

Left Lower Extremity Stimulation During Right Medial Branch Nerve Motor Testing Secondary to a Faulty Grounding Pad

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Introduction

Radiofrequency ablation (RFA) is an established treatment option for appropriately selected patients with facet-mediated back pain. However, the procedure carries inherent risks, including neurovascular injury related to electrode placement and thermal injury resulting from radiofrequency energy delivery. During RFA, electrical current flows from the active electrode through surrounding tissue and returns via the grounding pad to complete the circuit. Excessive concentration of current within any portion of the circuit may result in thermal injury ranging from superficial first-degree burns to full-thickness third-degree burns. Grounding pads are designed to disperse electrical current over a broad surface area, minimizing heat generation and reducing the risk of tissue injury. Improper placement, inadequate skin contact, or equipment malfunction may compromise current dispersion, increasing risk of complications.

Methods

Patient informed consent was obtained for inclusion and submission of an abstract. As the case report is devoid of patient identifiable information, it is exempt from IRB review requirements as per UT Southwestern policy.

Case Report

A 61-year-old woman with L4–L5 and L5–S1 facet pain presented for bilateral L3-L5 RFA after substantial relief with diagnostic medial branch blocks. The left-sided RFA was completed without complication. During the right-sided RFA, sensory stimulation testing was performed successfully. However, during motor stimulation of the right L5 dorsal ramus, the patient reported a repetitive "tapping" sensation localized to the posterolateral aspect of the contralateral (left) thigh.

Multiple adjustments in needle position were made; however, the patient consistently reported the same left thigh sensation during motor stimulation at 2 V. The patient localized the "tapping" sensation to correspond with the area where the grounding pad was placed. The grounding pad was subsequently replaced and repositioned on the right thigh. Following replacement, no further abnormal sensory or motor stimulation occurred, and the remainder of the RFA procedure was completed successfully.

At two-week follow-up, the patient reported near-complete resolution of her left-sided low back pain and some improvement in her right-sided low back pain. She did not endorse any residual paresthesia or other adverse effects.

Images

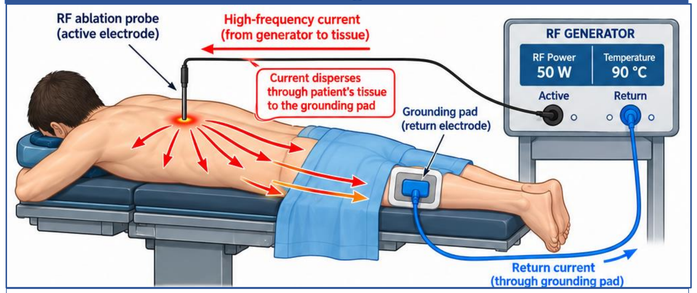


Image 1: Physiologic concept of the distribution of thermal energy during a radiofrequency ablation.

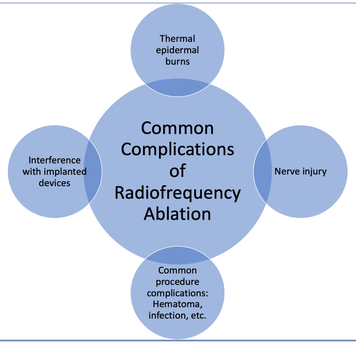


Image 2: Common complications of radiofrequency ablation take a variety of forms ranging from visible to not immediately apparent presentations.

Discussion

This case illustrates an unusual presentation of contralateral muscular stimulation localized to the grounding pad site during lumbar medial branch nerve motor testing.

Thermal injury from RFA is often identified through visible skin changes; however, neurologic injury may occur in the absence of cutaneous findings. Neural tissue possesses lower electrical resistance and may therefore be susceptible to injury at lower temperatures than those required to produce visible skin burns. Such injuries may manifest as paresthesias, dysesthesias, allodynia, numbness, or weakness. When atypical stimulation patterns occur, a systematic assessment of the radiofrequency circuit and associated equipment should be performed. Early recognition and correction of equipment-related issues can help ensure procedural safety and prevent unnecessary complications. This case highlights the importance of understanding the role of the grounding pad in the radiofrequency circuit, recognizing atypical findings during RFA, and systematically troubleshooting equipment-related causes when unexpected stimulation patterns occur.

Radiofrequency Ablation: Grounding Pad Checklist

Is the grounding pad functioning properly, or should it be replaced?
Is the grounding pad of appropriate size and type for the procedure being performed?
Is the pad fully adhered to the skin, providing adequate contact surface area?
Has partial detachment reduced effective current dispersion?
Is the grounding pad positioned an appropriate distance from the treatment site to facilitate adequate current distribution?
Would repositioning the pad improve circuit integrity and reduce localized current concentration?

References

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Image 1 was produced with help from Open AI for inspiration of its creation

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