Indian Journal of Clinical Anaesthesia 2022;9(4):157–159

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Indian Journal of Clinical Anaesthesia

Journal homepage: www.ijca.in

Letter to Editor

# Ultrasound-guided PICS (pleural instillation, intercostal nerve, and serratus anterior plane) block for uniportal video-assisted thoracoscopic surgery in a high-risk patient

**Rinku Prajapati**[1], **Tuhin Mistry**[2,*], **Kartik Sonawane**[2]

[1]*Dept. of Anaesthesiology, Global Hospitals, Mumbai, Maharashtra, India*
[2]*Dept. of Anaesthesiology, Ganga Medical Centre & Hospitals Pvt Ltd, Coimbatore, Tamil Nadu, India*

ARTICLE INFO

*Article history:*
Received 18-11-2021
Accepted 04-12-2021
Available online 12-02-2022



Dear Editor,

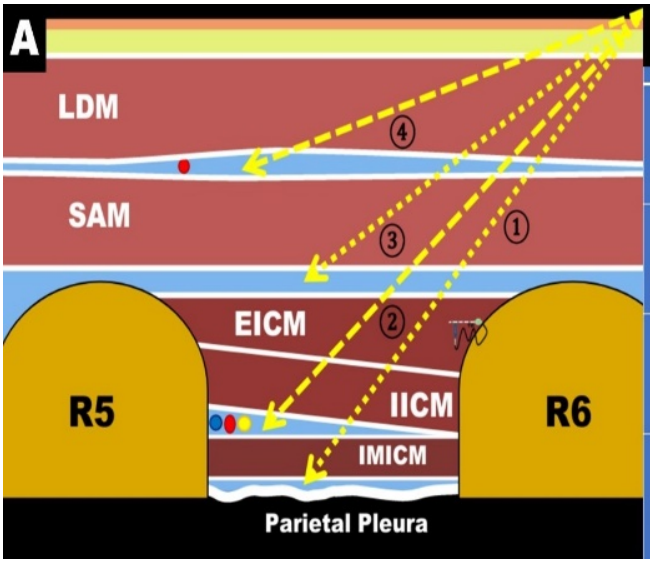
Video-assisted thoracoscopic surgery (VATS) is associated with moderate-to-severe postoperative pain.[1] Adequate analgesia expedites recovery and reduces potential pulmonary complications. Regional anesthesia/analgesia (RA) techniques used in VATS include local infiltration, intercostal nerve (ICN) block, pectoral nerve blocks (PEC I and II), serratus anterior plane (SAP I and II) block, thoracic epidural, thoracic paravertebral block, or erector spinae plane block.[2–4] This case describes the successful application of a novel ultrasound-guided PICS (pleural instillation, intercostal nerve, and serratus anterior plane) block as a sole anesthetic technique to facilitate uniportal VATS in a high-risk geriatric patient. The patient and her relatives provided informed written consent for this procedure and publication of this letter.

A 73 year-old-lady was admitted with a history of fever, chills, and right-sided chest pain for seven days. She was on medication for hypertension and diabetes mellitus. She was on maintenance hemodialysis three times a week with an in situ peritoneal catheter for chronic kidney disease. She also had a recent history of aphasia due to an acute ischemic stroke following the Covid-19 infection. She also underwent peripheral angioplasty for arterial thrombosis of the lower extremities and started on 2.5 mg of apixaban twice daily. It was stopped 48 hours before surgery. Clinically she had tachycardia, tachypnea and her echocardiography showed an ejection fraction of 25%, a right ventricular systolic pressure of 45 mmHg with dilated inferior vena cava. Laboratory tests showed hemoglobin 8.3 g/dL, white blood cell count 15400/cumm, and secondary fibrinolysis on thromboelastography. High-resolution computed tomography of the chest showed massive pleural effusion with collapsed right lung, mediastinal shift to the left, cardiomegaly, and mediastinal lymphadenopathy. She had undergone ultrasound-guided thoracentesis several times in the past due to recurrent pleural effusions. She was scheduled for diagnostic thoracoscopy, therapeutic thoracentesis, and pleural biopsy.

Standard monitors were attached inside the operating room, and an intravenous cannula was secured in the right hand (avoiding the left hand with arteriovenous fistula). An intravenous fentanyl 40 $\mu$g and paracetamol 1 gm were administered, followed by oxygen supplementation using Hudson mask at 4 L/min flow. After placing the patient in the left lateral position, a high-frequency linear array transducer (Sonosite HFL 38xp/13–6 MHz; Fujifilm SonoSite Inc., Bothell, WA, USA) was placed in oblique transverse orientation along the midaxillary line at the level between the fifth and sixth ribs. The latissimus dorsi

* *Corresponding author*.
*E-mail address*: tm.tuhin87@gmail.com (T. Mistry).

