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Case Report

Skin Burn after Sacroiliac Denervation: An Unusual but Significant Complication

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Radiofrequency (RF) lesioning, developed in 1965, has been very useful in pain medicine, providing long-term relief for many chronic pain problems by denervating the regions involved in the generation of pain. The technique involves the use of a probe placed into the targeted tissue to be ablated. An electrical current is then passed from the machine to the tip of the probe, ionically heating up the tissues, which destroys the nerve tissue. The circuit is completed when the electrons are collected by a distal dispersing electrode that carries the current back to the generator. The potential sites for RF lesioning are expanding, and this has led to an expansion of the use of RF in a variety of medical fields, including cardiology, gastroenterology, otolaryngology, neurosurgery, and pain medicine. The size of the probes is increasing as well, as is the length of time used in lesioning, which increases the power and therefore the electrical field generated by the ablating system. By the nature of the electrical field created, the RF technique creates a risk of superficial (and potentially deep) burns at the dispersive electrode. This small but significant risk of burns has been reported after cardiac and gastrointestinal ablation, but has not been emphasized to practicing pain physicians. We present here the case report of a significant burn at the dispersive electrode site after a denervation procedure of the sacroiliac joint. We describe the mechanism of injury and propose potential methods of prevention.

Key words: Radiofrequency lesioning, sacroiliac denervation, complications, sacroiliac joint treatment

Sacroiliac joints (SIJ) are an important source of low back (1) and lower limb pain (2). Clinical assessment and SIJ infiltration are the cornerstone of diagnosis. Patients resistant to conservative management may benefit from sacroiliac radiofrequency (RF) denervation (3-11), a relatively safe procedure done under light sedation and local anesthesia, with low reported rates of complication (11-13).

We report a case of a middle-aged patient who underwent sacroiliac RF denervation and developed a postprocedure thigh skin burn.

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CASE REPORT

A 52-year-old man presented with bilateral lower lumbar and gluteal pain, resistant to conservative treatment. The physical examination was consistent with sacroiliac joints involvement, as evidenced by bilateral positive distraction and Patrick tests. The lumbar spine magnetic resonance showed no abnormalities except for disc degeneration at L5-S1. The patient underwent bilateral sacroiliac joint injections with 3 mL of lidocaine 2% plus methylprednisolone 40mg at each site; he reported a decrease in his visual analog scale from 7 to 2. The pain returned after a few days, and he was scheduled for a bilateral sacroiliac denervation as the next treatment approach.

After an intravenous line was established, the patient was monitored while prone with a pillow beneath his abdomen to reduce the lumbar lordotic curvature. A disposable dispersive plate was applied to the

posterior right thigh. The lumbar region and buttocks were prepared and draped in a sterile fashion. An anteroposterior C-arm projection was obtained, centered on the inferior border of the sacrum. The skin entry point was identified at the inferior border of the sacrum, one centimeter lateral to and below the S4 foramen. The patient was given light sedation with midazolam 2 mg, fentanyl 50 μg, and propofol 4 cc. The aimed track of the Simplicity III™ electrode (St. Jude Medical, St. Paul, Minnesota) was anesthetized with 1% lidocaine via a 25-gauge 3-1/2 inch Quincke needle. The Simplicity III electrode was correctly inserted along the posterior surface of the sacrum, lateral to the sacral foramina and medial to the sacroiliac joint (Fig. 1). We then lesioned the site by using the Simplicity III™ pre-programmed steps using a Neurotherm™ generator model NT 1100 (St. Jude Medical, St. Paul, Minnesota). At the end of the procedure, the patient underwent an additional L5 primary dorsal ramus RF lesioning. The procedure was performed on both sides and was uneventful. After the procedure, in the postanesthesia care unit, 2 burn lesions were noted at the posterior right thigh, initially with blister formations and quickly turning to second degree burn lesions, one measuring 1.5 cm X 5 cm and another measuring 0.8 cm X 1 cm (Fig. 2). The patient was referred to a dermatologist and appropriately treated.

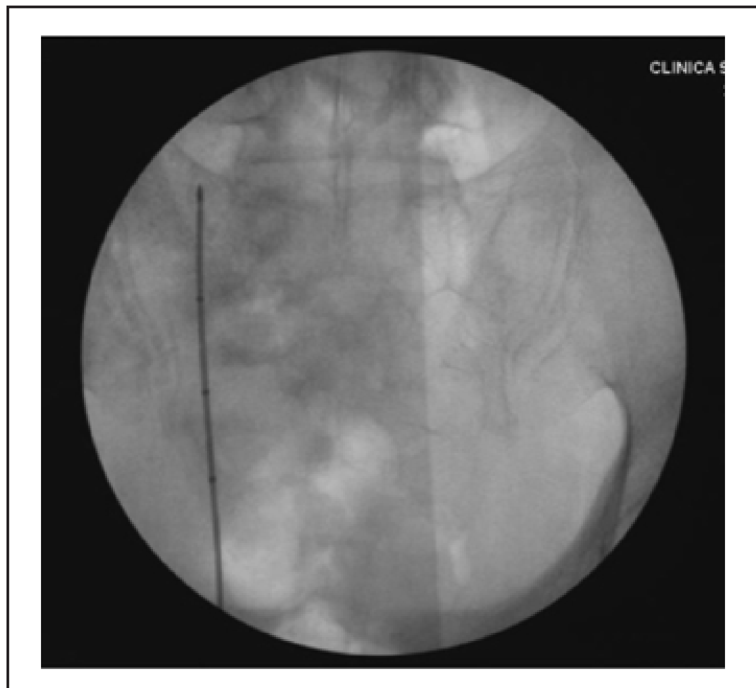

Fig. 1. Fluoroscopic image of Simplicity III™ probe in place over the sacroiliac joint.

