

Ultrasound-guided modified serratus anterior plane block for perioperative analgesia in breast oncoplastic surgery: A case series

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ABSTRACT

Ultrasound-guided serratus anterior plane (SAP) block has been described to provide complete anaesthesia and analgesia to the lateral thoracic wall. Its use has been recently reported in breast reconstruction surgeries. We present a series of 11 patients where ultrasound-guided SAP block was used as part of multimodal analgesia in breast reconstruction surgery using latissimus dorsi (LD) myocutaneous flap after mastectomies. This resulted in excellent analgesia in the perioperative period and minimal use of intravenous analgesics. The SAP block technique described here is safe and also provides effective analgesia in breast reconstruction surgery with LD flap.

Key words: Breast reconstruction, regional anaesthesia, SAP block, ultrasound

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INTRODUCTION

Ultrasound-guided muscle plane blocks have changed the practice of regional anaesthesia for breast surgeries. Different variations of Pecs block have been described with an aim to provide anaesthesia and analgesia of the hemithorax.^[1,2] Recently described serratus anterior plane (SAP) block was designed to target primarily the thoracic intercostal nerves,^[3] providing complete analgesia to the lateral part of the thorax. Compared with Pecs-II, the needle is placed more caudally and posteriorly in SAP block and local anaesthetic (LA) is deposited either superficial or deep to the serratus anterior muscle.^[4] Very few reports are available validating its use in clinical setting for the patients undergoing breast surgery.^[5-7] Recently, we described a modified technique of SAP block, wherein the ultrasound transducer (UST) was placed even more caudally and posteriorly toward posterior axillary line at the level of the 6th rib.^[8]

In this article we describe further modification of serratus anterior plane block where LA is deposited between latissimus dorsi (LD) and serratus anterior muscle (SA) with the patients in lateral position. This

block was used as a part of multimodal analgesia in 11 patients undergoing breast conservation surgery with axillary dissection and reconstruction with LD myocutaneous pedicle flap. Written informed consent for scientific publication was obtained from all the patients.

CASE DESCRIPTION

A total of 11 patients, diagnosed with breast malignancy and scheduled for breast conservation surgery with dissection of the axillary nodes followed by reconstruction using LD myocutaneous pedicle flap in the period between August 2015 to March

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2016 received the modified SAP block as a part of perioperative multimodal analgesia [Figure 1]. The surgical plan consisted of harvesting the LD flap with the patient in lateral position followed by a single crescent incision in the superolateral quadrant of the breast for resection of the tumor as well as axillary lymph nodes dissection. The LD flap was to be harvested using a transverse incision starting at the posterior axillary line at the level of the 7th rib and extending up to the tip of scapula. The surgical analgesia needed in this procedure was over the anterior, lateral, and part of posterior wall of the ipsilateral chest. We considered administering modified SAP block through posterior approach with an intention of providing analgesia to the ipsilateral chest wall along with blocking the plexus formed by the thoracodorsal nerve in the plane between SA and LD.

Same anaesthesia protocol was followed in all the patients, which included induction with intravenous (i.v.) fentanyl 2 mcg Kg⁻¹, propofol 2 mg Kg⁻¹, and rocuronium 0.9 mg Kg⁻¹, securing the airway with a properly placed endotracheal tube of adequate size, maintenance of anaesthesia with inhaled desflurane (one minimum alveolar concentration, MAC) in air oxygen mixture with an FIO₂ of 40% and muscle relaxation with i.v. infusion of atracurium 0.5 mg/kg/h. Patients were ventilated to normocapnoea by anaesthesia ventilator (Drager Primus™). After induction of general anaesthesia, ultrasound-guided modified SAP block (posterior approach) was performed in lateral position, which was also the position required for harvesting the LD flap.

