

Serratus Anterior Plane Block for Multiple Rib Fractures

TO THE EDITOR

A 63-year-old man, admitted to a tertiary care hospital, with a history of motor vehicle accident 2 days before was referred to a pain clinic within the hospital with severe chest pain on the left side. He was morbidly obese, with a body mass index of 44, a positive history of hypertension, uncontrolled diabetes mellitus, and obstructive sleep apnea. The patient had difficulty breathing due to pain and was unable to lie supine or prone or take deep breaths. He reported his static and dynamic pain scores on the Visual Analog Scale as 60 and 100 respectively. A posteroanterior x-ray revealed fractures of the 4th-7th ribs with no evidence of pneumothorax or hemothorax. The patient had already received intravenous (IV) diclofenac (75 mg every 12 hours), oral acetaminophen (1 g every 6 hours) and IV tramadol (100 mg every 8 hours). These analgesics did not provide any relief in dynamic pain. We therefore decided to perform a serratus anterior plane (SAP) block under ultrasound guidance, followed by catheter insertion for continuous infusion of local anesthetic which was done following informed consent.

The patient was placed in a sitting position with his left arm resting on a side table (Fig 1). An intravenous line was secured and all standard monitoring was applied. The procedure was performed with a 5-2 MHz curvilinear ultrasound probe (Sonosite M Turbo, Bothell, WA) under strict aseptic conditions. The serratus anterior muscle was localized over the 5th rib in a posterior axillary line in the vertical axis (Fig. 2A). Then the probe was aligned along the rib along the long axis of the rib. The needle entry point was anesthetized with 1% lidocaine. An 18 G Touhy needle was introduced under real time ultrasound using an in-line needle technique from a posterior to an anterocaudal direction. The needle tip was placed on the surface of the rib under the serratus anterior muscle between the posterior and mid-axillary line (Figure 2B). Hydro dissection was done with 3 mL saline to confirm the position of the needle tip. Thereafter, 20 mL of 0.125% bupivacaine was injected under ultrasound guidance. A 20 G epidural catheter was advanced through the epidural needle to a depth of 4 cm beyond the needle tip and tunneled subcutaneously to prevent dislodgment. The patient reported a significant decrease in



Fig. 1. Position of the patient and placement of the needle by in-line needling technique.

pain 15 minutes after the procedure. Continuous infusion of 0.0625% bupivacaine with 1 µg/mL of fentanyl using an elastomeric pump was started at 7mL/h after 4 hours. Infusion was increased to 12 mL/h the next day since the patient had pain in his left lower chest after the effect of the bolus dosage decreased. Thereafter the patient's static and dynamic VAS pain scores were reduced to 00 and 10-20 respectively and he was able to ambulate and undergo respiratory physiotherapy without pain. Other analgesics were stopped except acetaminophen. The catheter was removed on the sixth day and the patient was discharged 24 hours later with no complications. He was advised to continue oral nonsteroidal anti-inflammatory drugs (NSAIDs) for one week.

Multiple rib fractures (MRF) continue to be a challenging problem as the associated pain leads to a compromise in respiration, especially in obese patients; accompanying obstructive sleep apnea further complicates the management. Proper analgesia is required for early ambulation, physiotherapy, and to prevent development of respiratory failure (1,2). There are several regional analgesic methods used in treating MRF (3-6).

