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SURGICAL TECHNIQUES AND INNOVATIONS

Awake Video-Assisted Thoracoscopic Surgery with Erector Spinae Plane Block

Seniyye Ulgen Zengin[1,2] · Meliha Orhon Ergun[1] · Tunc Lacin[3]

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Abstract
Erector spinae plane block has been used for postoperative pain following thoracic surgery as an alternative to epidural block or adjunct to general anesthesia in thoracic procedures. However, its sole use during thoracoscopic surgery without general anesthesia is rare. Here, we report two cases in which erector spinae plane block was successfully used as the only anesthetic method during video-assisted thoracoscopy.

Keywords Erector spinae plain block (ESPB) · Video-assisted thoracic surgery (VATS) · Awake anesthesia

Background

Although general anesthesia with one lung ventilation has been the commonly preferred method for video-assisted thoracic surgery (VATS), recent years witnessed a tendency towards the use of local or regional blockage techniques such as paravertebral, thoracic epidural, and intercostal nerve block, with or without sedation to minimize adverse effects.

Although erector spinae plane block (ESPB) has been utilized for postoperative pain following thoracic surgery alternative to epidural block or as an adjunct to general anesthesia in thoracic procedures, its sole use during thoracoscopic surgery without general anesthesia has been reported rarely [1]. In this report of two cases, we describe its successful use during video-assisted thoracoscopy as the only anesthetic method.

✉ Seniyye Ulgen Zengin
ulgen_t@yahoo.com

[1] Department of Anesthesiology and Reanimation, Pendik Research and Training Hospital, Marmara University Medical Faculty, Istanbul, Turkey

[2] Pendik Egitim Ve Arastirma Hastanesi, Fevzi Cakmak Mah. Muhsin Yazicioglu Cad. No: 10, 34899 Ustkaynarca, Pendik/Istanbul, Turkey

[3] Department of Thoracic Surgery, Pendik Research and Training Hospital, Marmara University Medical Faculty, Istanbul, Turkey

Erector Spinae Plane Block Technique (ESPB)

An ultrasound-guided ESPB was performed on the side of intervention (left or right), in the sitting position. No sedation, using a linear probe (6–13 MHz) the injection site was marked 3 cm lateral to the T5 spinous processes. A 22G block needle (100 mm, B-Braun, Germany) was inserted using in-plane technique and advanced 30° in the caudal direction (Fig. 1). First 1–2 ml saline was injected to separate erector spinae muscle from the transverse process (Fig. 2). Then, 20 ml 0.5% bupivacaine and 100 mg lidocaine 2% were administered (Fig. 3). In both cases dexmedetomidine infusion (0.2 mcg/kg/h) was given to alleviate anxiety. To monitor sedation and pain, bispectral index (BIS) and analgesia nociception index (ANI) were used, which were kept between 80–90 and 55–69 respectively. Dexmedetomidine dose was adjusted accordingly. In addition, both patients received nebulized lidocaine inhalation during the procedure to prevent cough. No other sedative or analgesics other than dexmedetomidine and ESPB were administered during the procedures.

Patient 1

A 54-year-old woman (BMI, 21.5 kg/m^2) with severe dyspnea, chronic cough, impaired pulmonary function, pulmonary hypertension, pulmonary angiography findings of left lobe subsegmental embolism (3 weeks ago) was scheduled for wedge biopsy through VATS with awake anesthesia to differentiate pulmonary embolism

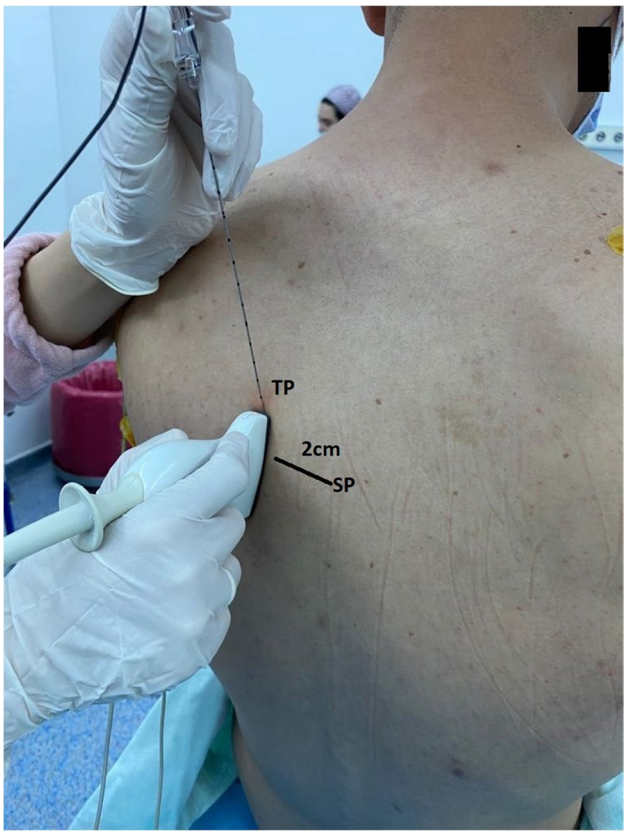

Fig. 1 Ultrasound probe placement and anatomical landmarks (TP: tranverse process, SP: spinous process)

