



Challenging Intrathecal Pump Placement in a Highly Instrumented Spine: A Case Report



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Past Medical History:

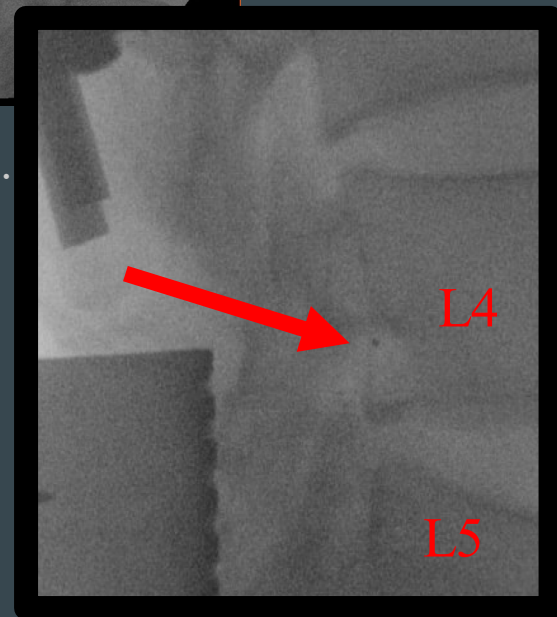
- 7/2013: Patient, a 20y/o M, underwent motorcycle accident, found unresponsive after colliding 70mph with a bus stop
- Radiologic findings after the accident: right subdural hematoma, C5/6 superior endplate fractures, fracture dislocation of T12 and L1 with associated hematoma, etc.
- 7/22/13: Posterior rod and pedicle screw fusion performed of T9-L3
- 10/25/2016: Initial attempt for baclofen pump implantation in Rhode Island - *aborted*

Initial Baclofen Pump Implant - 2017

- 10/31/2017: Pt presented to BWH for intrathecal catheter placement by the pain service with support from orthopedic surgery
 - L4 hemilaminotomy performed
 - Intrathecal space was then easily accessed using 15F epidural needle at L4-5 beneath left hemilaminotomy using intermittent fluoroscopic guidance.
 - Catheter left at L4 due to resistance
 - Device otherwise placed as normal
 - Pump set to run bupivacaine + baclofen

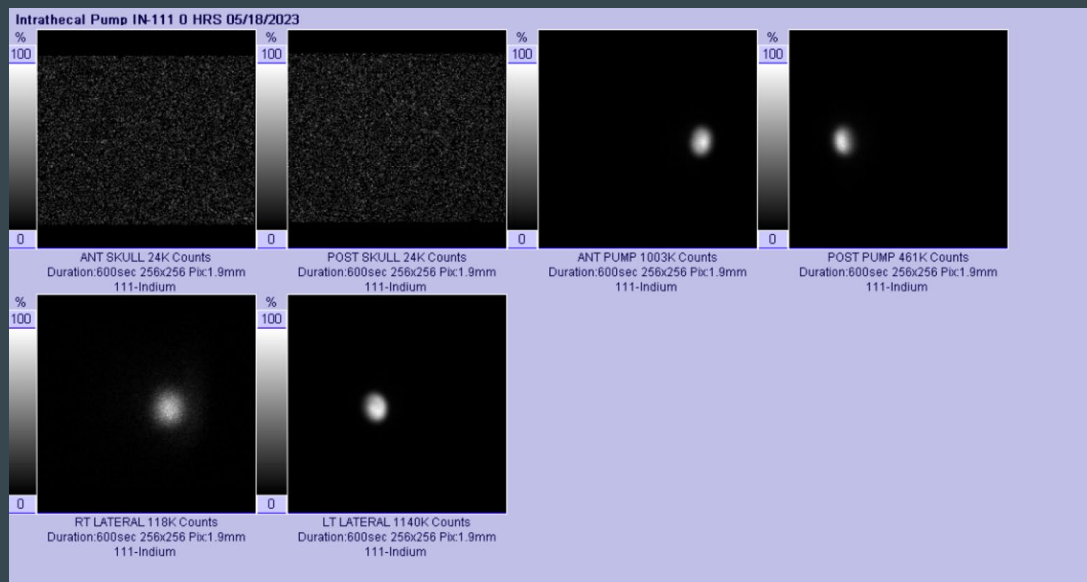


Zoomed in...