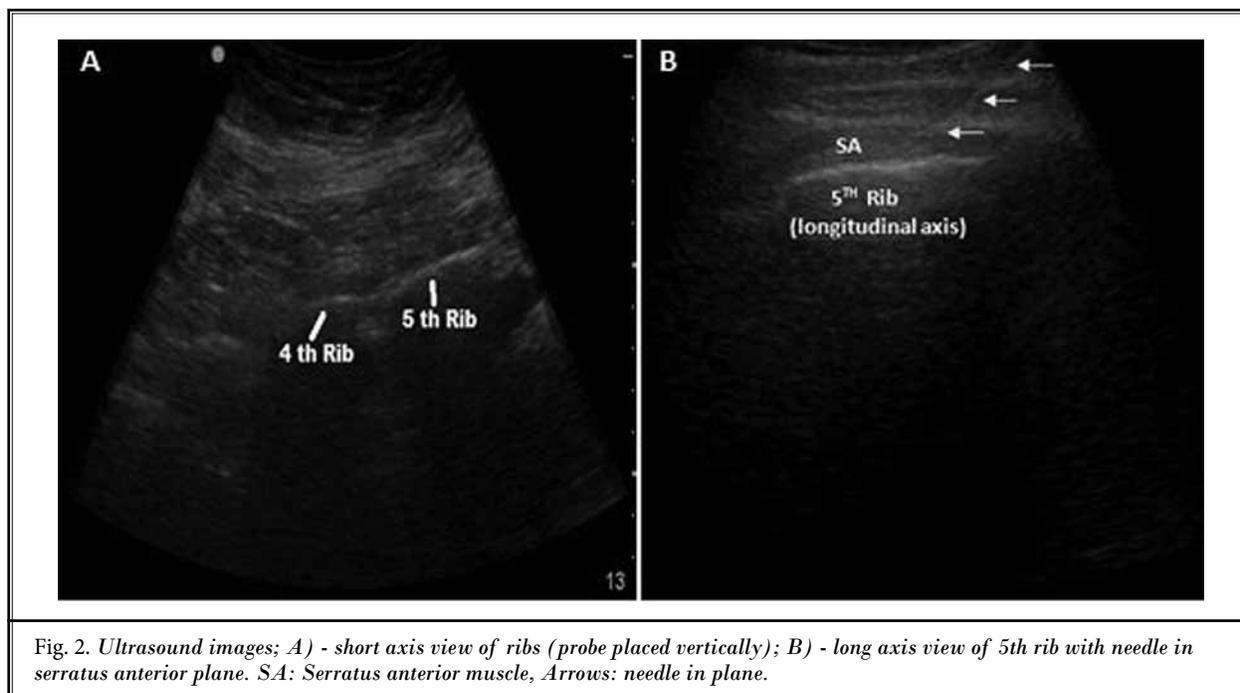


Fig. 2. Ultrasound images; A) - short axis view of ribs (probe placed vertically); B) - long axis view of 5th rib with needle in serratus anterior plane. SA: Serratus anterior muscle, Arrows: needle in plane.

Ultrasound-guided SAP block has recently been described as a regional anesthetic technique to provide analgesia for breast and thoracic wall surgeries (7). SAP block provides analgesia to a hemithorax by blocking the lateral branches of the intercostal nerves (7). SAP block has also been reported to provide analgesia and to facilitate weaning from mechanical ventilation in critical care patients with MRF (8). SAP block is technically simple and can be safely performed as a bedside procedure.

Our patient was morbidly obese and had obstructive sleep apnea. He developed MRF (4th to 7th ribs) following a traffic accident and presented to us with severe pain and difficulty in breathing. He had already received NSAIDs and tramadol with no relief in pain. Opioids were not tried because of a fear of respiratory depression due to associated obstructive sleep apnea (9). A single thoracic epidural steroid injection was recently described in the literature for managing pain in multiple rib fractures (10). Due to the patient's associated morbid obesity, which made placing the thoracic epidural technically difficult, and his uncontrolled blood sugar, we decided to perform the SAP block. On account of the short duration of action of a single shot bupivacaine block (4-8 hours) and the fact that the patient was hospitalized for control of his blood sugar, we opted for a continuous infusion of local anesthetic

– opioid combination. We started with an infusion rate of 7 mL/h (8) and subsequently increased to 12 mL/h the next day because of inadequate blockade (Baxter 2C9961 multi-rate infuser LV 5,7,12 with flow rate of 5, 7, 12 mL/h). A low concentration of local anesthetic (0.0625% bupivacaine) for continuous infusion was used to minimize the chances of local anesthetic toxicity and motor blockade, if any. The patient reported significant pain relief after 15 minutes of the SAP block and started mobilizing. His breathing significantly improved and he could subsequently undergo chest physiotherapy without pain.

Ultrasound-guided serratus anterior plane block is a simple and effective technique for providing pain relief in unilateral MRF, especially in obese patients who have obstructive sleep apnea.

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