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Case report

CASE REPORT

Fractured epidural catheter with retained fragment in the epidural space—a case study and proposed management algorithm

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Abstract

A broken epidural catheter with a retained fragment in the spinal canal is a rare complication of an otherwise low-risk procedure. We present a case of a 37-year-old post-partum female with a fractured epidural catheter with a retained fragment in the epidural space, after epidural anaesthesia using a midline L3/L4 approach. The patient was completely asymptomatic, and the management decision lay between surgical exploration with removal and conservative management with no intervention. CT scan findings were unhelpful, and MRI imaging showed a probable retained fragment penetrating the midline ligamentum flavum, with the catheter tip lying within the spinal canal. The fragment was removed under general anaesthesia 3 days post-delivery. In our proposed treatment algorithm, if the residual catheter fragment is proved radiologically to lie outside the spinal canal and there is no residual catheter breaching the skin to provide a portal for infection, conservative management is reasonable. Early removal is advised when the retained fragment is within the spinal canal—preferably within days to prevent the formation of dural adhesions. This is easier under direct vision, allowing rapid discharge and avoiding much more difficult and higher risk surgery later on.

Keywords: anaesthesia; epidural; management algorithm; procedural complications; retained epidural catheter

A broken epidural catheter with a retained fragment in the spinal canal—first reported in 1957—is a rare complication of an otherwise low risk procedure; it is estimated to occur in 0.002% of cases of catheter insertion and there is no management consensus.[1,2]

Case report

A 37-year-old female gave birth by spontaneous vaginal delivery, assisted by epidural anaesthesia delivered through a catheter sited using a midline approach in the L3/L4 space. A junior anaesthetist was tasked with catheter removal, and the patient lay in the left lateral position and flexed her spine as instructed. On attempted removal, resistance was encountered and the catheter snapped. The retained fragment was deep to the skin and comparing the residual fragment with an unused identical catheter, it was clear that 11 cm of catheter was retained. The patient was completely asymptomatic, and the spinal surgery team consulted: the management options were surgical exploration with catheter fragment removal or conservative management.

Review of the literature suggested that a retained epidural catheter fragment, if not removed, may be associated with serious consequences. Within weeks there may be formation of dense adhesions between the fragment and the dura, migration of the fragment within the spinal canal, radiculopathy similar to that caused by disc prolapse, or epidural haematoma.[2–4] Delayed removal, however, may be associated with a high risk of CSF leak or nerve root injury.

A CT scan was unhelpful, as the 1 mm diameter catheter could not be seen. Radiology opinion was that ultrasound would be unhelpful because of distortion of the signal by bone,

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Fig. 1. Mid-sagittal T2-weighted MRI of the lumbar spine. The retained epidural catheter fragment with its tip lying within the spinal canal is encircled.

assuming the fragment was at least in part in the spinal canal. MRI showed a probable retained fragment penetrating the midline ligamentum flavum, with the tip lying within the spinal canal (Fig 1).

The fragment was removed under general anaesthesia 3 days post-delivery through a 2 cm incision. It was difficult to spot in the subcutaneous fat initially, but once located with high-powered headlight illumination, it was removed easily by simple traction. The length of the retrieved catheter corresponded precisely to the calculated lost length. There was no CSF leak and healing was uncomplicated. The patient was discharged from the spinal clinic at her first outpatient follow-up appointment.

Discussion

A broken epidural catheter with a retained fragment in the spinal canal is a rare event, although the senior author has seen it twice. It was first reported in the literature in 1957 and there is no consensus on management; the major decision lies between leaving an asymptomatic retained fragment *in situ* or surgical exploration with removal.[1,2]

Sardana, Mitra, and colleagues[1,2] advise that the fragment may be left alone in most cases, arguing that any sequestered catheter fragment is inert so should produce no foreign body reaction, whereas surgical removal could do more harm than good. Reena and Vikram[3] suggest that surgery should be reserved only for symptomatic cases without clear definition of what constitutes a symptom(s) in this situation. The benefits of removal should also be weighed up against the patients' health and consequent anaesthetic risk. Tarukado and colleagues[4] propose that, if a catheter fragment is retained within the spinal canal, surgery should be considered before adhesions advance. Ugboma and colleagues[5] recommend aggressive surgical exploration and extraction, even in asymptomatic patients.

Our proposed treatment algorithm for a broken epidural catheter with a retained fragment is as follows:

1. Establish if any part of the catheter remains in the spinal canal by MRI scan; other scanning modalities are unlikely to be helpful.
2. Establish the length of the retained fragment by comparison with an identical unused catheter.
3. If the residual catheter fragment is proved radiologically to lie outside the spinal canal and there is no residual catheter penetrating the skin to provide a portal for infection, conservative management is reasonable.
4. Where at least part of the retained fragment lies within the spinal canal, early removal—within days—under direct vision before dural adhesions form is indicated; from a surgical perspective this is easy, allows rapid discharge from hospital, and avoids much more difficult and risky surgery later.

Authors' contributions

Contributed to the write up and presentation of the case and collation of information: BG.
Assisted with the editing and writing of the first draft: TR.
Supervised and advised on the clinical content and formation of the algorithm and edited the final draft submission: NS.

Declarations of interest

The authors declare that they have no conflicts of interest.

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