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Original Contribution

Thoracic paravertebral anesthesia for percutaneous radiofrequency ablation of hepatic tumors☆

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Abstract

Study Objective: To present our preliminary experience using a thoracic paravertebral block (TPVB) as the sole anesthetic in percutaneous hepatic radiofrequency ablation (RFA).

Design: Retrospective case series of 12 ASA physical status 1, 2, and 3 patients of average risk scheduled for RFA.

Setting: University medical center.

Measurements: The first 12 procedures performed using TPVB were analyzed to evaluate the efficacy and safety of this anesthetic technique. Data collected included patients' characteristics, procedure, pain referred during paravertebral punctures, and RFA (verbal numerical scale; VNS). Anesthesia and medical records also were reviewed for any major complications that occurred during or after the RFA.

Main Results: Ten of the 12 patients presented for hepatocellular carcinoma; the other two patients had melanoma metastasis. Nine patients were ASA physical status 1 or 2; the other three patients were ASA physical status 3. Nine had liver cirrhosis. All patients had normal coagulation profiles. The TPVBs

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were performed in a median time of 6.5 (4–15) minutes. Onset of sensory loss to pinprick test occurred approximately 15 to 20 minutes after the injections. No evidence of bilateral blockade was seen in any patient. In most cases, the extent of anesthesia ranged from T6 to T11 or T12. In one patient (no. 2), the stimulating needle elicited no sensory or motor response at the T7 level; the local anesthetic was then injected one cm beyond the transverse process. All patients were very pleased with their anesthetic care; all were discharged from the hospital with no procedure-related complications.

Conclusion: The use of thoracic paravertebral block as the sole anesthetic for RFA of liver produced satisfactory unilateral anesthesia and minor adverse events.

1. Introduction

Percutaneous hepatic radiofrequency ablation (RFA) is a minimally invasive procedure commonly performed for primary or metastatic tumors in the liver. Radiofrequency ablation is usually performed using general anesthesia, deep sedation, or epidural analgesia. Thoracic paravertebral block (TPVB) is typically performed for pain relief after thoracic surgery and for breast surgery [1,2]. Paravertebral block has been described as an effective analgesic technique for pain relief after liver trauma [3] and during percutaneous transhepatic biliary drainage [4,5].

In 2009, Wong et al published their experience with surgical resection versus RFA performed using PVB without describing the anesthetic technique they used [6]. Recently, Cheung Ning and Karmakar reported a successful case series of 20 patients who underwent the RFA procedure with paravertebral block anesthesia and propofol-based sedation [7]. This case series describes our preliminary experience with a thoracic paravertebral block as the sole anesthetic for RFA. A retrospective analysis of the first 12 procedures performed using TPVB was carried out to preliminarily evaluate the efficacy and safety of this anesthetic technique in this surgical scenario.

2. Materials and methods

After Fondazione IRCCS Istituto Nazionale dei Tumori Ethics Committee authorization (Protocol INT 96/12), we reviewed the medical records of 12 patients who presented for RFA of liver primary tumors or metastasis and who underwent the procedure with TPVB as the sole anesthetic. Anesthetic information was obtained from detailed handwritten anesthesia forms. Patients received no premedication before the procedure.

After applying noninvasive blood pressure monitoring (cycle every 4 min), electrocardiography, pulse oximetry, and a peripheral intravenous (IV) catheter for saline solution infusion (500 mL), we performed TPVB with the patient in the sitting position. The superior aspects of the spinous processes of T7 and T9 were marked and needle insertions performed 2.5 cm laterally on the right side of the back after skin anesthesia with 2 to 3 mL of 2% lidocaine. We used a 50 or 70-mm 22-G insulated stimulating needle (Polymedic®; Temena SARL, Bondy, France) and peripheral nerve stimulator (Polystim II®; Temena SARL). The needle was directed perpendicularly to the skin until the transverse process was contacted. The needle was then "walked" cranially off the transverse process and advanced with the nerve stimulator current set at 2.5 mA (0.3 msec duration and 1 Hz) until an appropriate intercostal muscle response was seen. The stimulating needle was then cautiously advanced until the muscle or sensitive response could still be achieved by a stimulating current of about 0.5 mA. After careful aspiration, 0.15 mL/kg of levobupivacaine 0.5% was administered at each segment. Patients were then placed in the supine position and sensory loss at pinprick testing was verified 15 minutes later. No sedatives or opioids were administered and RFA was started about 5 minutes later.

Only patients with a Child-Pugh score less than B7, a prothrombin time (PT)/INR value < 1.5, and platelet count higher than 50,000 per mm^3 underwent the RFA procedure. Radiofrequency ablations were performed with ultrasound guidance using expandable-tip electrode needles (Miras RC® 19-G or Miras TX® 15-G; Medtronic-Invatec, Roncadelle, Italy). The electrode tip was inserted into the tumor and thermal lesions were considered adequate when the hyperechoic ablation area was at least as large as the tumor itself.

No routine postoperative chest radiography or ultrasound chest examination was performed to detect pneumothorax.

Patients' characteristics, procedure data, pain referred during paravertebral punctures, and RFA (verbal numerical scale; VNS) were reviewed. Anesthetic and medical records were carefully reviewed to highlight any major complications that occurred during and after the RFA procedures. Hypotension was defined as a systolic blood pressure less than 100 mmHg or a documented ephedrine administration. Bradycardia was defined as a heart rate (HR) less than 50 beats per minute (bpm) or a documented atropine administration.

Prior to calculation of descriptive statistics, the Shapiro-Wilk test was used to assess the distribution of continuous data. Data are presented as means ± SD (ranges) or medians (ranges) for parametric and nonparametric data, respectively. Statistics were calculated using Prism 5.0® software (GraphPad Software, Inc. La Jolla, CA, USA).

3. Results

Patients' demographics are listed in Table 1. Ten of 12 patients presented for hepatocellular carcinoma, and two