

Case Report

e Intercostal Neuralgia Occurring as a Complication of Splanchnic Nerve Radiofrequency Ablation in a Patient with Chronic Pancreatitis

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Our intent is to report a case of intercostal neuralgia occurring as a complication of splanchnic radiofrequency ablation (RFA), due to a breach in the integrity of the insulating sheath of the RFA needle.

A 48-year-old man presented to our pain clinic with upper abdominal pain due to chronic pancreatitis, recalcitrant to medical management. We decided to perform bilateral splanchnic nerve RFA in this patient. After confirmation of bilateral correct needle placement under fluoroscopic guidance and sensorimotor testing, RFA was performed on the right side uneventfully. However, during RFA on the left side, the patient experienced severe pain in the epigastric region. A bolus of fentanyl 50 µg was given intravenously in order to minimise discomfort, and RFA was performed. In the post-procedure period, the patient described severe pain in the left subcostal and epigastric region, with features suggestive of intercostal neuralgia of the left 11th intercostal nerve. We went back and analysed all the fluoroscopic images again. Convinced of correct needle placement, we examined the RFA needles which had been used for ablation in this patient. One of the needles was discovered to have a fine breach in its insulating sheath, at a distance of approximately 30 mm from the active tip.

It is of utmost importance for all interventional pain physicians to perform a thorough pre-use check of the equipment prior to any RFA procedure, with special emphasis on ensuring the integrity of the insulating sheath of the needles which are to be used, in order to prevent injury of non target nerves.

Key words: Splanchnic nerve block, radiofrequency ablation, intercostal neuralgia, radiofrequency ablation complications, radiofrequency equipment check, radiofrequency needle

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Radiofrequency ablation (RFA) of the splanchnic nerves is an established method of pain relief in patients with chronic pancreatitis. Injury to the intercostal nerves is a feared complication while performing splanchnic nerve RFA, when the tip of the probe is a positioned slightly more posterior to the desired target site. We describe a case where we faced this complication not because of incorrect needle placement, but because of a breach in the integrity of the insulating sheath of the RFA needle.

Case Report

We describe the case of a 48-year-old man who presented to our pain clinic with upper abdominal pain for the past 5 months, secondary to chronic pancreatitis. The pain was severe in intensity and did not respond to medical management, including high doses of tramadol (300 mg/day) and amitriptyline (50 mg/day). A more aggressive treatment approach was adopted and bilateral splanchnic nerve RFA was planned for this patient following a successful diagnostic block.

After obtaining written informed consent, bilateral splanchnic nerve RFA was performed under fluoroscopic guidance using 2 20-gauge 150 mm radiofrequency needles with 10 mm active curved tips (Cosman Inc.). One milligram of midazolam and 100 µg fentanyl were administered intravenously for sedation, and once the desired fluoroscopic view was obtained, the needles were inserted and positioned bilaterally at the junction of the anterior one-third and posterior two-thirds of the eleventh thoracic vertebral body. 15 cm radiofrequency (RF) electrodes were then placed through each needle for stimulation.

When performing sensorimotor testing, the patient described mild epigastric discomfort on sensory stimulation (0.5 V, 50 Hz) and no motor contractions were noted on motor stimulation (2 V, 2 Hz) bilaterally. Correct position of the needles was thus confirmed and 5 mL of 1% lignocaine was deposited on each side. Two thermal RFA lesions were created on the right side uneventfully (80°C, 90 seconds each). However, during thermal RFA on the left side, the patient experienced severe pain in the epigastric region, which he described as being similar to the pain which he experienced due

to the pancreatitis. An additional bolus of fentanyl 50 µg was given intravenously in order to minimise discomfort to the patient, and 2 thermal RF lesions were then created. Twenty mg depot methylprednisolone was deposited on each side and the needles were withdrawn. The patient was shifted to the post anaesthesia care unit (PACU) for observation.

In the PACU, the patient began to complain of pain over the left back and epigastric region. This was initially thought to be due to inflammation at the needle site, but it was not relieved by an injection of diclofenac 75 mg intravenously. Upon taking a more detailed history, the patient described a severe pain, different in nature from the original pain, which he felt in the left subcostal and epigastric region in a girdle-like manner, radiating till below the umbilicus on the left side. The pain was a sharp, shooting, burning pain, constantly present with a severe VAS score of 80 mm to 100 mm.

