Sequestrated caudal catheter in a child: An anesthetic nightmare and surgical dilemma

ABSTRACT
The usage of epidural infusion for intraoperative and postoperative pain relief is widely used in certain pediatric anesthetic practice because of the effectiveness and advantages. However, there is drawback for these techniques due to its potential complications such as inadvertent intrathecal placement, local anesthetic toxicity, catheter migration, infection, and breakage of epidural catheter. Though occur infrequently, epidural catheters have been known to snap during insertion or removal. The retained catheter tip may lead to multiple complications, including nerve injury, infection, and even catheter migration. Although there are literatures recommend options for management of removal of retained catheter, there are limited reports of these occurrences, especially among children. We report a case of sequestrated sheared epidural catheter segment in a child, aiming to share this experience for the future management of patients under similar condition.

Key words: Breakage; children; retained caudal catheter; sequestrated; sheared

Introduction
Caudal epidural analgesia is widely used in certain pediatric anesthetic practice because for its effectiveness of pain relief. The avoidance of opioids has an advantage on respiratory function. Epidural catheters are usually removed without complications. On some rare occasions, excessive tension may cause breakage. In these occasions, there is a lack of guidelines and small number of cases reported, especially in pediatric age group. Hence, it becomes a dilemma to decide whether to leave or surgically remove the sequestrated catheter. This report aims to share an experience in this setting.

Case Report
This was a case of a 2-year-old girl, who was born full term via spontaneous vaginal delivery. She presented with prolonged obstructive jaundice, steatorrhea, and generalized itchiness. Ultrasound abdomen and contrast-enhanced computed tomography (CT) scan discovered her to have choledochal cyst and she was scheduled for portoenterostomy (KASAI procedure), liver biopsy and on-table cholangiogram.

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She received caudal epidural catheter (Perifix® ONE Paed; B. Braun, Germany) insertion where skin to space distance was 1.5 cm. In left lateral position, the catheter was advanced 10 cm with minimal twisting, measuring at approximately the T7 dermatome. Ultrasound guidance was used to locate the space and confirm cephalad movement of the catheter tip during advancement. Surgery was uneventful; patient was extubated and discharged back to ward after a day of observation in Intensive Care Unit. The epidural infusion was functioning well postoperatively with continuous infusion 2–4 ml/h and the pain was well-controlled.

On the 2nd day after surgery, epidural catheter was planned to be removed. However, resistance was encountered while removing the catheter, even with full flexion of the trunk. When the patient was repositioned to an extension, the epidural catheter suddenly “fell off.” The end segment was found to have sheared off, and about 6 cm was left inside space. The segment appeared to be twisted and crimped before breaking [Figure 1]. No remnant of the catheter noted around the skin area [Figure 2].

After informing the surgeon and patient’s parents, an urgent MRI thoracolumbar and complimentary non-contrast CT scan spine was performed immediately. CT scan showed that the catheter tip was retained from upper border of L4 vertebra down to the posterior part of the thecal sac at the level of S4 vertebra [Figure 3]. The retained catheter segment was approximately 6 cm in length. No other remnant of the catheter noted in the rest of the visualized thoracic and lumbar region.

On the 3rd day after surgery, the patient started to develop persistent vomiting and fever. Total white count increased from 17.15 to 23 × 10⁹/L. There was no neurological deficit. Differential diagnosis includes pathology from laparotomy, sepsis, or the retained catheter tip. This is because sequestration of a segment of epidural catheter can lead to infection or even catheter migration.

CT brain urgent was done and revealed normal finding without mass effect or hydrocephalus. Repeated CT scan spine showed no catheter migration; no other abnormal findings noted in the rest of the visualized thoracic and lumbar region. There was also no focal swelling or collection.

The fever subsided, but her vomiting persists. On the 18th postoperative day, she underwent relaparotomy and found to have adhesions. Adhesiolysis, small bowel resection, and side-to-side anastomosis was done, and she was extubated well on the second postoperative day. Subsequently, she was discharged home well 9 days after re-laparotomy.
Considering that the patient remained asymptomatic, and the risk of surgery is high, the pediatric surgery, neurosurgery, spine surgery, and anesthesiology team decided to let the fragment remain in situ and continue to follow-up the patient. Patient’s parents were advised to report any adverse symptoms.

Upon review in the clinic for the past 1 year, our patient has been well and did not complain of any symptoms of complication.

**Discussion**

Possible causes for catheter fragmentation include curling/kinking/knotting and manufacturing defect. Even with ultrasound guidance during catheter insertion, catheter breakage occurred on our patient.

The recommendations for insertion or removal of catheters should be strictly followed to prevent shearing. It should always be reminded to the practicing anesthetist and the trainees during insertion and removal as it is always neglected until the shearing occurred.

Current literature suggests that sequestrated fragments are sterile and unlikely to cause neurological complications. It is generally accepted that fragments are safe to leave in place as long as there are no neurological symptoms or signs.

If the patient develops neurological symptoms, catheter migration into the subarachnoid space, or if the catheter tip emerges out of the skin, exploratory laminectomy should be recommended.

The presence of a fragment should be documented and clearly informed to the patient’s caretakers and surgeons. Even though rare, the symptoms may develop months or years later, and is a potential medico-legal issue. Therefore, the patient should be followed up in the outpatient setting. Surveillance imaging, for example, CT scan may be beneficial.

We would also suggest to strictly avoid any form of twisting of the catheter during insertion. Insertion or removal of catheter should be abandoned if there is any form of resistance felt.

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**References**