

Brief Commentary



Serratus Anterior Plane Block: A New Analgesic Technique for Post-Thoracotomy Pain

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Pain following thoracotomy is of moderate to severe nature. Management of thoracotomy pain is a challenging task. Post thoracotomy pain has acute effects in the post operative period by affecting respiratory mechanics, which increases the morbidity. Poorly controlled thoracotomy pain in the acute phase may also lead to the development of a chronic pain syndrome.

A young male patient underwent esophagectomy and esophago-gastric anastomosis for corrosive stricture of the esophagus. Epidural analgesia is standard of care for patients undergoing thoracotomy. Due to hypotension and fluid losses following surgery, he was maintained on intravenous sedato-analgesia during postoperative mechanical ventilation. The thoracic epidural catheter which was placed pre-operatively, had developed blockage during the hospital stay. However, during weaning from ventilation and sedation, he indicated severe pain in the thoracotomy incision. The pain was severe enough to impair tidal breathing.

We wanted to evaluate the efficacy of the serratus anterior plane block in the management of thoracotomy pain. The usefulness of this block has been discussed in the management of pain of rib fractures and breast surgeries. Despite the hypothesis of its usefulness in causing anaesthesia of the hemithorax, there are no available reports of clinical use for pain relief following thoracotomy.

We performed the serratus anterior plane block under ultrasound guidance and placed a catheter for continuous infusion of local anaesthetic and opioid. The patient had significant pain relief following a single bolus of the drug. The infusion was started thereafter, which provided excellent analgesia and facilitated an uneventful recovery. Here, we describe the successful management of thoracotomy pain using the serratus anterior plane block.

Key words: Serratus anterior plane block, post-thoracotomy pain

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Providing analgesia for patients undergoing thoracotomy has always been challenging. Providing effective analgesia in the acute postoperative period is imperative not only to relieve postoperative pain but also in reducing the pulmonary complications associated with thoracotomy. Another aspect in management of acute thoracotomy pain is the role of a pain physician to prevent chronic post-thoracotomy pain syndrome, which is a well-established clinical entity (1,2). It has been found best to control early postoperative pain in order to prevent chronic sequelae (3,4).

A 21-year-old man with corrosive stricture of the esophagus was operated on for transthoracic esopha-

gectomy with gastric pull up and esophagogastric anastomosis. He had no other co-morbidities. A thoracic epidural catheter was placed preoperatively for postoperative analgesia. The esophagectomy was completed and the anastomosis was done through a right thoracotomy incision from below the nipple to the anterior axillary line.

He was ventilated for 2 days postoperatively in order to achieve good lung expansion. During this period in the ICU, he was hypotensive, owing to major fluid shifts and early sepsis requiring inotropic support. In view of the hypotension and elective ventilation, the epidural infusion was not started. He received an infusion of midazolam + fentanyl for postoperative

analgesia and sedation. On postoperative day 3, the patient's general condition and vital parameters improved; he was expected to be extubated.

However, during weaning from sedation and ventilation, it was noted that he was unable to generate adequate tidal volume and was tachypneic. On questioning, he indicated that the pain was more over the right chest than in the abdomen. The epidural could not be activated because of blockage. It was not relieved by repeated saline flushing. Intravenous paracetamol 1 gram every 6 hours, diclofenac 75 mg every 12 hours, and tramadol 50 mg every 8 hours were given. Despite these measures, he indicated a static pain on the visual analogue scale (VAS) of 90 mm in the chest and 30 mm in the abdomen. Dynamic pain reported was 100 mm in the chest. The patient also had mild coagulation derangement with PT international normalized ratio (INR) of 1.8 due to which placement of an epidural or paravertebral catheter was deferred.

We therefore decided to administer a serratus anterior plane block (SAP). After obtaining written informed consent, we performed the SAP block with a 19 French catheter via an 18-gauge Tuohy needle under ultrasound guidance. A bolus dose of 6 mL of 1% lignocaine was given, followed by a continuous infusion

of 0.1% bupivacaine and 1 microgram/mL of fentanyl at 7 mL/hour. The extent of anaesthesia was tested using loss of sensation to pinprick. The region covered the incision site as seen in the picture (Figs. 1, 2).

The static VAS dropped to 10 mm and dynamic VAS to 20 mm on the next day. He had significant improvement in tidal volume and could be extubated. Deep breathing exercises were started on postoperative day 3. The infusion was kept in-situ for a total of 6 days, then tapered gradually and stopped on postoperative day 9. Subsequent visits also revealed that he was pain free with a dynamic VAS of 10 mm. The sepsis resolved and the patient could participate well with his chest physiotherapist. There were no complications of the block despite the deranged coagulation parameters. The patient had an uneventful recovery and was discharged on postoperative day 14 from the hospital.

Patients undergoing thoracotomy experience moderate to severe pain (1). As a consequence of this pain, many deleterious effects occur. These patients reflexively restrict their chest movements in order to minimize pain. Owing to this, pulmonary function is reduced with a higher predisposition for pooled secretions and pneumonia. Also, poor control of pain in the peri-operative period in thoracotomy patients can give rise to



Fig 1. *Serratus anterior plane continuous infusion.*



Fig 2. *Extent of sensory loss.*

the occurrence of a chronic pain syndrome (1,2). Post-thoracotomy pain syndrome has been well known to occur and can be very difficult to treat. Hence, management of acute pain takes high priority in these patients.

Analgesic options for thoracotomy are various with each having their own merits and demerits. Thoracic epidural is said to be the gold standard for management of thoracotomy pain (5). Other options include paravertebral block, interpleural block, intrathecal opioids (6-10). Most of these invasive neuraxial techniques demand normal coagulation parameters to be present. Our patient had deranged coagulation parameters due to sepsis which compelled us to think of less invasive techniques. The SAP block was done under ultrasound guidance in the mid-axillary line at the level of the fourth rib and the catheter was placed superficial

to the serratus plane. The patient expressed relief in pain within 10 minutes of being given the bolus of local anaesthetic.

Pain following thoracotomy is chiefly due to rib retraction, and damage to the serratus/intercostal muscles and intercostal nerves (1,10,11). A SAP block addresses both these aspects. SAP block has been mentioned in previous studies for management of rib fractures and breast surgeries (12,13). However we are the first to report the use of this block in management of thoracotomy pain. Larger studies may be required to validate its introduction into routine clinical practice. However we conclude that the SAP block is very easy to perform and provides excellent analgesia in patients undergoing thoracotomy with minimal side effects.

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