https://doi.org/10.18231/j.ijca.2022.031




B

| 'PICS' block | Target area/nerve | Position of the needle tip | LA Volume |
|---|---|---|---|
| ❖ First injection: Pleural instillation | • Parietal pleural (costal pleura) innervations | The plane between the innermost ICM and parietal pleura | 7 ml |
| ❖ Second injection: ICN block | • Fifth ICN | The plane between internal ICM and innermost ICM adjacent to the intercostal artery | 3 ml |
| ❖ Third injection: Deep SAP / SAP II block: | • Lateral cutaneous branches of intercostal nerve | The plane between SAM and external ICM or rib | 10 ml |
| ❖ Fourth injection: Superficial SAP/SAP I block: | • Thoracodorsal nerve<br>• Nerve to serratus anterior (long thoracic nerve) | The plane between LDM and SAM | 15 ml |

**Fig. 1: A: Schematic representation of ultrasound-guided PICS block;** LDM = latissimus dorsi muscle, SAM = serratus anterior muscle, EICM = external intercostal muscle, IICM = internal intercostal muscle, IMICM = innermost intercostal muscle, R5 = fifth rib, R6= sixth rib, dashed lines = needle trajectory, blue area = local anesthetic, ① = parietal pleural instillation, ② = intercostal nerve block, ③ = SAP II block, ④ = SAP I block; B: Components of ultrasound-guided 'PICS' block; LA=local anesthetic, ICM = intercostal muscles, ICN = intercostal nerve, SAP = serratus anterior plane

muscle (LDM), serratus anterior muscle (SAM), intercostal muscles, ribs, and pleura were identified on the ultrasound image. A 23G 80-mm nerve block needle was inserted in the in-plane technique from the caudal-to-cephalad direction. Local anesthetic (LA) solution (10 ml of 2% lignocaine-adrenaline + 15 ml of 0.5% levobupivacaine + 10 ml of 0.9% saline + 8 mg of dexamethasone) was deposited over various planes of PICS block after negative aspiration. The PICS block was performed in a deep-to-superficial manner through a single needle entry (Figure 1 A). It consists of four injections (Figure 1 B): parietal pleural instillation, intercostal nerve block, SAP I, and SAP II. The sensory assessment of the block was performed after 15 min using a spirit-soaked gauze piece and a blunt-tipped needle. After confirming the complete sensory blockade over T3-T7 dermatomes, the surgeon inserted a 10 mm trocar into the fifth intercostal space along the midaxillary line. Approximately 800 ml of pleural fluid was drained. A pleural biopsy was taken at the end of the surgery, followed by the placement of an intercostal drain. The patient remained comfortable and hemodynamically stable throughout the procedure of 45 minutes duration. Postoperatively, she was kept in a high dependency unit for observation and was pain-free for 24 hours. She recovered well and got discharged after two days.

Various RA techniques have been used to provide surgical anesthesia for VATS in high-risk patients as an alternative to general anesthesia (GA). We used a combination of four different blocks to provide procedure-specific stand-alone RA. As VATS involve access to the pleura from the intercostal spaces in the midaxillary line, the pain-generating components involve (a) skin and subcutaneous tissues (supplied by a lateral cutaneous branch of the intercostal nerve), (b) area above and below the SAM (supplied by the nerve to SAM, thoracodorsal nerve, and intercostal nerves), (c) intercostal muscles (supplied by intercostal nerves), and (d) richly innervated parietal pleura. PICS block targets all innervations of the pain-generating components involved in VATS. The LA instilation over the richly innervated parietal pleura prevented the pain and patient discomfort while manipulating and entering the pleural cavity. This particular painful step required the administration of additional opioids or infiltration by surgeons.[2,3] We avoided thoracic epidural and paravertebral blocks in our patient because of her multiple comorbid conditions. Also, SAP 1 or 2 blocks alone or in combination may not be sufficient to cover all pain-generating innervations. An intercostal nerve block requires injections at multiple levels to cover wide dermatomal innervations. Due to the requirement for comprehensive analgesic coverage involving multiple innervations, procedure-specific combination blocks such as the PICS block is required. Bhardwaj et al.[2] reported a similar combination technique with PEC I, PEC II, and SAP blocks in a high-risk patient for drainage of pleural effusion and a biopsy.

To conclude, the ultrasound-guided PICS block could be a better alternative to GA or other available RA techniques in providing optimal surgical anesthesia and postoperative analgesia, especially in high-risk patients. However, further

clinical trials are warranted.

## Conflicts of interest

None.

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## Author biography

**Rinku Prajapati,** Senior Clinical Associate https://orcid.org/0000-0003-4349-5480

**Tuhin Mistry,** Junior Consultant https://orcid.org/0000-0003-1904-4831

**Kartik Sonawane,** Junior Consultant https://orcid.org/0000-0001-9277-5505

**Cite this article:** Prajapati R, Mistry T, Sonawane K. Ultrasound-guided PICS (pleural instillation, intercostal nerve, and serratus anterior plane) block for uniportal video-assisted thoracoscopic surgery in a high-risk patient. *Indian J Clin Anaesth* 2022;9(4):157-159.