After induction of general anaesthesia the patients were turned laterally with the operative side

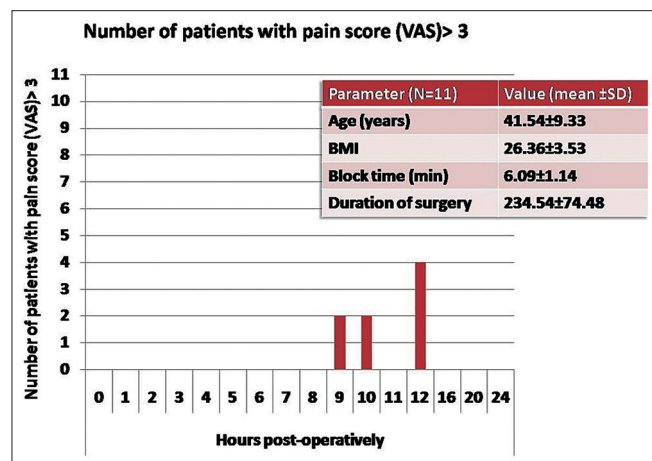


Figure 1: Composite diagram showing demographic characteristics and pain data

upward. The blocks were performed by either of the authors who have combined experience of 21 years of ultrasound-guided regional anaesthesia. After cleaning the area with 2.5% chlorhexidine in alcohol solution, a high frequency (12 MHz) linear array UST (GE Logiq e™, Milwaukee, Wisconsin, USA) was placed between the tip of scapula and the posterior axillary line (PAL) to get view of LD and SA [Figure 2]. An initial scan was performed to note the baseline anatomy [Figure 3].

The UST was placed in the transverse plane, over either sixth or seventh rib (wherever we got the better view of the relevant anatomical structures). LD (lying superficial) and SA (lying deep just above the ribs) could be identified here [Figure 3]. The thoracodorsal artery was identified at the onset of scanning and care was taken to avoid it, while a 19 G Tuohy needle was inserted in plane from posteromedial to anterolateral direction, toward PAL till it reached the plane between LD and SA. Placement of the needle tip was confirmed by hydrodissection. After confirming negative aspiration, 25 mL of 0.25% levobupivacaine was injected [Figure 4].

To ensure optimal ergonomics, for right-sided surgery the anaesthetist performing the block should stand on the right side, at the head end, with the ultrasound machine on the left side, toward the foot end, and the



Figure 2: Performing LD block: patient position, UST position, and ergonomics. (a) Patient in lateral decubitus, with sterile preparation of the block area, note: the arrow (skin marking) represents the tip of the scapula, and the spindle the intended incision marking. (b) UST held in transverse plane overlying the rib and the block needle approaches from medial to lateral direction. (c) Ergonomics: The operator stands at the head end, with UST in left hand (for a right sided block), and needle in right hand, while the ultrasound monitor is placed on the other side, so that the operator can have a clear view of both the block area and the screen at the same time

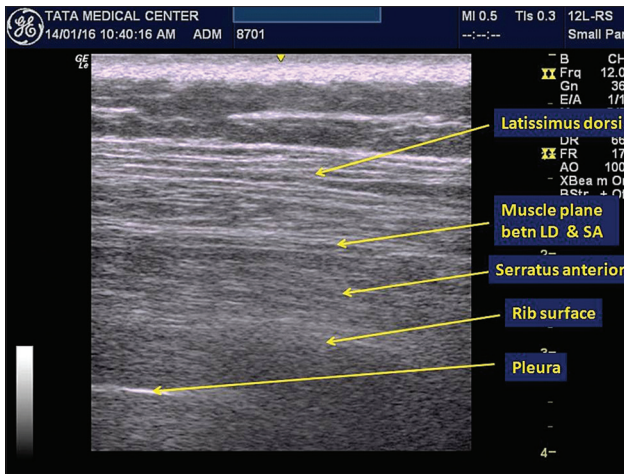


Figure 3: Initial ultrasound scan to note the sonoanatomy

reverse for left-sided surgery, i.e., standing toward the foot end of the patient and the machine kept toward the head end. This is preferable for the right-handed anaesthesiologist as the left hand is used to stabilize the UST and the right hand is used for needle insertion [Figure 2].

