

Introduction

Technical complications of spinal cord stimulators (SCS) related to device breakage or mechanical failure persist despite improvements in surgical technique and hardware design. Anchoring technique is often blamed for lead body fractures and migration. Mechanical destruction of the lead due to high forces along the anchor-fascia complex may also occur. Studying such failures will direct improvements in design and implantation technique that may mitigate the potential for failures requiring reoperation.

Methods

We present two cases where the structure of the SCS paddle electrode was severely compromised.

Case 1

62 year-old male who had undergone high cervical SCS paddle lead placement sustained a motor vehicle collision. Imaging revealed migration of the paddle lead. The patient described worsening neck and arm pain, and revision was therefore performed. The paddle electrode had separated from the lead body at the junction. It appeared that traction on the lead had drawn it through the anchor, delaminating the paddle.

Case 1



Migration of Spinal Cord Stimulator Paddle Lead

Paddle Lead Delamination Noted Intraoperatively



Case 2

40 year-old male reported loss of stimulation efficacy six months after thoracic SCS implantation. Plain films revealed the lead partially withdrawn from the epidural space, but programming adjustments regained effective coverage. Two months later, when efficacy was again lost, further out-migration of the lead with separation of the contacts from the paddle was noted on imaging. In both instances, paddle electrode damage appeared related to the proximity of the anchor.

Conclusions

Given that lead-anchor-fascia disruption is a possible failure mechanism for SCS, improvements in product design and surgical technique are necessary to avoid similar failures. Wireless technology, new "stretchy" lead materials, strategic placement of strain relief loops, and better lead-anchor design represent means by which this type of failure might be mitigated.

Case 2



Migration of Thoracic Spinal Cord Stimulator

References

1. Henderson JM et al. Prevention of mechanical failures in implanted spinal cord stimulation systems. *Neuromodulation*. 2006;9:183-191.
2. McGreevy K et al. Cephalad lead migration following spinal cord stimulation implantation. *Pain Physician*. 2012 Jan-Feb;15(1):E79-87.
3. Renard VM, North RB. Prevention of percutaneous electrode migration in spinal cord stimulation by a modification of the standard implantation technique. *Journal of Neurosurgery: Spine*. 2006;4:300-303.