UHealth Jackson
Rehabilitation Care
CHRISTINE E. LYNN REHABILITATION CENTER
FOR THE MIAMI PROJECT TO CURE PARALYSIS

Spinal Cord Stimulation for Central Neuropathic Pain in Complete Thoracic Spinal Cord Injury: A Targeting Dilemma

Carolina Mallar, MD; Zachary Dickey, DO; Justin Nguyen, MD; Ali Mostoufi, MD
Department of Physical Medicine and Rehabilitation



INTRODUCTION

SCI-related neuropathic pain is common and often refractory to medical therapy.[1] Below-level central neuropathic pain following complete (ASIA-A) injury is especially difficult to treat, and evidence for neuromodulation in this setting is limited.[2,3] Conventional dorsal column spinal cord stimulation (SCS) relies on dorsal column conduction rostral to the stimulation site; anatomic cord discontinuity and altered post-surgical epidural anatomy force reconsideration of both stimulation target and technique. We describe such a case and its management.

CASE PRESENTATION

Patient: 49-year-old man with a T7–T8 fracture-dislocation and ASIA-A paraplegia. T7–T10 posterior fusion with T8–T10 laminectomies (2023), then surgery for post-traumatic hydromyelia (2024).

Pain: Severe electric, burning, knife-like pain across the mid-back and the insensate lumbosacral and coccygeal regions: pain perceived in areas without sensation, consistent with below-level central neuropathic pain. Rated 10/10.

Refractory to: acetaminophen, gabapentin, pregabalin, tramadol, and hydrocodone, as well as physical therapy and a lumbar epidural steroid injection.

MRI: Serial studies showed cord indistinctiveness with probable discontinuity at T7-8 (Figure 1) and progressive myelomalacia and Wallerian degeneration extending to the conus and cranially to T7.

METHODS

Retrospective review of a single de-identified patient case. Per institutional policy, IRB review was not required; the patient provided informed consent for treatment.

Trial: Percutaneous two-lead SCS trial using 10-kHz high-frequency stimulation.[4] Under fluoroscopy with loss-of-resistance technique, the dorsal epidural space was accessed at the T7–T8 interspace via a paramedian approach.

Lead placement: The T7–T10 instrumented fusion with T8–T10 laminectomies obliterated the conventional epidural corridor, so two 8-contact cylindrical leads were advanced rostral to the fusion construct rather than to the traditional T8 target. Leads were parallel and near midline with intentional staggering, tips at T4 and T6 (Figure 2). Programming was optimized over the monitoring period.

Outcomes: Daily home pain log (numeric rating scale), analgesic use, and wheelchair-sitting tolerance across the 7-day trial before lead removal.

IMAGING

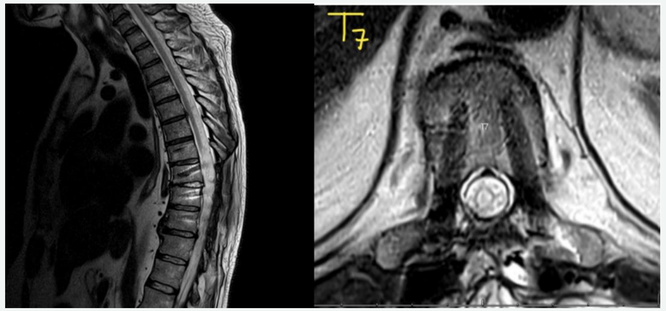


Figure 1. Sagittal MRI shows T7–T10 posterior instrumentation with T8–T10 decompression and evidence of a severed/discontinuous spinal cord at the index level of injury. Axial MRI shows the thecal sac empty of normal spinal cord due to severance of the neural tissue.

