

A Case of Implantable Pulse Generator Device Malfunction Following Monopolar Electrocautery Use During Spine Hardware Removal

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Introduction

With an increasing global adoption of spinal cord stimulators (SCS), at approximately 34,000 annual implants (as of 2016) ¹, there is a pressing need for enhanced perioperative education and tailored guidelines for this patient population. This case report underscores a case of an implantable pulse generator (IPG) malfunction post spine surgery due to monopolar cautery use, highlighting the necessity for specialized perioperative protocols.

Materials and Methods

The case report is devoid of patient identifiable information, it is thus exempt from IRB review requirements as per Cleveland Clinic institutional policy.

Case Report

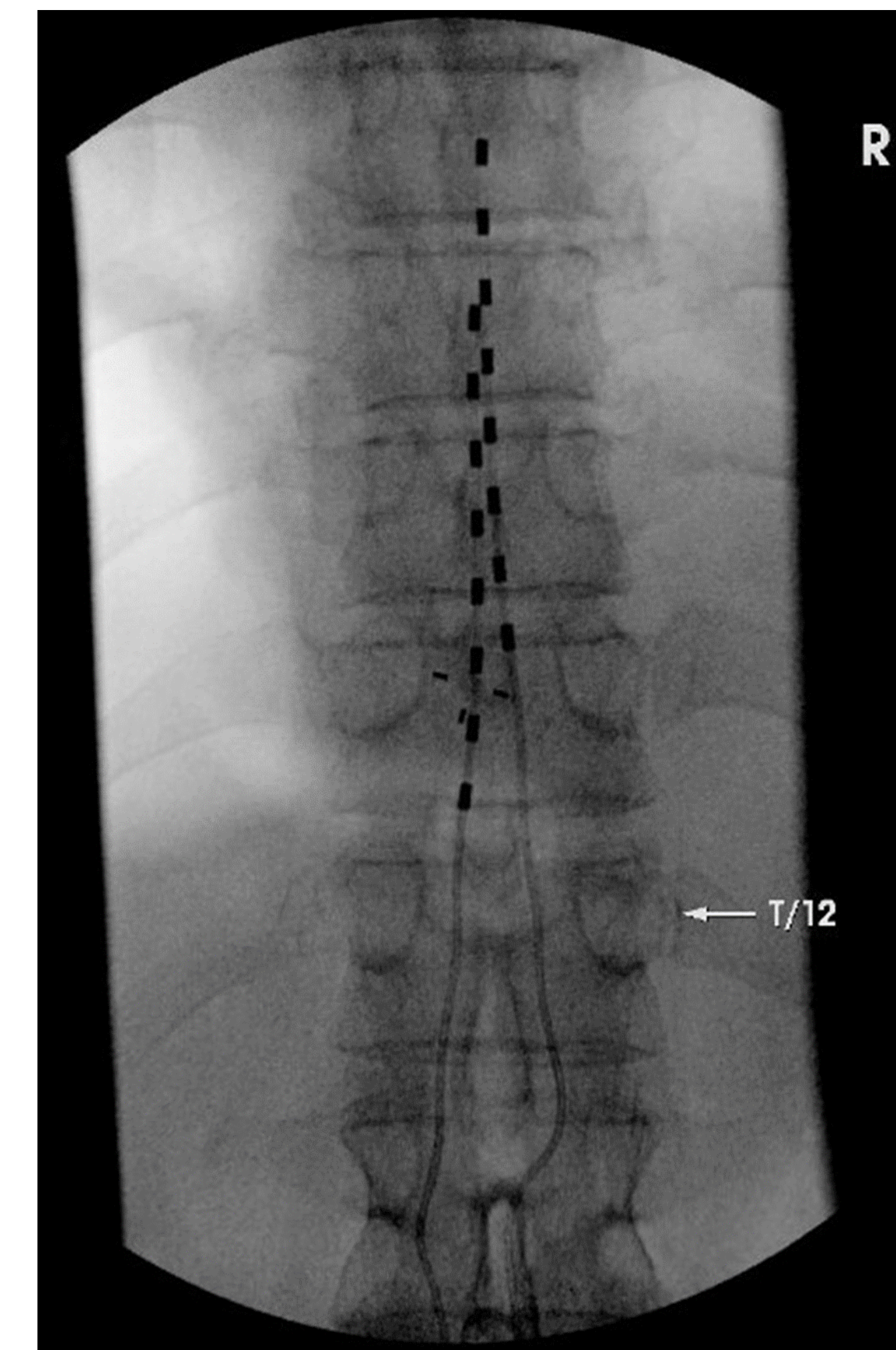
A 62-year-old female with a history of anxiety, depression, myofascial syndrome, and obesity underwent L3-L5 lumbar decompression in 2016 and posterior L3-L5 lumbar fusion in 2017 for her chronic back and leg pain. Due to the persistence of her chronic pain, a two-lead spinal cord stimulator (SCS) was implanted in February 2019 following a successful trial.

Despite initial relief, her back persistent returned and was attributed to severe stenosis at L2-3 and foraminal stenosis at L5-S1. In February 2020, she elected to undergo decompression and fusion extension (L2 to pelvis) with no avail. In June 2020, the SCS was explanted and replaced with a two-lead Nevro SCS system, resulting in significant pain relief and improved functionality.

In December 2022, she presented with severe tenderness at the IPG site and warmth during charging. IPG revision was recommended after ruling out lead migration with a thoracic X-ray. However, due to her hardware loosening and fracture, spine surgery recommended hardware removal before SCS revision. It was noted that monopolar cautery was used hardware removal in March 2023. Post-surgery, device testing revealed impedances in the leads, rendering them MRI incompatible. Hence, the decision was made to proceed with SCS revision and lead replacement.

At the planned revision in April 2023, the old leads were replaced with new ones. However, there were still high impedences when connecting to the old IPG, hence a decision was made to replace the old IPG. Upon connecting the leads to the new IPG, the high impedance seem to have resolved. Subsequently, the IPG pocket was revised and closed.

Post-surgery, the patient reported significant pain relief, especially in the right lower extremity, and reduced pain at the IPG site. Warmth around the IPG during charging was resolved.



Fluoroscopic guided leads replacement

Discussion

In this case, monopolar cautery was utilized to expose the spinal hardware during removal, and this might have contributed to device failure in an already suboptimal IPG ². The use of bipolar cautery may have been a more appropriate choice, and if monopolar electrocautery is to be employed, it should be set at the lowest effective setting. Additionally, the grounding pad should be positioned on the opposite side of the IPG, farthest away from the SCS system. ²

In the era of precision medicine, there is a growing need for tailored education, interventions, and guidelines for patients with SCS who require spinal or non-spinal surgeries. This approach can enhance surgical planning, patient care, and safety. ^{2,3}

Having knowledge about the safety concerns related to SCS and adopting appropriate perioperative evaluation and management strategies for the SCS system can reduce risks and enhance surgical planning.

References

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