

Management and visualization of a kinked epidural catheter

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Abstract

A lumbar epidural catheter inserted in a 29-year-old woman for labor analgesia. The catheter failed to provide adequate analgesia. Moreover, after labor, it proved difficult to be removed. After computer tomography (CT) and magnetic resonance impedance (MRI) examination the course of the catheter was visible, the entrapped catheter was dislodged intact, revealing a kinking near its distal tip. Kinking of an epidural catheter leading to entrapment is an unusual complication of epidural catheterization. Hippokratia 2010; 14 (4): 294-296

Key words: obstetric analgesia; epidural analgesia; epidural catheter complications

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Kinking of an epidural catheter is a rare complication of lumbar epidural analgesia. We present the usefulness of computer tomography and magnetic resonance impedance examination in order to visualize the course of an entrapped epidural catheter after failure to provide adequate pain relief during labor and delivery.

Case report

A 29 year-old multigravida (height 155 cm, weight 63 kg) presented at early labor at 39th week of gestation at our obstetric department). The woman was under antithrombotic prophylaxis during pregnancy because of varicose veins of the lower limbs. Three hours after admission to labor unit, she requested epidural analgesia due to unbearable labor pain. The placement of the epidural catheter was performed by a consultant anesthesiologist. The epidural space was identified in the L2–3 interspace at a depth of 6 cm using the loss of resistance

to sterile saline technique with a 18-gauge Tuohy needle. A 20-gauge, Braun®, polyurethane, closed end, epidural catheter with three ports was easily inserted with the patient in sitting position. The catheter was threaded to the 15 cm mark, the needle was removed, and the catheter was left with the 12 cm mark at the skin. This left 6 cm of catheter in the epidural space. Following a test dose of 3 ml lidocaine 2%, the catheter was taped in place. Ten ml ropivacaine 0.2% and fentanyl 3µg/ml were administered, but no pain relief was achieved. Meperidine 20 mg i.m. was then given as labor analgesia. An uneventful vaginal delivery of a healthy female infant occurred approximately one and a half hour later.

Two hours after delivery the attending obstetrician attempted to remove the catheter but was partially successful. The length of the catheter entrapped into the skin was 6 cm. During subsequent attempts for withdrawal, gentle traction was applied on the catheter with the patient in

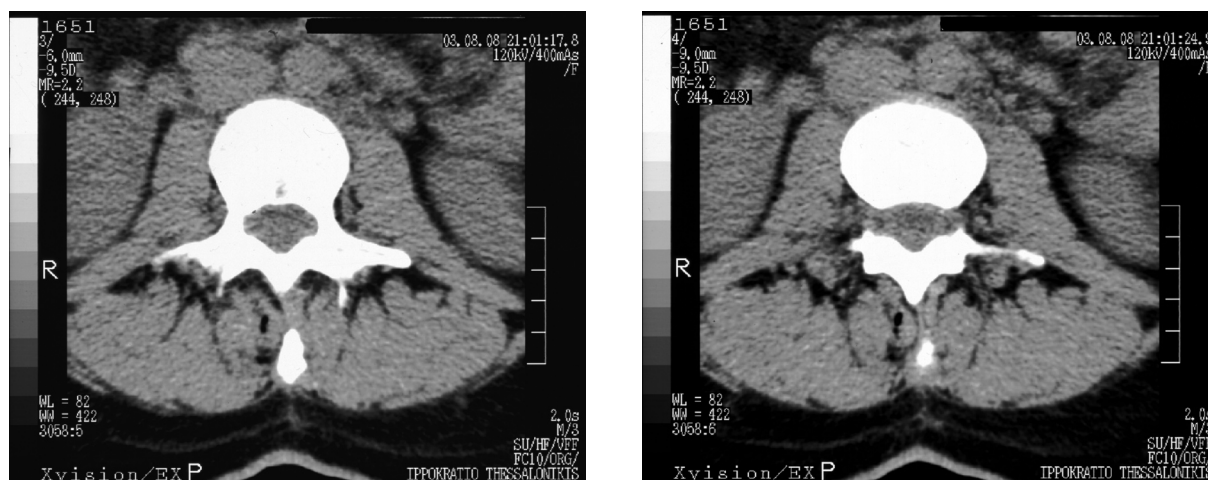


Figure 1: Tiny bubbles of air in CT examination picture suggesting the location of the epidural catheter.