The characteristics of pain were highly suggestive of intercostal neuralgia of the left 11th intercostal nerve. With that suspicion, we went back and analysed all the fluoroscopic images again, confirming the tip of the needle to be correctly placed bilaterally in antero-

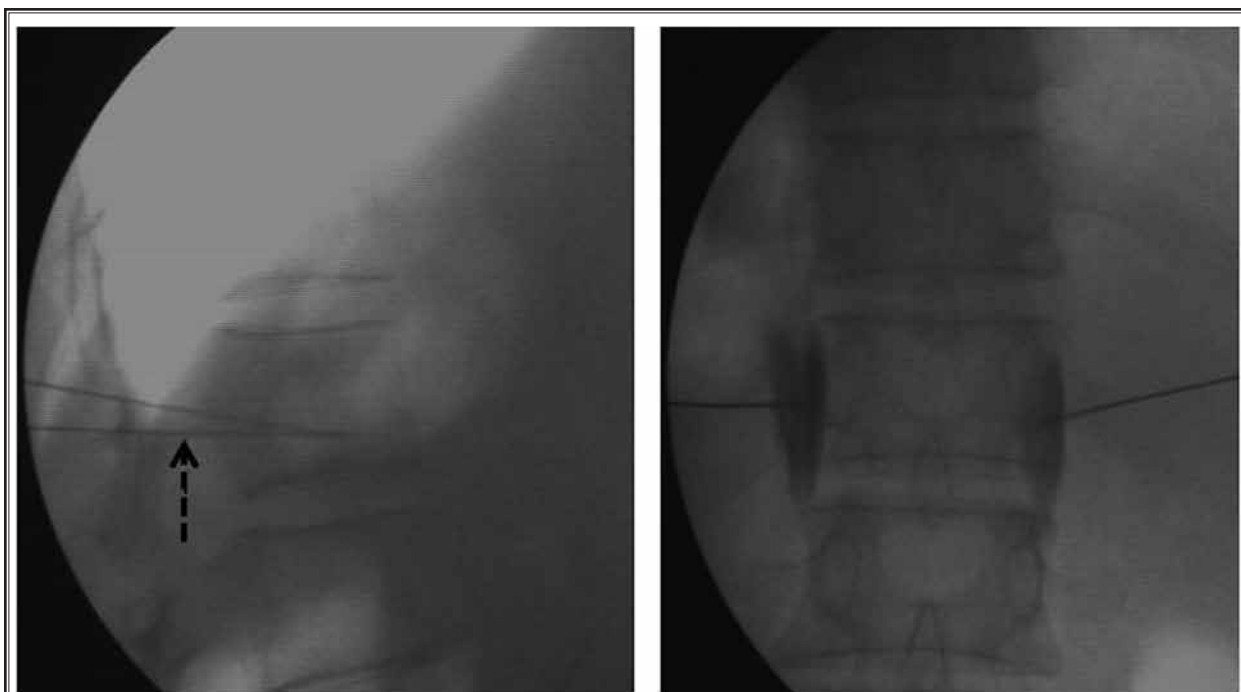


Fig. 1. Fluoroscopic images (a. lateral; b. anteroposterior) demonstrating correct needle placement bilaterally for splanchnic nerve RFA.

Dotted arrow indicates the possible site of contact with the intercostal nerve.



Fig. 2. A 150 mm RF needle with 10 mm active tip. Dotted arrow indicates the site of breach in the integrity of the insulating sheath.

posterior, lateral, and oblique views (Fig. 1). Convinced of correct needle placement, we then examined the RF needle which had been used for ablation in this patient. One of the RF needles was discovered to have a fine breach in its sheath, at a distance of approximately 30 mm from the active tip (Fig. 2).

In the following 4 weeks, the pain of chronic pancreatitis resolved, but the intercostal neuralgia persisted despite medical management with high doses of anti-neuropathic medication and a short course of opioids. This pain subsided only when the patient received an intercostal nerve block with 5 mL of 0.25% bupivacaine and 20 mg depot methylprednisolone at the left eleventh intercostal nerve, repeated twice over 15 days.

Discussion

Radiofrequency neurotomy (RFN) has proven to be a very useful tool in achieving successful long-term pain relief in a wide variety of conditions in chronic pain since the 1960s. However, it is not bereft of complications. Infection, hematoma formation, and inadvertent burns, including third degree skin burns, have occurred with this technique (1). Neural damage leading to cutaneous dysesthesia and hypoaesthesia have also been described (2). Irreversible injury of non target nerves is a possible complication of RFN (3). We describe one such case.

Splanchnic nerve RFA is a proven method of successful pain alleviation in patients suffering from chronic pancreatitis. It has been found to provide pain relief up to a median period of 45 weeks (4). Splanchnic nerve RFA is a relatively safe procedure, as the predictable relationship of the splanchnic nerves to other structures allows for accurate needle placement, resulting in accurate radiofrequency lesioning (5). Minor complications like diarrhoea and intestinal colic may occur, but these are temporary and can be easily managed (6). Major complications including injury to the pleura or kidneys are rare, but warrant a mandatory check via x-ray of the chest following the procedure.

