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An alternative plane block for multiple rib fractures: Rhomboid Intercostal and Sub-Serratus block (RISS)

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ABSTRACT

Rib fractures are a common injury, which occur after severe blunt chest trauma. Sufficient and early pain control is essential to avoid respiratory complications. In recent years, the serratus plane and the erector spinae plane blocks have been used in ED for pain related to rib fractures. The Rhomboid Intercostal and Sub-Serratus (RISS) block can be utilized for pain control in patients with multiple rib fractures. We report two cases of patients with multiple rib fractures in which pain reduction was achieved with application of the RISS block.

1. Introduction

Multiple rib fractures can be an injury sustained after severe blunt chest trauma and are associated with increased morbidity and mortality in patients. Patients may experience severe and debilitating pain attributed to multiple rib fractures. If pain control is not adequately addressed, patients may experience difficulty coughing and shallow respirations, which can result in respiratory complications including reduced respiratory capacity, sputum retention, atelectasis, and pneumonia [1].

The rhomboid intercostal block was first described in 2016 [2]. The region described is known as the triangle of auscultation that is bounded medially by inferior part of the trapezius, inferiorly by the superior border of latissimus dorsi, and laterally by the medial border of the scapula. In this ultrasound-guided block, the local anesthetic drug is administered between the rhomboid major and the intercostal muscle fascia at the level of T6–T7 and provides analgesia of T3–T8 dermatomes [2]. Elsharkawy et al. described a modification to the rhomboid intercostal block to expand dermatomal coverage. They describe the RISS (Rhomboid Intercostal and Sub-Serratus) block that is a two-injection block of both the rhomboid intercostal and sub-serratus space. After the first injection, the ultrasound probe advances caudally and laterally distal to the inferior angle of the scapula, the second injection apply between the serratus and intercostal muscle fascia. The RISS block is a novel ultrasound-guided block that has been shown to provide analgesia from T2–T11 dermatomes [3].

We report two cases in which adequate analgesia was achieved in patients with multiple rib fractures using the RISS block.

Informed written consent was obtained from the patients whose data are used in this report.

2. Case reports

2.1. Case-1

A 45-year-old male presented to our emergency department after a motor vehicle accident with blunt chest trauma. The patient was diagnosed with multiple (2nd–7th) left sided posterior rib fractures. Despite 50 mg dexketoprofen trometamol and 2 mg morphine given intravenously, adequate analgesia was not achieved. A RISS block was performed and adequate pain control was obtained 30 min after the block. Sensory block was tested with cold alcohol-soaked compress, the loss of cold sensation was achieved at the T2–T11 dermatome site. Pain control was assessed using the Visual Analogue Scale (VAS 0: no pain; VAS 100: the worst possible). Prior to the procedure, the patient reported a VAS score of 90/100. Thirty minutes after the procedure, the patient reported a VAS score of 20/100. Notably, twenty-four hours after the procedures, the patient reported a VAS score of 0–20/100

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at rest, and 0–40/100 during deep inhalation. In addition to the block, the patient received dexketoprofen trometamol 50 mg every 12 h intravenously.

2.2. Case-2

A 65 year-old-woman with multiple left-sided postero-lateral rib fractures (3rd–9th) after a motor vehicle accident was admitted to the emergency intensive care unit. A left sided chest tube was previously placed for pneumothorax and the patient did not have adequate pain control with dexketoprofen 50 mg twice daily and 50 mg tramadol every 8 h. A RISS block was performed. Prior to the procedure, the patient reported a VAS score of 80/100. Twelve hours after the procedure, the patient reported a VAS score of 0–40/100. In addition to the RISS block, the patient received dexketoprofen trometamol 50 mg twice daily and paracetamol 10 mg/kg every 6 h intravenously. Forty eight hours after the procedures, the patient reported a VAS score of 0–40/100.

2.3. The RISS block technique

A total mixture of 30 mL was made using 15 mL 0.5% bupivacaine, 2 mL 8 mg dexamethasone as an adjuvant to prolong the block duration, and 13 mL normal saline. The patient was placed in the lateral decubitus position with the ipsilateral arm adducted across the chest, allowing for lateral scapula movement thus opening up the thoracic cavity. The procedure was performed using a high frequency linear ultrasound probe under sterile conditions. The ultrasound probe was placed in the oblique sagittal plane orientation, 1–2 cm medial to the medial scapula at the T5–T6 level. The trapezius muscle, rhomboid major muscle, ribs, intercostal muscle and pleura were visualized respectively using ultrasound. A sonovisible 50 mm needle was inserted from the cranial to the caudal direction using the in-plane technique. The needle was advanced between the rhomboid major and intercostal muscle fascia. The location of the needle was confirmed with 2 mL saline solution, after which 20 mL local anesthetic mixture was administered. Then the probe was advanced caudally and laterally to identify the plane between the serratus and intercostal muscle for the sub-serratus block at T9 level (Fig. 1). To confirm the position of the needle, a 2 mL saline injection was made and 10 mL local anesthetic mixture was injected between the serratus and intercostal muscle fascia.

