CASE REPORT

Percutaneous retrieval of an intrathecal foreign body: technical note

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SUMMARY

A 58-year-old man had an intrathecal baclofen pump implanted. A guidewire used during removal of a previously placed lumbar drain catheter fractured, and a fragment was left within the thecal sac. Using fluoroscopic guidance, a loop snare device was used to retrieve the intrathecal foreign body successfully and without complication. The pump was placed without any difficulty, and the patient's hospital course was uneventful.

BACKGROUND

There are many common neurosurgical procedures performed today that require placement of hardware within the subarachnoid space of the spinal canal. We describe implantation of a baclofen pump that was complicated by a broken guidewire. The fragment remained in the thecal sac but was successfully retrieved using a loop snare device under fluoroscopic guidance. This case illustrates how a common interventional radiology technique can be applied by the neurointerventionalist to treat retained hardware within the spinal canal. To our knowledge, this is the first reported case of endovascular retrieval of an intrathecal foreign body.

CASE PRESENTATION

A 58-year-old man with a crush injury 20 years prior resulting in complete spinal cord injury at T8 level presented for evaluation of worsening leg spasms and pain that severely diminished his quality of life. He had undergone multiple spinal surgeries since his accident: the initial decompression and fusion, removal of instrumentation, and adjacent level laminectomy. He was scheduled for baclofen pump trial and, if successful, pump implantation.

Initial physical examination was remarkable for 0/5 in muscle strength in his lower extremities with increased tone and myelopathy. He had spasms that worsened with movement, with an Ashworth Scale of 3/5 at rest and 4/5 with transfers, as documented by the physical therapist's notes.¹ His spasms were refractory to oral tizanidine, baclofen, and diazepam, which were at doses causing somnolence and intolerable central side effects.

He was taken to the endovascular suite for placement of a lumbar drain (Medtronic, Minneapolis, Minnesota, USA) which was used for the trial injection of 50 µg baclofen (Gablofen; CNS Therapeutics, St Paul, Minnesota, USA). The lumbar drain was not removed in the event that there were

no benefits observed from the trial, and a dose of 100 µg baclofen could be given without the need to perform another lumbar puncture to inject the medication.

Due to significant scarring of the spinal canal, the catheter could not be passed higher than the L3 level, and so a 0.014 micro guidewire was advanced to the T12 level, and the lumbar drain was threaded over this wire to T12; the catheter was kinked at the tip. The guidewire was removed, CSF was flowing through the drain despite the kink, and the medication was given as directed.

Three hours postprocedure the patient was assessed by a physical therapist who noted dramatic improvement in his spasticity to a score of 1/5 in all lower extremity muscle groups, according to the Ashworth Scale. As the patient responded successfully to the baclofen trial, implant surgery in the main operating room was scheduled for the following day.

During the permanent implantation, in an attempt to reduce access time to the thecal space and avoid another puncture, a 0.014 microguidewire was advanced into the lumbar drain catheter to straighten it and to obtain support. A 14 G Tuohy needle was advanced over the lumbar drain catheter into the thecal sac at the L3–4 interlaminar space. With the needle in place, the catheter was withdrawn slowly first, the guidewire followed, and the distal soft tip of the wire fractured at the tip of the needle and remained in the thecal sac.

The decision was made to proceed with the procedure, the permanent baclofen infusion catheter was placed, and the baclofen pump implanted without complication.

TREATMENT

As no guidelines exist for management of intrathecal foreign bodies, and in an attempt to avoid a durotomy to retrieve the fractured wire, a percutaneous approach was selected to retrieve the foreign body (figure 1).

With the patient still on the operating table, and under fluoroscopic guidance, a 16 G spinal needle was advanced into the thecal sac at the L4–5 interlaminar space. The tip of the needle was below our previous access site, and thus below the fractured wire. The stylet was removed, clear CSF was obtained, and a 4 mm Microsnare retrieval device (Covidien, Mansfield, Massachusetts, USA) was advanced in a Marksman microcatheter (Covidien) through the spinal needle into the thecal space (figure 2). The snare was maneuvered to catch the proximal end of the fractured wire, in the standard

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Figure 1 Anteroposterior (A) and lateral (B) views of the lumbar spine showing the piece of guidewire left inside the thecal sac at the level of L3. A 16 G spinal needle is used to access the thecal space from the L4–5 interlaminar space.

way we use it in intravascular procedures, and it was successfully retrieved ([figure 3](#)).

