



Knotting of a Lumbar Epidural Catheter during its Removal: A Case Report

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ABSTRACT

Knotting of an epidural catheter is a rare complication during the removal of an epidural catheter. There are many factors for knotting of an epidural catheter, such as the characteristics of the catheter itself, patient's factors [anatomy, position during insertion and removal of the catheter, and the body mass index (BMI)], the difficulty of the procedure and the distance of advancing the catheter in epidural space. During its removal, we experienced a knot of a lumbar epidural catheter which was inserted for labor pain analgesia. The knot was successfully removed. In this case, the knotting was due to long distance advancement of the catheter, which was double knotted and looped in epidural space, far from its distal tip. To prevent this complication, catheters should be left with less than 6 cm in length in the epidural space.

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Introduction

Epidural analgesia is used for postoperative pain control, labor analgesia, chronic pain, and cancer pain control as well as for anesthesia. Labor epidural analgesia is particularly effective for labor pain control. Today, neuraxial techniques for labor are consistently shown to be the best method of providing analgesia when compared with all other modalities. However, a range of complications including breakage, migration, kinking, and knotting

can occur as the catheter is inserted in the epidural space (1, 2). Although generally an epidural catheter is normally removed without any complications, knotting of an epidural catheter leading to entrapment is a rare complication of epidural catheterization.

Here, we report a new case on knotting of a lumbar epidural catheter in delivery procedure.

Case Report

A twenty-year-old, gravid 2-parity 1 (G2-P1) women presented to our delivery suite at

39 weeks of gestation, in early labor. Ten minutes later, at 4-5-cm cervical dilatation, she requested an epidural analgesia for her labor pain. Her medical and obstetric history was unremarkable, and she was not taking other medication. The epidural space was identified in L3-L4 interspace at the depth of 5 cm by the loss of air resistance technique, using an 18-gauge Tuohy needle. A dose of 16 ml of 0.125% bupivacain in 50 microgram fentanyl (17 ml) was injected. A clear catheter with 20 gauge and closed Tip-3 lateral eyes (MEDIKIT, Gurgaon, India) was easily inserted in the patient's epidural space in sitting position. The catheter was threaded to the 23-cm mark, the needle was removed, and the catheter was left with 20-cm mark at the skin. This left 15 cm of catheter in the epidural space. But, at this time, we felt that the catheter is advanced more than usual. The catheter was taped in place. The automatic blood pressure measurement machine and fetal heart monitor was attached to patient, and lactated Ringer was administered intravenously. The Patient was comfortable and stable all through her labor which lasted around 2 hours. After vaginal delivery, the catheter could not be removed by the acute pain nurse.

A senior consultant was involved. Repeated attempts to remove the catheter by several methods continued to be unsuccessful. The anesthesiologist was called and tried to remove the catheter by pulling. Although the patient was placed in the same position as when the catheter was initially inserted, the resistance persisted. A number of different other positions were tried and all attempts were unsuccessful. Then, the patient was asked to walk a small distance and then after detailed discussion with the patient and her partner, it was decided to apply a firm and steady traction on the catheter with the patient in lateral position by the anesthesiologist. This maneuver allowed the retrieval of the catheter intact without any complication except for transient discomfort at the insertion site and, the knotted and looped catheter

successfully removed. The subsequent postpartum course was uneventful and no neurological sequel was developed. Detailed examination of the catheter revealed a 13-mm tight double knot from the tip, distal to the three lateral holes (Figure 1, A and B).

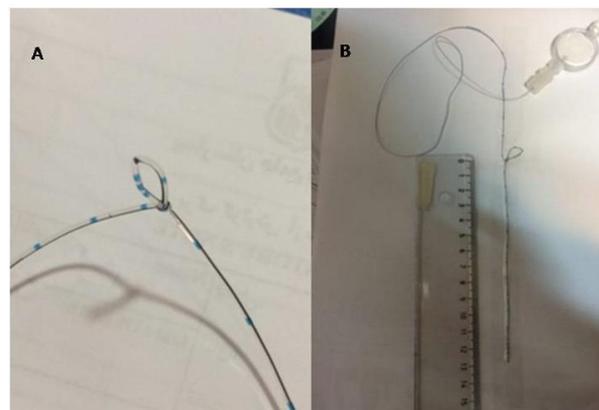


Figure 1. Image of the knotting of the lumbar epidural catheter (A), Details of the knotting of epidural catheter (B)

Discussion

Knotting of catheter is a very rare complication with the incidence of 0.0015% (3). Most of the involved cases (88%) were obstetric patients (3). In most cases, it occurs during catheter removal; however, in one case report, it occurred during insertion while withdrawing of the catheter to its correct length (4).

There are several factors that cause catheter knotting in epidural space. The most important factor is the distance of advancement to the catheter into the epidural space. Some authors have reported insertion of catheter up to 10 cm in the epidural space without any complication (5); and some others recommended that leaving the catheter less than 4 cm in length in the epidural space may avoid this complication (6). Because of unreliability of catheter displacement and removal during a prolonged labor, in our hospital, we normally prefer to advance the catheter even more than 10 cm in the epidural space. This case was our only experience in catheter knotting. In contrast, several reports of knotting catheter with small distances of

insertion (e.g. 3 cm) exist. Altogether, there is no consensus about the optimal size of insertion (7).

The catheter placed in our patient was inserted 15 cm, and the knot was located 13 cm from the catheter tip. This long distance might have caused the catheter to turn 180° and form a loop and make a knot. Another factor involved in knotting is the catheter nature in this way that the firm catheter is more likely to knot than the rigid one, unlike breakage and to subarachnoid and vessel migration.

The other factor is the epidural space anatomy. Catheter may be deflected by connective tissue bands, blood vessels, or nerve roots that lie in the path, curling up, or doubling back after passing only a short distance. In a study, researchers reported an epidural catheter that formed a figure of eight in lumbar epidural space (8). Browne and Politi reported that the catheter tended to be deflected by blood vessels and nerve roots that lied in its path and as a result, curl up or double back. This is more common in the lumbar region than in thoracic. This may be because of oblique direction of the needle required in thoracic epidural insertion (9).

From the several above factors, we can control the insertion distance and the type of catheter and also, we can manage them for the lower complication. But, epidural space anatomy is not under our control.

To remove the tight catheter, authors recommended steady and gentle traction and placing the patient in the same position as when the catheter was initially inserted (10). In this case, the epidural process was done in a sitting position; but, finally we removed the catheter in a lateral position. It has been shown that catheters removed with the patient in the sitting position required a force more than 2.5 times greater than that required in the lateral position (8). Thus, the risk of catheter breakage is higher. A knotted catheter can usually be removed by applying a firm steady pull, but patient pain complain and neurological signs should also be considered.

However, it may happen that the catheter is completely fixed and, we are unable to advance or remove them; and may not feel any change in their position. In this condition, the surgical option is probably the most appropriate since application of an excessive tension may cause stretching or breakage of the catheter (10).

Difficulty in insertion of catheter is an important factor in knotting and entrapment. In another lumbar epidural entrapped catheter case in our unit, catheter insertion was difficult and after delivery, the catheter could not be removed by the nurse. We asked the patient to walk around, and then we were successful to remove the catheter applying a steady pull while the patient was in a lateral position. In this case, the catheter became tight and was entrapped, while there was no knot. This may have happened because of the difficulty in the catheter insertion, and the needle may have not followed the appropriate route between the skin and the epidural space. We believe that walking may result in an incidental movement of the catheter, and presumably help to removal of it. There are no reports on the walking effect on a tight catheter removal; therefore more studies are needed to measure the affectivity of this factor.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

None.

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