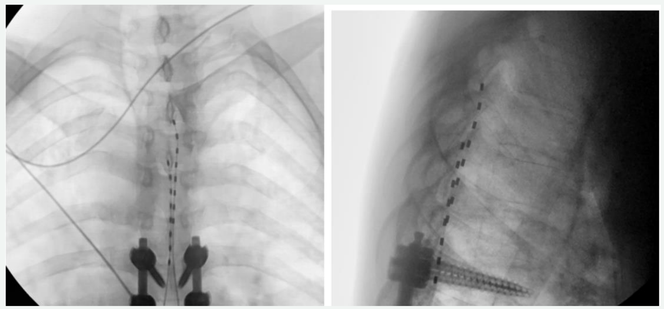


Figure 2. PA and lateral fluoroscopic images of spinal cord stimulator lead placement demonstrating T7-8 epidural entrance, with staggered leads spanning nearly four vertebral lengths from T3-4 to T7-8.

REFERENCES

1. Siddall PJ, McClelland JM, Rutkowski SB, Cousins MJ. A longitudinal study of the prevalence and characteristics of pain in the first 5 years following spinal cord injury. Pain. 2003;103(3):249–257.

2. Dombovy-Johnson ML, Hunt CL, Morrow MM, Lamer TJ, Pittelkow TP. Current evidence lacking to guide clinical practice for spinal cord stimulation in the treatment of neuropathic pain in spinal cord injury: a review of the literature and a proposal for future study. Pain Pract. 2020;20(3):325–335.

3. Duarte RV, Nevitt S, McNicol E, et al. Systematic review and meta-analysis of placebo/sham-controlled randomised trials of spinal cord stimulation for neuropathic pain. Pain. 2020;161(1):24–35.

4. Kapural L, Yu C, Doust MW, et al. Novel 10-kHz high-frequency therapy (HF10 therapy) is superior to traditional low-frequency spinal cord stimulation for the treatment of chronic back and leg pain: the SENZA-RCT randomized controlled trial. Anesthesiology. 2015;123(4):851–860.

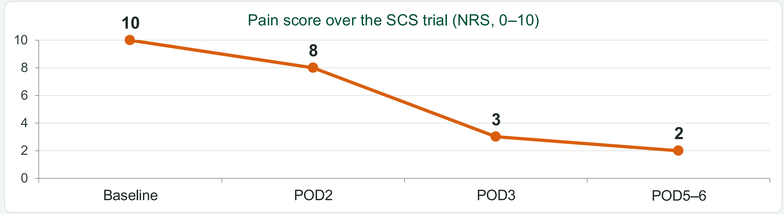
5. Pollard EM, Lamer TJ, Moeschler SM, Gazelka HM, Hooten WM, Bendel MA, Warner NS, Murad MH. The effect of spinal cord stimulation on pain medication reduction in intractable spine and limb pain: a systematic review of randomized controlled trials and meta-analysis. J Pain Res. 2019;12:1311–1324.

RESULTS

>80%
overall pain relief on 7-day diary

10 → 2
pain score (NRS), baseline to POD5–6

7 days
trial, then permanent implantation



After early incisional discomfort and reprogramming, pain fell to 3/10 on a single non-opioid analgesic by POD3, with relief in both the mid-back and lower back/buttock. Given ASIA-A status, success was judged by pain relief.

Function improved in parallel: previously unable to tolerate prolonged wheelchair sitting, he sat comfortably for extended hours on a single non-opioid medication, the outcome he valued most. Leads were removed at day 7 and he proceeded to permanent implantation.

DISCUSSION

Two factors drove targeting rostral to the T8 lesion:

Physiologic: A discontinuous cord cannot relay stimulation applied at or caudal to the gap toward supraspinal structures, so coverage must originate above it.

Technical: Prior laminectomies and fusion obliterated the conventional epidural corridor, preventing lead advancement across the instrumented segment.

Rostral placement produced relief and reduced analgesic requirements, consistent with reported SCS outcomes.[5]

CONCLUSION

Cord continuity and post-surgical epidural anatomy should guide neuromodulation planning for below-level SCI pain.