

Multimodal Management of Neuropathic Pain in Spinal Cord Ischemia

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Introduction

- Neuropathic pain is a debilitating condition frequently observed following spinal cord injury (SCI) or ischemia, particularly after thoracoabdominal aortic dissection (TAD) repairs.
- The incidence of chronic neuropathic pain after SCI is as high as 80%, with degrees of central and peripheral manifestations.
- Pathophysiology involves damage to the somatosensory system, leading to phenomena such as hyperalgesia, allodynia, and spontaneous pain, which result from inflammation, excitotoxicity, and central sensitization.

Case Presentation

- 54M PMH Type A aortic dissection requiring multiple surgeries, incl. total aortic arch replacement in 2023, complicated by thoracoabdominal aortic dissection sp TEVAR.
- Initial visit: Severe neuropathic pain predominantly affecting bilateral lower extremities, characterized by burning, allodynia, hyperesthesia, and "sharp knife" sensation; exacerbated by prolonged sitting, sudden movement, and contact.
- Previous treatments:
 - Lumbar sympathetic block: Administered twice with 25-50% transient improvement in pain, lasting 2-3 weeks.
 - Caudal epidural steroid injection: Achieved 75% relief in low back pain and 25% in neuropathic pain.
 - Pharmacotherapy: Pregabalin, duloxetine, and carbamazepine. Partial efficacy but associated with adverse effects such as sweating and dizziness, prompting the patient to consider medication reduction.
- Current: Persistent neuropathic pain, averaging 7/10. Considering ketamine infusion, SCS, DRGs

Discussion

- Neuropathic pain following thoracoabdominal aortic dissection likely stems from spinal cord ischemia, a common vascular complication affecting both at-level and below-level areas.
- At-level pain:
 - Affects areas at or near the site of SCI, by direct nerve damage/compression at the injury level.
 - Often described as burning/electric sensations and may involve dermatomes close to injury site.
- Below-level pain:
 - Occurs distant to the injury, caused by disrupted ascending sensory pathways due to SCI
- Pharmacological treatments:
 - Antiepileptics (pregabalin, gabapentin) and antidepressants (duloxetine) are commonly employed to target neuropathic pain from SCI but provided limited relief here, aligning with findings that SCI-induced neuropathic pain is often resistant to standard medications
- Interventional procedures:
 - Lumbar sympathetic blocks and caudal epidural steroid injections provided partial and temporary relief, with only modest improvement lasting a few weeks.
 - Central pain mechanisms make the response to sympathetic blocks less predictable, requiring a combination of therapies
- Advanced treatment options:
 - Ketamine infusions: May help reduce central sensitization and chronic neuropathic pain. Studies have shown efficacy in reducing refractory SCI pain, especially when traditional approaches fail
 - Neuromodulation: SCS and DRGs are potential future options for managing below-level and at-level neuropathic pain, as neuromodulation has shown effectiveness in reducing central pain and improving quality of life in similar cases.

References

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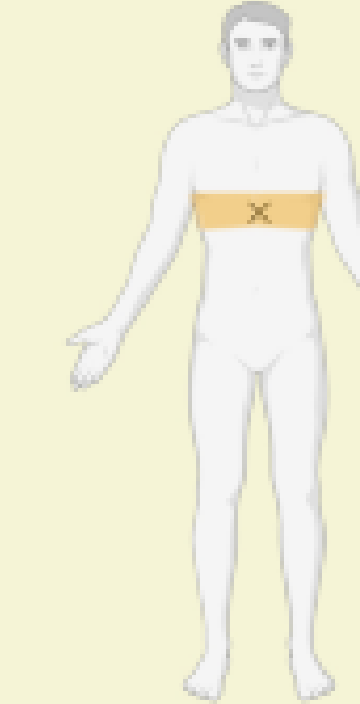
Neuropathic Pain

*Pain caused by a lesion or disease of the somatosensory nervous system**

- Sensory dysfunction (hypoesthesia, allodynia, hyperalgesia) and pain in an area that is consistent with the injury level and severity.
- Burning, tingling, pricking, pins and needles, sharp, electric, stinging, pressing, shooting, squeezing, stabbing, painful cold or electric shock-like quality
- Onset within 1 year post SCI
- No primary relation to movement, inflammation, or local tissue damage

At level neuropathic pain

- Located at the neurological level of injury or within three dermatomes below this level
- Caused by a lesion or disease of a nerve root (peripheral neuropathic pain) or the spinal cord (central neuropathic pain)



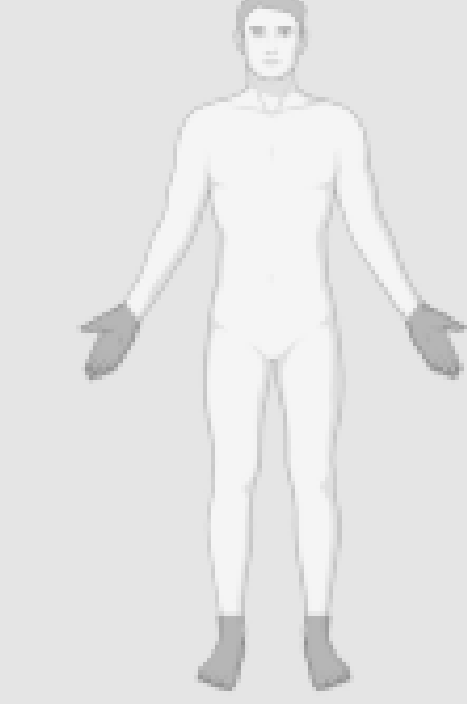
Below level neuropathic pain

- Located more than 3 dermatomes below the neurological level of injury (NLI) or extend between the NLI and extend further than three dermatomes below the NLI
- Complete or incomplete SCI



Other neuropathic pain

Can be located anywhere in the body and does not have a direct causal link to the SCI (e.g., postherpetic neuralgia, diabetic neuropathy pain, carpal tunnel syndrome, or central post-stroke pain)



x: neurological level of injury

*International Association for the Study of Pain *<http://www.iasp-pain.org/Taxonomy>

Conclusions

- Neuropathic pain following SCI and ischemia, particularly after major vascular surgeries, presents a significant therapeutic challenge. In this patient, standard pharmacotherapy and interventional procedures provided only partial, temporary relief.
- Advanced interventions like ketamine infusion and neuromodulation may offer more durable pain control, particularly in refractory cases.
- A multimodal approach that includes optimizing pharmacological regimens, considering interventional procedures, and incorporating neuromodulation is crucial for improving patient outcomes in complex neuropathic pain conditions associated with spinal cord ischemia.