Injury to the intercostal nerves is a feared complication while performing splanchnic nerve RFA, when the tip of the probe is positioned slightly more posterior to the desired target site. In this needle position, sensory stimulation elicits pain in a girdle-like fashion around the affected intercostal space; it is advised to push the needle more anteriorly in this event (7). We faced this complication not because of incorrect needle placement, but because of a breach in the integrity of the insulating sheath of the RF needle.

The RF needle is typically comprised of a metal shaft which is entirely insulated, except for an exposed conductive tip. A wide grounding plate placed on the patient's skin allows for completion of the circuit and delivery of alternate current from the RF generator to the active tip, leading to thermal lesioning of the target. When approaching the desired position for splanchnic nerve RFA, the needle may pass close to the intercostals nerves, and sometimes may even be in contact with them (Fig. 3). When performing the RFA with a normal needle, the sheath insulates the rest of the needle and avoids any injury to the intercostal nerves. In the event of any disruption of the sheath however, a large variety of complications may be precipitated, as in our patient.

There were 2 possible reasons for this mishap. Firstly, such incidents have not been reported in literature before, and although we did perform a pre-use check of the RF generator and the needles, it did not occur to us to particularly check the integrity of the insulating sheath of the needles. Secondly, the patient was unable to differentiate this pain from his original pain of chronic pancreatitis while performing RFA. This could be partly due to an incomplete understanding of the procedure by the patient, and also partly due to the effect of sedatives. Although the pain experienced by our patient during the procedure was baseline, it is strongly advisable to thoroughly investigate any unexpected or disproportionate pain during any case when performing RFA.



Fig. 3. A skeletal model demonstrating the relationship between the RF needle placed for splanchnic nerve RFA and the adjoining intercostal nerve.

Dotted arrow indicates the possible point of contact between the non-insulated part of the needle and the intercostal nerve.

While performing RFA, electrical impedance is a measure which is known to confirm the continuity of an electrical circuit and to detect any short circuits (7). However, in our patient, it showed a value between 300 – 350 Ω bilaterally. It would be interesting to evaluate its utility in detecting a breach in the insulating sheath if they are missed by the naked eye during visual inspection of the needle.

CONCLUSION

RFA of nerves is a widely accepted and popular method of long time pain relief in patients suffering from chronic pain. It is of utmost importance for all interventional pain physicians to perform a thorough pre-use check of all the equipment prior to RFA, with special emphasis on ensuring the integrity of the insulating sheath of the needles being used. Also, it is vital to ensure a clear understanding of the procedure by the patient and maintain effective communication between the patient and operator before and during the procedure.

REFERENCES

1. Walega D, Roussis C. Third-Degree burn from cooled radiofrequency ablation of medial branch nerves for treatment of thoracic facet syndrome. *Pain Pract Off J World Inst Pain* 2014; 14:e154-e158.
2. Muhlner SB. Review article: Radiofrequency neurotomy for the treatment of sacroiliac joint syndrome. *Curr Rev Musculoskelet Med* 2009; 2:10-14.
3. Abbott Z, Smuck M, Haig A, Sagher O. Irreversible spinal nerve injury from dorsal ramus radiofrequency neurotomy: A case report. *Arch Phys Med Rehabil* 2007; 88:1350-1352.
4. Verhaegh BPM, van Kleef M, Geurts JW, Puylaert M, van Zundert J, Kessels AGH, Masclee AAD, Keulemans YCA. Percutaneous radiofrequency ablation of the splanchnic nerves in patients with chronic pancreatitis: Results of single and repeated procedures in 11 patients. *Pain Pract Off J World Inst Pain* 2013; 13:621-626.
5. Garcea G, Thomasset S, Berry DP, Tordoff S. Percutaneous splanchnic nerve radiofrequency ablation for chronic abdominal pain. *ANZ J Surg* 2005; 75:640-644.
6. Papadopoulos D, Kostopanagiotou G, Batistaki C. Bilateral thoracic splanchnic nerve radiofrequency thermocoagulation for the management of end-stage pancreatic abdominal cancer pain. *Pain Physician* 2013; 16:125-133.
7. Raj PP, Lou L, Erdine S, Staats PS, Waldman SD, Racz G, Hammer M, Niv D, Ruiz-Lopez R, Heavner JE. *Interventional pain management: Image-Guided procedures*. Churchill Livingstone, Philadelphia; 2007 pp. 263-264.