Spinal Cord Stimulation For Refractory Phantom Limb Pain

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Introduction

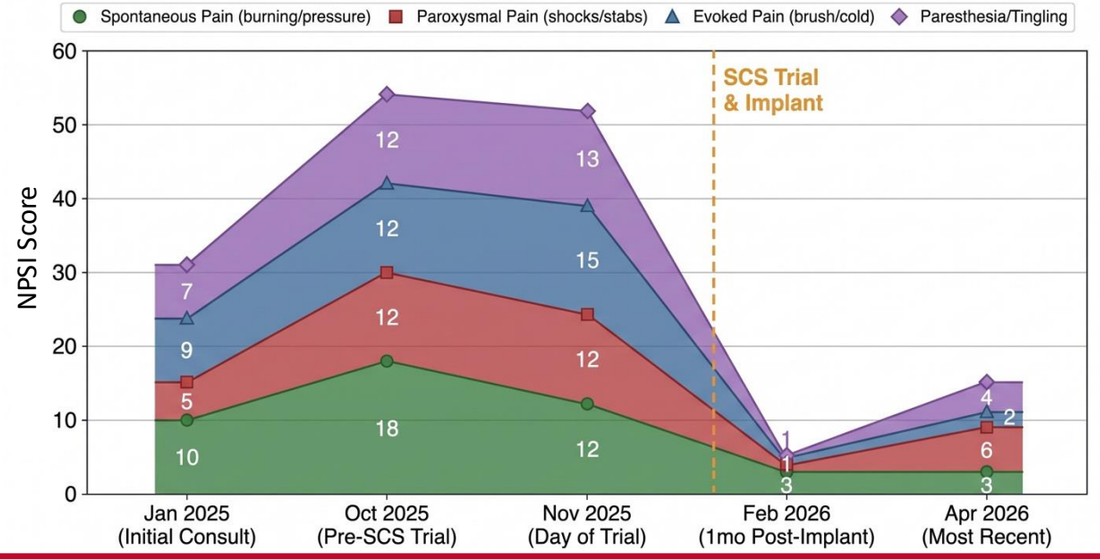
- Persistent post-amputation pain, encompassing phantom (PLP) and residual limb pain, remains a clinical challenge. Typical management ranges from conservative measures like pharmacology to invasive interventions such as targeted muscle reinnervation; yet pain often remains refractory.
- Neuromodulation has emerged as an alternative avenue for pain control.
- Evidence for neuromodulation in phantom limb pain focuses on peripheral nerve stimulation (PNS), with limited data establishing efficacy of dorsal root ganglion (DRG) or spinal cord stimulation (SCS).[1,2]
- *This case demonstrates successful application of spinal cord stimulation to treat refractory phantom pain following a series of surgical amputations, failed DRG trial, failed TMR, and insurance denial of PNS.*

Case Presentation

- **Presentation:** 43F with severe, refractory RLE phantom and residual limb pain characterized by electric shocks, painful cold, and distal stump allodynia.
- **Prior Interventions:**
  - ***Surgical:*** 2019 neuroma correction complicated by osteomyelitis, precipitating transmetatarsal amputation in 2022 and an *initial* BKA in 2023. Followed by *revision* BKA+TMR in March 2024 where initial relief was achieved, but PLP recurred in 3-4 months (prompting pain referral)
  - ***Pharmacologic*:** Gabapentin, pregabalin, & tramadol; (p*atient still on amitriptyline)*
  - ***Neuromodulation*:** L5 DRG stimulator 2023, explanted due to loss of efficacy
- **Diagnostic US:** abnormal internal morphology of R peroneal & tibial nerves. Scan reproduced paresthesia
- **Clinical Course after Pain Evaluation**: Initial plans for sciatic nerve PNS denied by insurance. Patient subsequently underwent T10-T12 SCS trial Nov 2025, with permanent implantation Jan 2026.

Outcome Measure	Jan 25 *(Initial)*	Oct 25 *(pre-trial)*	Feb 26 *(1mo Post)*	Apr 26 *(most recent)*	Net Change *(vs Oct 25)*
VAS Pain (0–10)	5.0	5.33	3.63	2.41	▼ 2.92
PROMIS Sleep	62.0	64.1	64.1	46.0	▼ 18.1
PROMIS Depression	61.0	62.1	49.0	54.1	▼ 8.0
PROMIS Physical Function	36.0	32.1	38.1	36.1	▲ 4
Total NPSI (0–100)	31	54	5	15	▼ 39

Neuropathic Pain Symptom Inventory (NPSI) Scores Over Time



Discussion

- **SCS as Salvage Therapy:** While PNS is typically preferred for isolated, distal neuropathies, the broad dermatomal coverage of T10–T12 SCS can be an effective alternative when PNS is not an option.
- **Pain & Impairment:** The sustained reduction in VAS (5.33 → 2.41) correlated with normalization of PROMIS depression and sleep metrics as well as a 39-point drop in total NPSI. Based on NPSI measures, SCS was most effective for reducing spontaneous and evoked pain, with a mild 3-month recurrence driven primarily by paroxysmal shock-like sensations.
- **Physical Function:** Notably, the PROMIS physical function score remained essentially unchanged demonstrating that while SCS mitigates PLP pain, functional improvement may be dissociated from pain reduction or, alternatively, may require a longer time horizon for detectable change

References
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2. Jaffee S, Verma R, Vaezi M, Kite T, Tomycz N. A scoping review of spinal cord stimulation for phantom limb pain. *Interv Pain Med*. 2025;4(1):100571. Published 2025 Mar 12. doi:10.1016/j.inpm.2025.100571