

Ultrasound-guided pulsed radiofrequency treatment of the intercostal nerve: three cases

Taylan Akkaya · Derya Ozkan

Received: 26 February 2013 / Accepted: 21 May 2013 / Published online: 4 June 2013
© Japanese Society of Anesthesiologists 2013

To the Editor:

Radiofrequency thermocoagulation (RFTC) can be effectively used to treat chronic pain [1]. However, it may lead to thermal destruction of tissue surrounding the nerve [2]. Thus, correct identification of the targeted tissue is of great importance. For this purpose, imaging methods such as fluoroscopy, magnetic resonance imaging (MRI), computed tomography (CT) scan, and—more recently—ultrasound (US), are utilized [3]. RFTC has been successfully applied in treating intercostal neuralgia [2].

Three patients (a 33-year-old woman, a 66-year-old man, and a 73-year-old man) who had been diagnosed with various diseases (intercostals neuralgia, postthoracotomy pain syndrome, and postherpetic neuralgia) were examined in a pain unit. Numerical Rating Scale (NRS) scores were 7, 6, and 7, respectively. All three patients had been treated previously with anti-inflammatory drugs, gabapentin, paracetamol, and tramadol. Diagnostic intercostal nerve blocks (ICNB) were applied to the concerned segments with US guidance. The patients underwent US-guided pulsed radiofrequency (PRF) therapy (42 °C, 120 s) after having given informed consent. They reported pain relief within 30 min and remained at the lower limit (NRS scores 2, 0, 1 respectively) throughout the 6-month follow-up period.

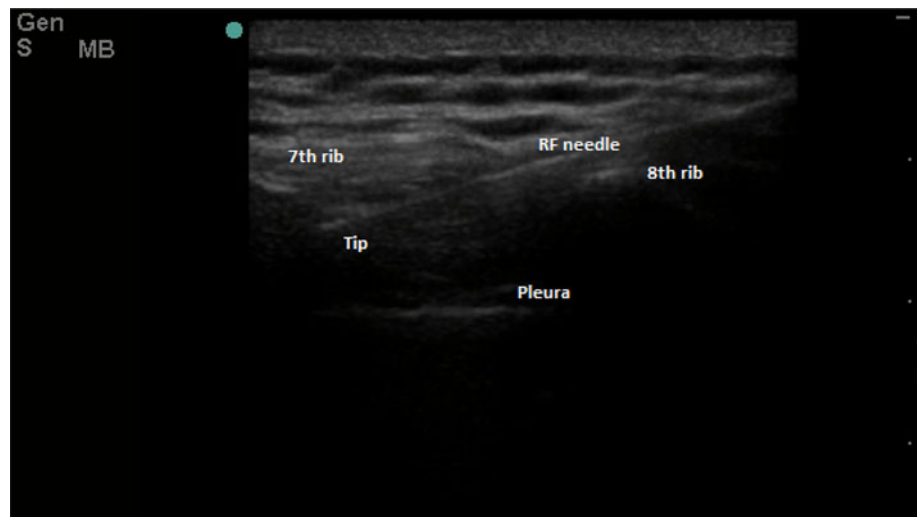
The targeted ribs were marked at 8 cm lateral to the spinous processes. A SonoSite[®] M-turbo ultrasound machine (Bothell, WA, USA) with a linear transducer probe (HFL 38X/13-6 MHz) was used to perform the intercostal nerve RFTC. The US probe was placed on the marked area in the longitudinal plane, and using an appropriate tilt, the ribs and the pleura became visible (Fig. 1). The RFTC needle (100 cm insulated with a 10-mm straight tip, NeuroTherm[®], USA) was viewed with the in-plane technique and was then directed toward the caudal edge of the ribs. When the edge of the needle was observed to be in the intercostal groove, the location of the concerned intercostal nerve was verified both by motor nerve stimulation (2 Hz, 1 ms, 2 V) and by confirming that the impedance value was 300–350 Ω. Local muscle spasms only were identified. While maintaining visualization of the needle at the caudal edge of rib, PRF was applied at 42 °C for 120 s with an RFTC generator (NT1100, NeuroTherm[®]). After two PRF cycles, 3 ml 0.25 % bupivacaine was injected by real-time observation of the local anesthetic spread under US guidance, and the RF needle was removed. The patients tolerated the procedures well and were monitored for 1 h postprocedure. All three patients were discharged on the same day.

Although an intercostal nerve block is an effective and well-known technique for pain relief, its application, especially through the conventional method, is avoided because of the risk of pneumothorax, hemothorax, intravascular injection, and intrathecal injection [4]. Pleura can be viewed clearly using the US-guided intercostal nerve-block method, allowing an intercostal nerve block to be applied more safely [5]. US offers the advantage of portability, real-time imaging, cost savings, and a lack of radiation. In conclusion, US-guided PRF of intercostal nerves may be effective and safe.

T. Akkaya · D. Ozkan
Anesthesiology Department and Pain Unit, Ministry of Health
Diskapi Yildirim Beyazit Training and Research Hospital,
Ankara, Turkey

D. Ozkan (✉)
Koru M Kavakli S NO: 4/44, Cayyolu, 06810 Ankara, Turkey
e-mail: derya_z@yahoo.com

Fig. 1 Ultrasound image of the radiofrequency thermocoagulation (RFTC) cannula, pleura; 7th and 8th ribs in an in-plane technique



Acknowledgments Departmental funding only. The authors have no conflicts of interest.

References

1. Cohen SP, Abdi S. Lateral branch blocks as a treatment for sacroiliac joint pain: a pilot study. *Reg Anesth Pain Med.* 2003;28:113–9.
2. Cohen SP, Sireci A, Wu CL, Larkin TM, Williams KA, Hurley RW. Pulsed radiofrequency of the dorsal root ganglia is superior to pharmacotherapy or pulsed radiofrequency of the intercostal nerves in the treatment of chronic postsurgical thoracic pain. *Pain Phys.* 2006;9:227–35.
3. Van Boxem K, Cheng J, Patijn J, van Kleef M, Lataster A, Mekhail N, Van Zundert J. 11. Lumbosacral radicular pain. *Pain Pract.* 2010;10:339–58.
4. Ho AM, Karmakar MK, Critchley LA. Acute pain management of patients with multiple fractured ribs: a focus on regional techniques. *Curr Opin Crit Care.* 2011;17:323–7.
5. Williams EH, Williams CG, Rosson GD, Heitmiller RF, Dellon AL. Neurectomy for treatment of intercostal neuralgia. *Ann Thorac Surg.* 2008;85:1766–70.