

Background

- Patients with chronic spinal cord injury (SCI) undergoing surgery require special considerations based on the spinal level and severity of their neurologic deficit.
- General anesthesia and neuraxial approaches have been accepted as safe options for this population¹, though there is less data surrounding the benefits and safety of peripheral nerve blockade.
- Given the varying degrees of residual sensation below a spinal cord lesion, many patients with SCI may still benefit from improved analgesia
- Our aim is to discuss additional benefits of increased perfusion from regional anesthesia via peripheral nerve block catheters.

Methods

- Prior to placing peripheral nerve catheters, a brief literature review was completed to understand the risks and benefits of regional anesthesia in similar patients.
- At the time of surgery, the patient consented for both the blocks and this case report.
- A full review of his hospital stay was performed to provide a comprehensive report.
- In accordance with the Colorado Multiple Institutional Review Board policies, this report does not require IRB review as no identifiable patient information is reported and less than three cases are presented.

Case Presentation

- A 60-year-old male with incomplete L1 paraplegia secondary to multiple surgical interventions for chronic spinal stenosis complicated by venous stasis and DVT
- Presented for a right sided vastus lateralis to ankle free flap for a chronic right lower extremity wound
- He had near-complete numbness below the knees bilaterally, occasionally experienced an “electric shock-like” shooting sensation down his legs.
- The Acute Pain Service was consulted for peripheral nerve block catheters to assist with postoperative flap perfusion.
- Preoperatively, the patient received adductor canal (10cc) and popliteal (20cc) nerve blocks with 0.5% bupivacaine and 5mg dexamethasone.
- Following an uncomplicated anesthetic, saphenous and sciatic peripheral nerve catheters were placed and infused with 0.2% ropivacaine at 6 ml/hr
- The patient was admitted to the Surgical ICU for hourly flap checks.
- The surgical team was pleased with doppler tones and flap appearance.
- The patient reported that his pain was well controlled and post operative day 6 the catheters were removed.
- He returned to the operating room on post operative day 9 for a split-thickness skin graft to the vastus lateralis flap and was discharged from the hospital with a viable flap on post operative day 20.

Resources

1. Jacob, A. K., & Kopp, S. L. (2011). Regional anesthesia in the patient with preexisting neurologic disorders. *Advances in Anesthesia*, 29(1), 1–18. <https://doi.org/10.1016/j.aan.2011.07.001>
2. West, C., AlYahya, A., Laher, I. *et al.* Peripheral vascular function in spinal cord injury: a systematic review. *Spinal Cord* 51, 10–19 (2013). <https://doi.org/10.1038/sc.2012.136>
3. Popa, C., Popa, F., Grigorean, V. T. *et al.* (2010). Vascular dysfunctions following spinal cord injury. *Journal of medicine and life*, 3(3), 275–285. <https://doi.org.proxy.hsl.ucdenver.edu/10.1016/j.aan.2011.07.001>
4. Previnaire, J., Soler, J., El Masri, W. *et al.* Assessment of the sympathetic level of lesion in patients with spinal cord injury. *Spinal Cord* 47, 122–127 (2009). <https://doi.org/10.1038/sc.2008.87>
5. Sebastiani, A., Philippi, L., Boehme, S. *et al.* Perfusion index and plethysmographic variability index in patients with interscalene nerve catheters. *Can J Anesth/J Can Anesth* 59, 1095–1101 (2012). <https://doi.org/10.1007/s12630-012-9796-3>

Discussion

- Following SCI, many changes can occur to peripheral blood flow including decreased arterial blood flow and increased arterial resistance.²
- The sympathetic outflow below the lesion can become unpredictable in this patient population.
- The risk of losing this sympathetic control is much higher in more rostral and more complete injuries, notably T6 or higher.³
- Patients with lower-level SCI can see varying levels of peripheral vasoconstriction as a direct effect of sympathetic drive below their spinal cord lesion.⁴
- Vasoconstriction in combination with our patient’s known vascular dysfunction increased the chance of graft failure.
- We aimed to target this local sympathetic tone to improve blood flow, an increasingly common practice at our institution with nerve catheters.
- There are multiple studies that demonstrate increased perfusion indices following regional nerve block via local sympathectomy causing arterial smooth muscle relaxation and thus arterial dilation.⁵
- This data demonstrating local sympathectomy to increase limb blood flow following regional nerve blockade supported our clinical decision to place saphenous and sciatic peripheral nerve catheters for the specific goal of improving the ankle graft blood flow.
- The patient did well in the acute phase; however, it is difficult to predict the long-term benefit of this short-term increase in blood flow.
- Further investigation into increased peripheral perfusion following regional block in patients with SCI could provide guidance nerve catheters to improve free flap viability outcomes in similar patients.