A knotty affair

Srivishnu Vardhan Yallapragada*, Nagendra Nath Vemuri* and Mastan Saheb Shaik*

* Department of Anaesthesiology, NRI Medical College & General Hospital, Guntur, India
*Corresponding author, email: ysvdhan@gmail.com

Introduction

Epidural anesthesia is the regional anesthesia of choice for lengthy surgical procedures. Delivering the local anesthetic through a catheter in the epidural space offers the advantage of titrating the dose to effect for the duration of surgery and also for postoperative analgesia. At the same time it is important to note that epidural catheterisation is not devoid of problems. Knotting of the epidural catheter is one such complication we encountered recently.

Case report

A 30-year-old man sustained injury to his right knee and was diagnosed with an anterior cruciate ligament tear. He was scheduled for arthroscopic repair under epidural anesthesia. An epidural catheter was placed conventionally in L4-L5 inter vertebral space in the left lateral position. Epidural space was engaged at a depth of 4 cm and the catheter was fixed at 9 cm mark such that the length of the catheter in the epidural space was 5 cm. Anesthesia was activated after giving the test dose according to the standard protocol. Surgery was uneventful and the epidural catheter was used for postoperative analgesia for 3 days. On the fourth postoperative day, our resident tried to remove the epidural catheter and found that the catheter was stuck inside. We attempted pulling out the catheter by placing the patient in left lateral position with his back flexed, but failed. Finally, under spinal anesthesia, the catheter was tracked surgically, along its course up to the epidural space. A knot was observed at the tip of the retrieved catheter. There is a lot of debate in the literature favouring and contradicting the surgical removal of broken fragments of an epidural catheter. However, since the catheter was intact, we attempted removal by surgical dissection of the tract. Broken and lost fragments are better left untouched unless they pose problems and the patients reassured.

Figure 1: Elongated and thinned out segment distal to 10 cm mark

Figure 2: Knotted catheter recovered by laminectomy
Figure 3: Epidural catheter knot

Discussion
Knotting of epidural catheter is a very rare complication with a suggested incidence of about 0.0015%.1 The path taken by a catheter in the epidural space as it is advanced depends on the relative resistance encountered within the space due to loose areolar tissue, fat and blood vessels.2 There is no guarantee that if the bevel of the Tuohy needle is turned cephalad, the catheter would go cephalad. There is evidence that only 13% of the catheter tips could be advanced more than 4 cm without coiling3 and around 17.6% of epidural catheters curl in the epidural space.4 A coiled catheter is likely to form a knot if it is advanced further and then pulled back. Once a knot is formed, it becomes difficult to pull the catheter out as the knot cannot easily pass through the ligaments. In our case, we attempted to retrieve the catheter by placing the patient in the left lateral position with maximal flexion of the back and applying a steady traction. It was shown earlier that the best position for the easy retrieval of an epidural catheter was the position in which it was sited.5 Further, it has been reported that steady traction would allow the catheter and the knot to decrease in diameter and facilitate easy passage through the ligaments.6 However, in the case of our patient, steady traction in the said position led to stretching and thinning of the catheter and fearing the possibility that it would break, we stopped pulling. Literature suggests that injecting saline into the catheter can undo the knot6,7 but this did not work in our case. There is a lot of debate in the literature as to what to do with the broken catheter in the epidural space. Reactive epidural mass resulting in lumbar spinal stenosis8 and localised tissue reactions leading to dural thickening and cocoon formation9 are some of the reported complications of retained catheter fragments in the epidural compartment. However, many advocate leaving the retained fragments of sheared catheters unless they are symptomatic because surgical removal can do more harm than good.10 In our case, we opted for surgical removal of the catheter because the retained fragment in the epidural space extending up to the skin can be a potential source of infection. Moreover, surgical removal was apt and convenient as tracking an intact catheter along its path of insertion is always easier than exploring a lost fragment in the epidural space.

Conclusion
Though there is evidence that epidural catheters often tend to curl and coil in the epidural space, the incidence of knotting is very low. Utmost care is required while retrieving the knotted fragment. If the catheter breaks during the traction, or a fragment shears when the catheter is wrongly pulled out after it emerges from the Tuohy needle, it is better to leave it rather than attempting surgical exploration. But what to do with an intact catheter? We could not find any report of the anaesthetist being in such a situation, and the option we chose was to explore and retrieve it surgically with the catheter in situ as a guide. We wonder what others in our fraternity would do when faced with a similar situation.

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References
1. Lala PS, Rai A, Langar V, et al. A rare complication of epidural anaesthesia a case report with brief review of literature. Indian J Anaesth. 2011;55:629–30. http://dx.doi.org/10.4103/0019-5094.90631
2. Brookman JC, Sair HI, Benkwitz C, et al. Wandering epidural catheter. Anesthesiology. 2010;113:1198. http://dx.doi.org/10.1097/ALN.0b013e181e4f349
3. Lim YI, Bahk JH, Ahn WS, et al. Coiling of lumbar epidural catheters. Acta Anaesthesiol Scand. 2002;46:603–06. http://dx.doi.org/10.1034/j.1399-6576.2002.460520.x
4. Choi DH, Lee SM, Cho HS, et al. Relationship between the bevel of the Tuohy needle and catheter direction in thoracic epidural anaesthesia. Reg Anesth Pain Med. 2006;31:105–12. http://dx.doi.org/10.1097/00115550-200603000-00003
5. Morris GN, Warren BB, Hanson EW. Influence of patient position on withdrawal forces during removal of lumbar extradural catheters. Anesthesiology. 1997;86:778.
6. Kendall MC, Nader A, Maniker RB, et al. Removal of a knotted stimulating femoral nerve catheter using a saline bolus injection. Local Reg Anesth. 2010;3:31–4. http://dx.doi.org/10.2147/LRA
7. Pant D, Jain P, Kanthed P, et al. Epidural catheter breakage: a dilemma. Indian J Anaesth. 2007;51:434–7.
8. Staats PS, Stinson SM, Lee R. Lumbar stenosis complicating retained epidural catheter tip. Anesthesiology. 1995;83:1115–118. http://dx.doi.org/10.1097/00000542-199511000-00027
9. Coombs DW, Fratkin JD, Meier FA, et al. Neuropathologic lesions and CSF morphine concentrations during chronic continuous intraspinal morphine infusion. A clinical and post-mortem study. Pain. 1985;22:337–51. http://dx.doi.org/10.1016/0304-3959(85)90040-5
10. DeVera H, Ries M. Complication of continuous spinal microcatheters. Anesthesiology. 1991;74:794. http://dx.doi.org/10.1097/00000542-199104000-00033

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