The surgical incisions were made after about 20 min from the administration of the blocks.

Mean procedure time for the block was 6 min and average duration of surgery was 234.5 min [Figure 1]. None of the patients required any supplemental opioid analgesic during the entire intraoperative period as assessed by their haemodynamic status. At the end of the surgery, the trachea was extubated and the patient shifted to post anaesthesia care unit for observation for 1 h and then shifted to surgical ward. All the patients received 1 gm of i.v. paracetamol 6 hourly. Postoperative pain was assessed by hourly visual analog scale (VAS) score till first 12 h followed by 4 hourly till 24 h postoperatively. Pain (VAS) more than 3 was treated with 3 mg of i.v. morphine bolus followed by i.v. patient controlled analgesia (PCA) with morphine, set to deliver bolus of 1 mg, at lockout interval of 5 min, no background infusion and maximum limit of 10 mg/h.

All the patients were pain free till 9 h after surgery. VAS score of more than 3 was noted first on the 9th h and 10th h postoperatively in two patients and in another four patients it was noted on the 12th h. They were administered 3 mg of i.v. morphine bolus followed by i.v. PCA. None of the patients required any more morphine through the PCA. After the patients were allowed orally, paracetamol 1 gm PO was given 6 h for

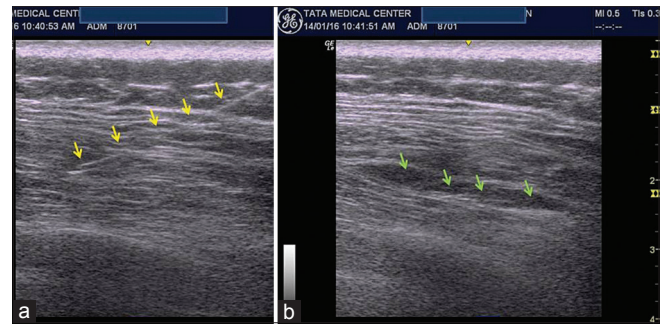


Figure 4: Ultrasound image of LD block: (a) The block needle (yellow arrows) enters the muscle plane. (b) The drug is injected in the plane, separating two muscle layers (green arrows)

another 48 h. All the patients were discharged from the hospital on the 5th postoperative day. Their overall experience with the pain control was satisfactory.

DISCUSSION

SAP block has been described recently as injection of LA in mid axillary line at the level of the 5th rib either superficial or deep to the SA muscle. The intention is to block the thoracic intercostal nerves to provide complete analgesia of the lateral part of the chest.^[4] There are some clinical reports validating its use in breast surgeries.^[5-8] Although SAP block affects the long thoracic nerve of bell supplying SA but there is no mention of blocking the thoracodorsal nerve supplying LD. The thoracodorsal nerve is the sole nerve that supplies LD and forms a plexus between SA and LD.^[9-11] Recently, we reported a modified SAP block technique for breast reconstruction surgery.^[8] In this technique, the UST was placed at posterior axillary line at the level of 6th rib, mainly targeting the plexus formed by the thoracodorsal nerve between LD and SA.

We went a step further and administered the block in lateral position, which is the position required for harvesting the LD flap. We believe this approach is more convenient compared to the previously described one^[8] in the supine position, wherein it was difficult to visualize the ribs and the intended muscle plane, particularly in patients with large breast, whereas in the posterior approach the entire soft tissue of the breast is far away from the UST and the needle, making it easier to image the relevant anatomy and advance the needle. As this posterior extension of SAP block is dedicated to breast reconstruction surgery using LD flap, and the intended muscle plane is between LD and SA, we call this “LD block.” We found that the “LD block” was easy to perform with a high efficacy

and no complication in our case series. The average time required to perform the block was similar to entry level muscle plane blocks such as the transversus abdominis plane block.

“LD block” is an innovative technique that can provide excellent postoperative analgesia in breast reconstruction surgery. However, this technique needs further validation through randomised clinical studies.

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Conflicts of interest

There are no conflicts of interest.

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