateral decubitus with extended and relaxed back and lower limbs, injecting saline, and force its removal with light traction. The epidural catheter was successfully exteriorized [Figure 2].

**Discussion**

Based on the reports of cases described in the literature, the incidence of knots in epidural catheters has been estimated at 1 in 20,000–25,000. Retention of the catheter with no knot is even rarer. A mechanism that may have caused entrapment of the catheter in this case could be excessive muscular tension in the withdrawal maneuver. Increased muscular tension is more likely when a paramedian approach is used, because it often crosses the bellies of the semispinalis muscles where the muscle bulk is greatest.

The abnormal anatomical location of the catheter may have occurred during its placement, by secondary migration during the postoperative period or during withdrawal attempts. There are case reports and imaging studies also showing the possibility of epidural catheter migration to different regions of the vertebral column, including transforaminal dislocation of the catheter to psoas muscle compartment. This can occur even without excessive catheter introduction or clinical signs such as paresthesia, as described in this clinical case.

Although cases of injury occurring secondary to magnetic resonance imaging have not been reported, many clinicians do not recommend this as the first diagnostic test because of some theoretical risks. These risks include thermal injury, dislodgment, or movement. It has been suggested that computed tomography (CT) scanning through level of interest is more sensitive than plain radiography, because of its higher resolution; if CT scanning is readily available, it may be the best test.

However, the authors want to reinforce the contribution of the contrast radiograph in successful catheter removal. It did not only exclude the presence of knots and important structure involvement but also helped in identifying the correct positioning for the removal, into one that allowed relaxation of the paraspinal musculature. The authors were not able to find any case report in the literature that explores the contribution of contrast X-ray imaging. This was paramount in identifying the problem and finding the solution. Indeed, some institutions may not have CT
scanning and contrast X-ray can be a viable alternative, with the advantage of having less radiation exposure.\textsuperscript{[3]}

Epidural catheters may consist of different materials, including nylon, polyethylene, polyurethane, and polyamide.\textsuperscript{[2]} The mechanical properties of epidural catheters can influence the outcome in a situation of retained epidural catheter. It was demonstrated that polyurethane catheters are less fragile compared with nylon catheters.\textsuperscript{[2,3]} In this case, we used a nylon catheter which can be stretched by 30\% of its original length, which can explain why the catheter did not break during the multiple attempts.\textsuperscript{[2]} Although radiopaque epidural catheters have lower tensile strength, they are easier to locate radiologically than nonradiopaque ones, which could have been advantageous in this clinical case.\textsuperscript{[3]} However, a radiopaque fragment can be impossible to locate radiologically when the surrounding structures are radiodense.\textsuperscript{[3]} Therefore, the characteristics of an ideal catheter include being radiopaque, flexible, disposable, and having stretching capacity.\textsuperscript{[2]}

Finally, this clinical case demonstrated the need for the development of a protocol for clinical orientation of epidural catheter retention. Diagram 1 represents an example applied in our institution that follows the current recommendations. There have been described in literature clinical cases of broken catheters fragments that remained undetectable by imagiology and even in surgery.\textsuperscript{[2]} Therefore, decision-making and monitoring should be performed based on the individual patient’s clinical case.\textsuperscript{[2]}

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understand that her name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Üşar P, Kar AA, Çıtkak G, Maral J, Canlı Ş. Breakage of an epidural catheter inserted for labor analgesia. Turk J Anaesthesiol Reanim
2. Mitra R, Fleischmann K. Management of the sheared epidural catheter: Is surgical extraction really necessary? J Clin Anesth 2007;19:310-4.

3. Molina-Garcia RA, Muñoz-Martínez AC, Hoyos-Pescador R, Torre-Espinosa RDL. Retained epidural catheter: A rare complication. Report of two cases. Rev Colomb Anestesiol 2017;45:4-7.

4. Shah R, Butala B, Parikh G, Pargi R. Visible evidence of lumbar epidural catheter misplacement-A critical incident case report. J Clin Diagn Res 2017;11:UD01-2.

5. Pant D, Jain P, Kanthed P, Sood J. Epidural catheter breakage: A dilemma. Indian J Anaesth 2007;51:434-7.