Fig. 2 ESPB ultrasound image of the needle while applying**. A** Needle

or idiopathic pulmonary fibrosis. The patient had persistent but mild occasional chronic cough for 3 months that would not interfere with the procedure. She also had hypertension, atrial flutter, and mild aortic stenosis. Due

Fig. 3 ESPB ultrasound image after injection. **A** Injection side. **B** Transverse process. **C** Erector spinae muscle

to potential risk of extended intubation, multidisciplinary committee of a chest physician, a radiologist, an anesthesiologist, and a pulmonary surgeon recommended awake VATS, but switch to general endotracheal anesthesia was planned when necessary. Fifteen minutes after ESPB, a sensory blockade to cold occurred between T3 and T8 vertebral levels in anterior, lateral and posterior part of the left hemithorax without any hemodynamic change. No local anesthetic infiltration was performed by surgeons. Supplemental oxygen was administered at a rate of 6 L per minute. Few cough incidences occurred during the operation and the procedure was paused for brief periods. The 45-min surgical procedure was well tolerated; the patient was hemodynamically stable, comfortable, and able to talk. Supplemental analgesia was not required. In full lateral position, wedge biopsy was taken from the upper lob and lower lobe. A mild pneumothorax developed and immediately a chest tube was inserted, and pneumothorax was tolerated with minimal coughing.

Patient 2

A 62-year-old man (BMI, 23.5 kg/m^2) had a pulmonary nodule in left lower lobe. Tru-cut biopsy was attempted, but adequate sample could not be obtained, and iatrogenic pneumothorax occurred. He had chronic obstructive pulmonary disease (COPD) and pulmonary functional test findings showed that he is not suitable for general anesthesia. Therefore, awake VATS-wedge biopsy was planned.

ESP block was performed on the left side as described above. Throughout the procedure, the patient was hemodynamically stable, and pneumothorax was tolerated with minimal coughing. Surgery (wedge resection) was performed in full lateral position.

In both cases, at the termination of the procedure, acetaminophen 1 g was administered intravenously, and VAS was 0 while transferring to the recovery room. Six hours after the operation, both patient received an additional dose of intravenous acetaminophen since VAS was above 2. Both were content with the anesthesia. VAS was monitored for 48 h after the operation and additional analgesia was given if VAS ≥ 4. In the first 24 h, both patients received three doses of 150 mg tramadol, three doses of 1 g intravenous paracetamol, and patient 1 received additional 100 mg ketoprofen. In the second 24 h, both patients received three doses of 150 mg tramadol and three doses of 1 g intravenous paracetamol.

Discussion

In these two cases with respiratory insufficiency who underwent VATS, USG-guided ESPB allowed us to avoid general anesthesia and its possible consequences including the need for postoperative mechanical ventilation. Regional anesthesia has several advantages over general anesthesia including better intraoperative hemodynamic stability, improved postoperative analgesia, reduced surgical stress response, and less side effects. Various studies have established the use of ESPB as the sole anesthetic method for breast surgery [2]; however, such studies in awake VATS are scarce.

ESPB was described as an alternative analgesia technique [3]. ESPB is not only an easy technique with somatic effects, but also has visceral effects. Thus, pain originating from the resected lung tissue as well as from trocar port entry sites can be managed adequately [3].

A previous study [4] reported successful thoracic paravertebral block application in awake VATS; however, three recent studies reported total spinal block as an important complication of paravertebral block applications [5, 6]. In a recent study reported four cases (11.4%) of pneumothorax in the paravertebral block group, whereas no cases were reported in any of the erector spinae plane block groups [7]. These studies indicates us that USG guided ESPB is a reliable method for perioperative anesthesia and analgesia.

Epidural anesthesia requires technical expertise and skill. In addition, it is contraindicated in several conditions including difficult thoracic vertebral anatomy, sepsis, pre-existing neurological disorders, and coagulation disorders [8]. Thoracal epidural anesthesia may lead to complications such as dural puncture, paraplegia, and neurological injury [8]. However, ESPB is comparatively simple to perform with ultrasound guidance.

Conclusion

In conclusion, the utility of thoracic erector spinae plane block as a single anesthetic method for video-assisted thoracoscopy for wedge resection and biopsy seems safe and easy. Erector spinae plane block provides effective analgesia, and it is less invasive when compared to other anesthesia techniques.

Authors' Contributions All authors contributed to the study conception, design, and data collection. The first draft of the manuscript was written by the first author and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability Not applicable.

Code Availability Not applicable.

Declarations

Ethics Approval Local authorities do not require ethical approval for case reports not disclosing private information. However, the study was conducted in accordance with the Declaration of Helsinki.

Consent to Participate Two patients consented to participate in this case study.

Consent for Publication Two patients consented for publication.

Conflicts of Interest The authors declare that they have no conflicts of interest.

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