DISCUSSION

The use of RF lesioning in the treatment of pain was initially described in 1965 by Mullan (14) using a direct current. Subsequently, the technique was modified by Rosomoff et al (15) to use RF current, hoping that RF would produce a more predictable lesion. A few years later, Sweet and Wepsic (16) described their technique for RF lesioning of the Gasserian ganglion to treat intractable trigeminal neuralgia. The first commercial generators, developed by Aranow (17) and Cosman (18) were released in the 1950s and used higher frequency, in the range of 300 – 500 KHz, to produce more reliable lesions. Since high frequencies in this range were also used in radio transmitters, the term “radiofrequency lesioning” was coined.

The generator creates an electrical current at the active electrode (e.g., the tip of the needle or, as in this case, the Simplicity III™ electrodes), which then flows to the dispersive plate (Fig. 3).

This complication is more frequently reported following RF ablation of solid tumors, occurring in 0.1% to 3% of cases (19-23) as well as after arrhythmia ablations, most likely because of the time length of the cases and the high energy used to accomplish these procedures. Burns are rare with RF lesioning for pain, and are usually due to electrical faults, insulation breaks, or machine malfunctioning (24). There have been 8 reported cases of superficial burns at the needle puncture site (but not the dispersive plate) (25). We found only one case report of thermal lesion by a dispersive plate, caused by an intradiscal electrothermal therapy (IDET) RF ablation (25) and so the patient is seldom warned about the risk.

The electrical burns can be caused by high RF current density from the generator or by direct current from the malfunctioning device (26). It usually occurs because of an alternate current pathway during monopolar mode or because of moisture beneath the negative electrode (27), but any fluid (like blood or saline) may create alternate current pathways and cause thermal lesions (28). Maladaptive dispersive plates may occur due to the drying of the electrode gel, incorrect position on a hairy area or on a sharply angled surface like a bone eminence.

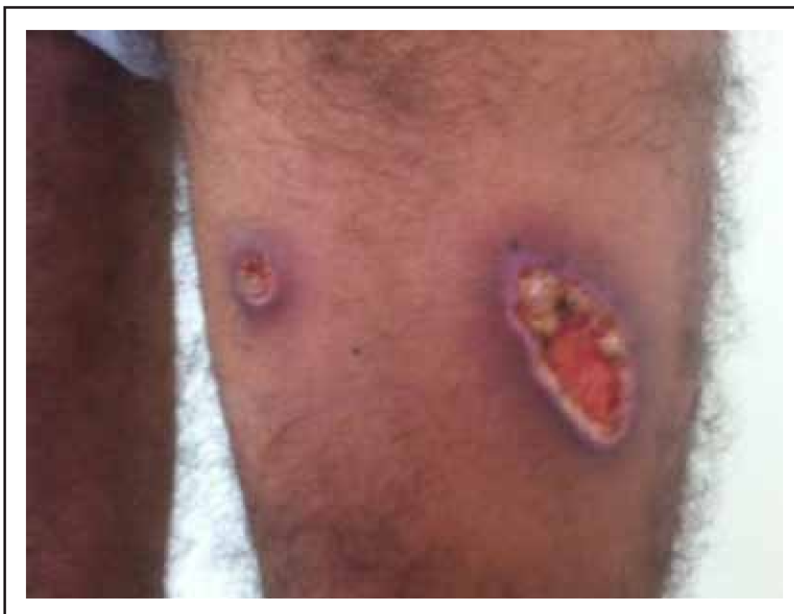

Fig. 2. Full thickness burns at the site of the dispersing plate.

In this case report, the dispersive plate apparently had insufficient contact with the hairy skin surface and the current density was dramatically increased in the contact area. Curiously, the patient was under only light sedation, was able to reply to the stimulus, and didn't complain about thigh pain during the RF procedure.

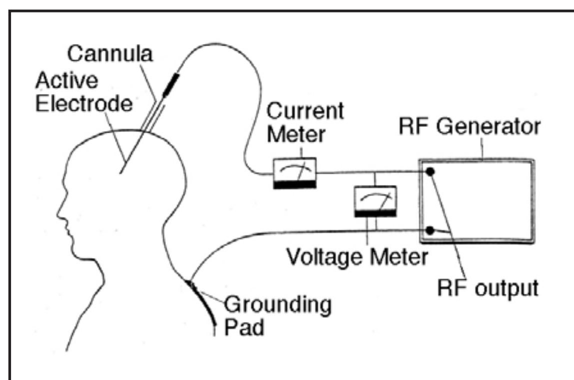

Fig. 3. Radiofrequency circuit.

[Image from Trescot AM, Hansen HC. Radiofrequency neurolysis. In: Manchikanti L and Singh V (eds). Interventional Techniques in Chronic Non-spinal Pain. American Society of Interventional Pain Physicians Publishing, Paducah, KY, 2009 (with permission)].

CONCLUSION

This article was written to warn pain practitioners regarding the potential danger from dispersive electrode burns. As the RF probes for pain treatment get larger and the heating times longer (such as with cooled RF and sacroiliac denervation procedures), the risk of unintended thermal lesions increase. Meticulous care must be taken when placing the dispersing plate, by assuring that the gel is fresh, that the plate is evenly adhering to the tissues, and that an appropriate site has been selected. For these longer, larger procedures, perhaps the consents should include the risk of burns, which will hopefully be decreased by preprocedure care.

Conflict of Interest

We confirm that there has been no conflict of interest, and no corporate sponsorship or funding.

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