Muscle relaxant or prone position, which one unfastened the entrapped epidural catheter?

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ABSTRACT
Some nonsurgical steps have been introduced to remove an entrapped catheter. But occasionally, the majority of them fail, and we are forced to extract the catheter through an invasive procedure. This article depicts our team’s experience on the issue. When we found that the inserted epidural catheter was entrapped, we performed all recommended noninvasive maneuvers to release the catheter, but no progress was achieved. Therefore, after obtaining informed consent, we induced anesthesia and changed her to a prone position to explore her back. The intact catheter was removed easily in this stage. The authors believe, in this process, it would have been better if they had tried pulling the catheter in a prone position as a preliminary step. Furthermore, pulling the catheter in a prone position after injecting a muscle relaxant appeared to be more effective and saved the patient from the scheduled surgery.

Key words: Entrapment, entrapped catheter, epidural anesthesia, neuraxial anesthesia, remove catheter

INTRODUCTION
Providing an epidural catheter is a common practice. Though in most cases it is removed easily, it can also lead to trouble on very rare occasions. In some cases of entrapment, a couple of nonsurgical maneuvers are recommended before surgery. An entrapped epidural catheter case has been reported in this paper for which all noninvasive recommended methods led to a vain reply, but it was eventually removed after injecting a muscle relaxant and changing to the prone position.

This article is to explore a case of removing entrapped catheter after injecting a muscle relaxant and changing the position into prone one. In the literature, we have not found any strong recommendation to try prone position during preliminary noninvasive steps in the literature.

CASE REPORT
In this study, the patient was a 49-year-old American Society of Anesthesiology class I Asian woman who was scheduled for internal fixation of her femoral bone traumatic fracture. Her medical history was not remarkable.

On the physical examination, her back was slightly scoliotic, and vertebral interspaces seemed narrow. Anesthesia team planned for epidural anesthesia in accordance with its advantages and patient’s desire. An arrow epidural catheterization set with a 17-gauge epidural Tuohy needle, and a 19-gauge wire reinforced flex tip catheter was used for epidural anesthesia. As the patient was not comfortable in sitting flexed position, we initially tried paramedian approach in lateral decubitus position to access her epidural space.

However, when we failed to guide the needle beyond bony structures after 2 times of paramedian attempts, we tried midline approach at L4-L5 interspace, which was successful. A test dose was negative for intrathecal or intravascular placement. Then, the catheter was inserted without any difficulty and threaded about 4 cm beyond needle tip into the epidural space. After injecting 20 ml lidocaine 1.5% into the catheter, the surgery proceeded uneventfully. Postoperative pain was controlled with a continuous epidural infusion of preservative-free bupivacaine 0.1%.
On the second postoperative day, an anesthesiology resident attempted to remove the catheter while the patient was in sitting position. Due to resistance to dragging, the resident reported the problem and was instructed to try steady and gentle traction in the patient's diverse positions especially the same position as when the catheter had been initially inserted. But, the catheter appeared difficult to be removed in sitting or lateral lying positions (either flexed or extended back). While making efforts to dismiss the catheter, the patient did not complain of any pain or paresthesia.

Next, we paved the same way while injecting the saline into the catheter, and then we repeated the task 10 min after administering 5 mg intravenous diazepam, but both were unsuccessful. We took anteroposterior and lateral X-rays to monitor the catheter and the tip [Figure 1]. Because the tip was not clear in plain X-ray studies, we did not insert a guide wire into the catheter.

To come up with a solution, a surgery consultation was conducted, and the patient was informed about the alternatives. Having consented, she was scheduled for an exploring surgery. In the operating room, we induced anesthesia and intubated the patient by thiopental and cisatracurium followed by prone positioning with chest and iliac rolls. Before getting ready for the operation, the surgeon tried to remove the catheter in the prone position, but this time the entrapped catheter was removed easily and intact without any resistance. There was no knot on the catheter, but we observed an angulation point, almost 5 cm before the tip. That point resembled a pressure point on the catheter caused by an entrapment.

**DISCUSSION**

Epidural catheter might be kinked, knotted, trapped, curled, or even broken, and its tip might be left. The incidence is about 0.0015 for a knotted epidural catheter. In rare cases, the catheter has been reported to be trapped in tight intervertebral spacing, facet joint, or even in ligamentum flavum without any knot. Upon the recommendations, some immediate steps should be taken if an entrapment of the epidural catheter is observed, before consulting a surgeon. Initially, we can ask the patient to flex or extend his or her back while the catheter is in traction (including the sitting and lateral decubitus positions). Moreover, rotation and lateral bending might be helpful. Steady, slow, and gentle traction has been effective in many reports. These maneuvers can be more successful if they are applied in the same position of inserting the catheter. Sometimes radiologic studies (with or without a contrast medium or a guide wire) are required to reveal or remove a knotted catheter. It has been reported that injecting saline has also helped the catheter retrieval by increasing its turgor or by lubricating the tissues. Due to feeling pain on some movements after back or lower limb surgeries, back muscles become almost generally spasmodic. Thus, providing muscle relaxation or paralysis increases the spine unstrained movements and decreases interspinous tightness. Inducing general anesthesia and injecting muscle relaxants might be the last choice before surgery.

As described, we applied most of the above measures including all recommended positions to remove the epidural catheter, yet the efforts failed. The success was achieved when the combination of muscle paralyzing and prone positioning was taken.

We cannot strongly state whether changing the position into prone or paralyzing the patient was the key success factor in the operating room. Nevertheless, paralyzing during induction of anesthesia made the muscles relaxed and vertebral column loose enough to unfasten the catheter.

The authors believe, we should keep the entangled catheter in steady traction, as an early noninvasive step, in prone or knee chest position as well as other positions. Additionally, we believe that if all nonsurgical attempts in releasing an entrapped epidural catheter fail, applying traction after injecting a short acting muscle relaxant will be worthwhile. This action could be more beneficial if prone positioning is used in patients. Yet, in some cases all the mentioned stages are ineffective, and the patient must undergo a surgery.

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