Figure 2: MRI examination revealing the course of the epidural catheter into the soft tissues. The white line is marking the location of the catheter.

varying degrees of lumbar flexion and extension while sitting, lying in lateral decubitus position, and standing. Firm resistance to traction was felt. The catheter stretched with traction but did not move. We were unable to inject sterile saline through the catheter at this time.

After discussion with the patient and her husband, and considering the risk of a thrombotic incidence if we left the catheter in situ, we then proceeded with immediate radiographic imaging to outline the position and orientation of the catheter.

We excluded the injection of radiopaque dye through the catheter, due to a previous history of allergy reported by the woman. We conducted a CT (Figure 1). Where we traced tiny bubbles of air marking the catheter's position. Nevertheless, three-dimensional reconstruction was not available at the time. So, we proceeded with an MRI examination of the area (Figure 2). A loop of the catheter was visualized 2.25 cm approximately from the skin, entrapped in the soft tissues posterior to the spinal process of the 2nd lumbar vertebra. Subsequently the catheter was removed intact (Figure 3) with the help of forceps and gentle traction with no further complications. The patient was discharged home the next day with no residual side-effects.

Discussion

We have described an unusual complication during epidural catheterization. There have been eleven cases of similar kind of complications in the recent literature¹⁻¹¹. Six of them involved single knots near the distal tip of the catheter^{1-3,7,9,11}. One case reported a double knot after a combined spinal-epidural anesthesia⁴ and one reported a double knot in a catheter used for thoracic epidural anesthesia¹⁰. One case involved knot in the epidural space as

well as a loop within the interlaminar ligamentum flavum between L₃ and L₄⁸. One case reported spontaneous kinking of the epidural catheter⁵ and there was one report of a sequestered epidural catheter⁶.

In nine of the eleven reports, the catheter was removed intact (without breakage) with firm or gentle traction^{1-3,5-7,9-11}. In the other two cases, the catheter was not totally broken. Nevertheless it was not possible to remove it otherwise, so it was removed surgically^{6,8}. Radiological visualization of the catheter was attempted in three cases^{6,8,11}. In two of the latter cases computed tomography examination was used and in one case the visualization of the catheter was reported with the aid of a guidewire.

In our case we suspect that the kinking of the catheter took place during its insertion. Failure of achieving adequate pain relief during labor supports our hypothesis. The conclusion of some reports is that insertion of excessive amounts of catheter into the epidural space is a causative factor in knot formation^{4,5,12}. Some authors have recommended the insertion of no more than 4 cm of catheter into the epidural space and some others no more than 5 cm^{2,3,12}. The 6 cm of catheter inserted into the epidural space in the current case was not excessive. The latter may explain the absence of a knot of the epidural catheter.

Generally, this kind of complications using epidural anesthesia (kinking, knot, breakage) are very rare. Multiple reports show that they can often be removed intact with traction^{1-3,5-7,9-11}. However, catheter breakage is a reported risk potentially entailing extensive surgical exploration⁶. Even if surgical removal of a retained catheter fragment is not attempted, complications may still arise. We adopted the following approach, first proposed by Renehan et al¹¹ to the management of a trapped lumbar epidural catheter:

1. Gentle traction on the catheter with the patient in various positions and in various degrees of lumbar flex-



Figure 3: The distal tip of the catheter after it was pulled out.

ion and extension. There is some evidence that the force required for catheter removal is reduced when the patient is in the lateral decubitus position.

2. Determination of the patency of the catheter by attempting to inject sterile, preservative-free normal saline through the catheter.

3. Radiological imaging with radiopaque dye if the catheter is patent or with a guidewire if the catheter is occluded.

4. Radiological evaluation on the position relative to the epidural space and orientation of a knot to guide the decision on whether consultation with a surgical specialty is required.

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