OUTCOME AND FOLLOW-UP

After surgery there were no complaints and the neurologic examination was unchanged from prior to the operation. The patient reported continued improvement of his spasticity, muscle spasms, and pain, consistent with his results after the initial trial. At his 1 month follow-up, he showed continued improvement in his quality of life and activities of daily living ([figure 4](#)).

Figure 2 Anteroposterior view of the lumbar spine showing the goose snare device introduced through the spinal needle.

DISCUSSION

The field of interventional radiology pioneered the use of percutaneous techniques for the removal of foreign bodies. Central venous catheters, defibrillators, embolization coils, lumbar drain catheters, and intrathecal spinal implants are more frequently being used than in previous years, and as the number of patients undergoing these procedures increases, so do the number of complications. Endovascular methods for retrieving a lost or fractured implant evolved using various instruments, with the most effective tool being the Amplatz gooseneck snare loop, introduced in 1991.² The increased efficacy of removing a foreign body by percutaneous methods make this a common procedure in most interventional radiology departments today. There are numerous case reports on intravascular retrieval of misplaced coils by neurointerventionalists, but none that describes the removal of a foreign body within the thecal sac.

Intrathecal baclofen pumps are now standard of care today for spasticity of neurogenic origin. Other pain related neurosurgical procedures include spinal cord stimulators and morphine pumps. Lumbar drains aid in surgical exposure during clipping of aneurysms, are used for the treatment of CSF leaks, and decrease the risk of paraplegia during aortic aneurysm repair.³ The guidewires and catheters used in these procedures run the risk of breakage with too much traction or torque, shearing by the Tuohy needle, or fracture during removal. The largest series of intrathecal baclofen pumps shows a breakage between 1.5% and 2.6% of cases.^{4, 5} Lumbar drains with retained catheters in the spinal canal have a similar rate of this complication (1.8%), and a third of those treated conservatively develop neurologic symptoms.⁶

The patient is at risk of nerve root irritation, spinal cord damage, granuloma formation, and infection with a free floating catheter or wire in the spinal canal. Open surgery to remove this includes a larger incision, muscle dissection, laminectomy, opening of the dura, removal of the object, and a water tight primary closure with the hope of avoiding neurologic injury or CSF fistula. There are no guidelines on the management of this complication, but the method described here avoids the morbidity of an open procedure. Removal is mandated should there be a neurologic deficit, radiculopathy, or infection. There are

Figure 3 One of the distal ends of the piece of guidewire is snared and retrieved (A), and subsequently removed (B).

ongoing cadaveric studies using more caudal approaches through the sacral hiatus in order to improve the working angle and decrease the torque used with percutaneous intraspinal navigation, with the aim of decreasing the number of complications with these procedures.⁷

The number of fractured devices will only increase as physicians continue to perform pain procedures and use lumbar drains. This case demonstrates a technically feasible and minimally invasive way to retrieve intrathecal foreign bodies,

which avoids the morbidity of an open surgery and the potential risks of leaving a lost wire or catheter in the subarachnoid space. We show that a common interventional radiology technique can be used in an area not previously described, and with ease and success. This will broaden the scope of treatment options for the interventionalist, with the goal of becoming a standard procedure in endovascular surgery as technicians become more familiar with this method of retrieval.

Figure 4 Anteroposterior (A) and lateral (B) views of the lumbar spine showing successful removal of the broken guidewire.

Learning points

- ▶ The number of procedures involving introduction of a catheter or wire into the subarachnoid space or thecal sac is increasing, leading to more complications.
- ▶ Objects can be successfully retrieved from the spinal canal by percutaneous methods, thereby avoiding the morbidity of open surgery for removal of a foreign body.
- ▶ This is a technically feasible technique of retrieving sheared catheters or broken wires by using common methods familiar to the interventionalist.

Contributors All authors listed contributed sufficiently to be included as authors on the manuscript. MM is the primary author and wrote the manuscript. JW performed the surgical procedure and managed the patient. HHC-S also performed the endovascular procedure and is the guarantor.

Competing interests None.

Patient consent Obtained.

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