Return to Care, 2023

- After massage at PT, pt felt pop in his back
- Pt reported increasing spasticity, however subjectively, he did not undergo any symptoms of withdrawal
- Nuclear med dye study performed



Static planar images of the lower back at 5 minutes, 24 hrs, 48 hrs and five days post radiotracer injection

7/28/2023 - Revision of ITP

- Iterative attempt to minimize intervention
 - Side port aspiration negative, no kink appreciated, catheter sheared at front pocket with no CSF flow
 - Pump segment replaced and tunneled to flank
 - Back incision with dissection down to fascial anchor, catheter ligated above fascia with no spontaneous flow of CSF. Anchor removed and distal end tied off, left subfascially
- A burr was used to expose ligamentum flavum, then ligamentum was removed with Kerrison rongeurs
- Neurosurgery then extended the L4 hemilaminectomy even more superiorly and medially to the top of the ligamentum of L4-5, revealing the underlying dura and thecal sac.
- Tuohy needle inserted, no CSF flow appreciated





Revision of ITP - Part 2

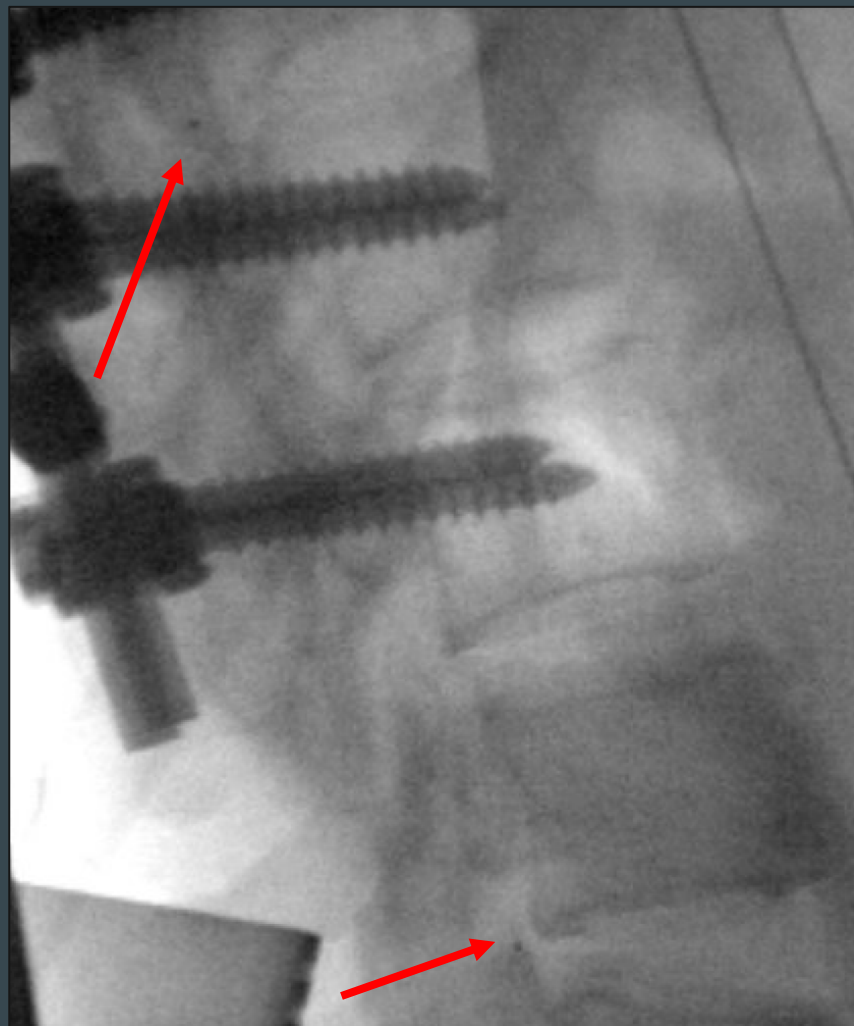
- Team discussion
 - Patient was not consented for laminectomy a level above, and there was concern about attempting procedure higher for this reason
 - Discussion of potential reasons for no CSF flow
 - Consideration for attempting to thread catheter despite lack of CSF
- Catheter was threaded despite lack of egress of CSF
- Good spontaneous flow of CSF was evident from catheter after advancing it several centimeters
- It was successfully threaded to L1-2, however it could not be threaded higher as it started to loop
- Anchors were placed
- Flow of CSF reconfirmed prior to closure.