3. Discussion

Effective analgesia is essential in patients with multiple rib fractures to reduce respiratory complications. Multiple analgesia

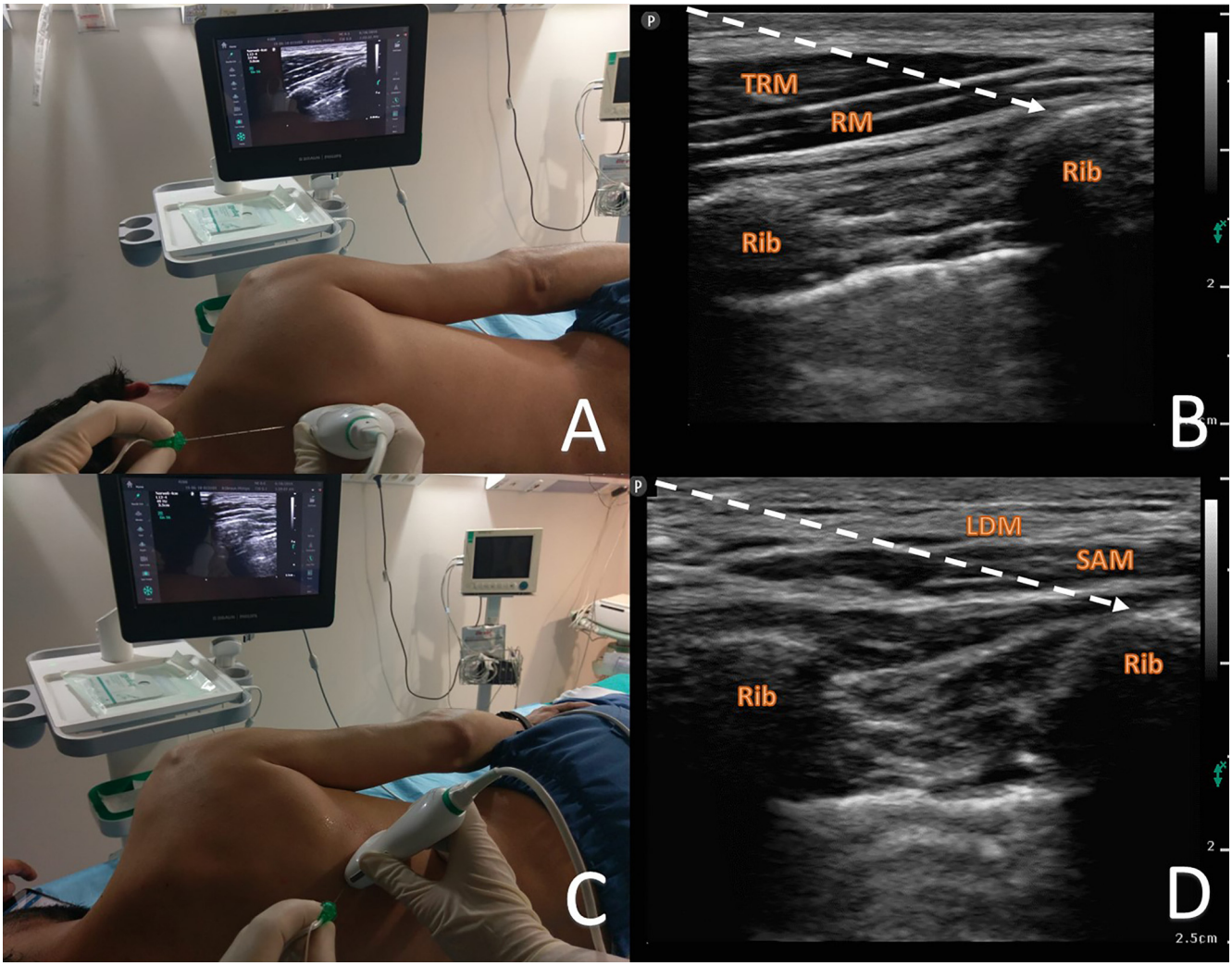

Fig. 1. A, B. Ultrasound, patient set up and sonographic image for rhomboid intercostal plane block Fig. 1 C, D. Ultrasound, patient set up and sonographic image for subserratus block. TRM: Trapezius Muscle, RM: Rhomboid Muscle, LDM: Latissimus Dorsi Muscle, SAM: Serratus Anterior Muscle.

modalities have been utilized for the pain control in patients with multiple rib fractures including systemic opioids, ketamine, epidural placement, and regional anesthesia including paravertebral, interpleural and serratus-erector spinaea blocks [4,5]. We describe the RISS block for pain control in patients with multiple rib fractures. In the case reports described above, the RISS block resulted in adequate pain control. In this block, the injection is performed between the intercostal muscles and, the serratus and rhomboid muscles. The local anesthetic solution is spread in the facial plane and its blocks the ventral and dorsal radii of the thoracic intercostal nerves to provide effective analgesia in patients with rib fractures and those requiring chest tubes. The RISS block is more superficial and easier to perform compared to paravertebral block. As a result, this block could be used with increasing frequency in the emergency department.

Although there are no published complications of RISS block in the literature, possible risk factors for chest wall blocks are valid for this block. Pneumothorax, local anesthetic systemic toxicity, hematoma and infection are possible complications. The potential limitation in this block is adequate training for identification of sonoanatomical structures, and needling technique, which involves learning to manipulate the ultrasound transducer and hand-eye coordination.

There are several pharmacological and regional anesthetic treatments for pain associated with multiple rib fractures and the RISS block is an additional adjunct that can be included in the multimodal approach to pain control in multiple rib fractures. In this case report, RISS block has been provided for superior analgesia over routine care. The RISS block may be a good alternative or addition in the management of pain control in multiple rib fractures as a part of multimodal analgesia. Further studies evaluating the RISS block are needed to explore the efficacy and appropriate volume and concentration of medications used.

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