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Discussion

Considerations:

- 1) Why did this pump stop working in the first place?
 - Unlikely to be kinked due to multiple cuts in the catheter without egress
 - Migration? - imaging shows catheter tip in place
 - Obstruction at catheter tip?
 - Focal granuloma? - Less likely since Tuohy did not achieve flow
 - Intrathecal scar tissue?
- 1) What factors made this replacement challenging, and how can these challenges be mitigated?

Intrathecal and Extrathecal Scar Tissue

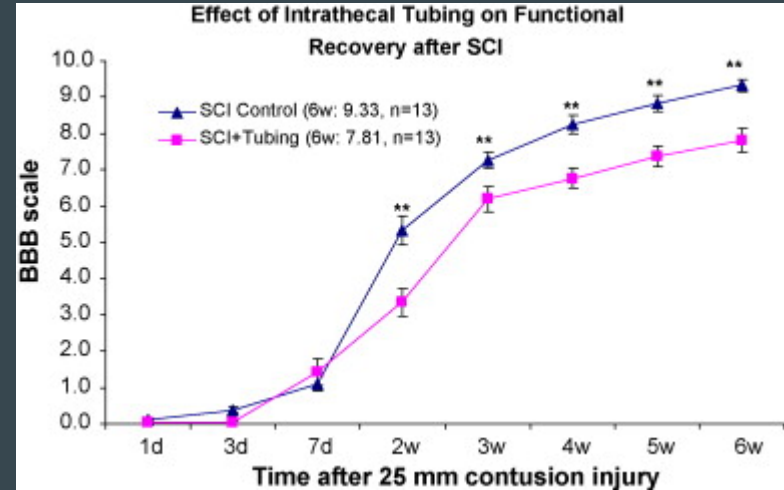
- 2007 Protopapas MG et al: *The Complications of Scar Formation Associated With Intrathecal Pump Placement*
 - Pt with morphine-baclofen ITP + C-spine fusion
 - Autopsy showed catheter encased in epidural scar



Gross pathologic specimen. Note the catheter extending into fibrotic scar on the anterior aspect of the spinal cord

Intrathecal and Extrathecal Scar Tissue

- 2010 Zhang S et al, *Extensive scarring induced by chronic intrathecal tubing augmented cord tissue damage and worsened functional recovery after rat spinal cord injury.*
 - Lesioned spinal cord of rats, then implanted ITP
 - 6w later, tubing occluded by scar tissue





Summary

- Both initial and revision intrathecal pumps in patients with prior instrumentation of the spine and intrathecal space can present unique challenges which can be mitigated through strategic planning
 - Consider consenting patient for laminectomy at multiple levels preoperatively
 - Consider engaging neurosurgical support
 - If dural access is suspected despite lack of CSF egress, consider threading the catheter to achieve flow above sites of potential scar tissue
- Intrathecal pump placement may have implications on the healing and composition of the intrathecal space

Thank you for your time and attention!