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CASE REPORT

Thoracic Segmental Spinal Anesthesia for Awake Video-assisted Thoracoscopic Surgery: A Case Report

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ABSTRACT

Awake video-assisted thoracic surgery (VATS) using thoracic spinal anesthesia is a promising alternative to traditional general anesthesia, especially for patients with comorbidities. We report a case of a 72-year-old male with diabetes, hypertension, and coronary artery disease who underwent successful awake VATS for massive pleural effusion. A single-shot T6-T7 spinal injection with isobaric bupivacaine and fentanyl provided effective sensory blockade (T1-T10) without additional sedatives. The procedure was well tolerated, with no complications. Thoracic spinal anesthesia offers simplicity, rapid onset, and the avoidance of intubation-related risks, making it a viable option for selected patients.

Keywords: Awake surgery, pleural effusion, regional anesthesia, thoracic spinal anesthesia

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Introduction

Thoracic surgeries are highly painful procedures with a significant incidence of chronic postoperative pain. Video-assisted thoracic surgery (VATS), considered a minimally invasive technique compared to thoracotomy, has gained increasing popularity due to its advantages, including reduced morbidity, shorter hospital stays, and lower postoperative pain levels.[1] VATS is commonly performed under general anesthesia with one-lung ventilation; however, this approach is associated with numerous potential complications, such as tracheal injury, ventilator-induced lung injury, postoperative residual neuromuscular blockade, hypoxemia, and re-expansion pulmonary edema.[2,3]

To avoid the complications of general anesthesia in VATS procedures, awake surgery under spontaneous breathing is becoming increasingly popular.[4] Awake surgeries have been associated with shorter hospital and intensive care unit stays, lower complication rates, and reduced costs.[2]

Awake VATS procedures conducted without endotracheal intubation typically utilize regional anesthesia techniques combined with local anesthesia and moderate-to-deep sedation. Among regional anesthesia techniques, thoracic epidural anesthesia is the most commonly used and is considered the gold standard for both anesthesia and analgesia in thoracic surgeries. Other techniques, including thoracic paravertebral block, erector spinae block, serratus anterior block, rhomboid block, intercostal nerve blocks, and their combinations, are also utilized.[1,4]

Various regional anesthesia techniques employed in the conduct of VATS procedures are described in the literature. This case report aims to present the successful application of Thoracic Segmental Spinal Anesthesia (TSSA) as a novel approach in an awake VATS procedure.

Case Report

A 72-year-old male patient presented with dyspnea. His medical history included type 2 diabetes mellitus,

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hypertension, coronary artery disease, and a 10-year smoking history. On examination, rhonchi and rales, hypoxia (peripheral oxygen saturation (SpO_2) 89%), and spirometry findings indicating an obstructive respiratory pattern (FEV_1: 58.2% - FEV_1/FVC: 68%) led to a suspicion of chronic obstructive pulmonary disease (COPD). Imaging studies revealed a massive pleural effusion, and the patient was subsequently referred to the thoracic surgery clinic. Upon further evaluation, the patient appeared in a moderately debilitated state, with SpO_2 of 89%, a creatinine level of 2.06 mg/dL, and an ejection fraction of 55% with minimal tricuspid regurgitation on echocardiography. The patient was placed on oxygen therapy and managed with nephrology recommendations. On the third day of hospitalization, as creatinine levels showed improvement, the decision to proceed with surgery was made. Imaging confirmed the presence of a massive pleural effusion, and VATS was planned for both diagnostic biopsy and therapeutic intervention.

On the day of the operation, the patient's laboratory values were within normal limits. However, in preoperative evaluations, the pulmonology department indicated a high risk of postoperative pulmonary complications, and nephrology recommended avoiding nephrotoxic agents. To avoid the potential complications associated with general anesthesia, it was decided to perform the VATS procedure under thoracic spinal anesthesia. The patient was informed about the anesthesia technique, and written informed consent was obtained.

In the operating room, the patient was monitored with electrocardiography, non-invasive arterial blood pressure, and peripheral oxygen saturation. Baseline measurements were as follows: heart rate of 65 beats per minute, blood pressure of 128/64 mmHg, and SpO_2 94% with 2 L/min oxygen support. After ensuring aseptic conditions, a 25G pencil-point spinal needle was introduced into the intrathecal space through a paramedian approach at the T6-T7 intervertebral level. Once cerebrospinal fluid flow was observed, 5 mg of isobaric bupivacaine (Buvicaine 0.5%, 5 mg/mL, Polifarma) and 25 mcg of fentanyl (Talinat 0.5 mg/10 mL, Vem İlaç, Çerkezköy, Türkiye) were administered (Fig. 1).

Approximately five minutes after the procedure, sensory blockade was confirmed between the T1-T10 dermatomes, and the patient was positioned laterally for surgery. Supplemental oxygen was provided throughout the procedure (Fig. 2). Moderate hypotensive episodes occurred at the 5th and 15th minutes post-procedure (83/45 mmHg and 89/44 mmHg, respectively) and were managed effectively with two doses of 10 mg ephedrine. The surgery lasted approximately 1.5 hours, and no additional sedative or anesthetic agents were required.

The patient, who showed no early postoperative complications, was transferred to the ward awake and cooperative. The duration of analgesia lasted approximately 20 hours. At the 20th hour, the patient, reporting pain, was administered 1 g of intravenous paracetamol. The VAS score during the first 24 hours postoperatively was evaluated as 0–3 (min-max). On postoperative day 1, the oxygen requirement resolved, and oxygen support was discontinued. The pleurocan, which had been inserted due to pleural effusion, was removed on postoperative day 1. In the absence of any air leakage, the chest tube was removed on postoperative day 2. On postoperative day 3, the patient was discharged in good health.

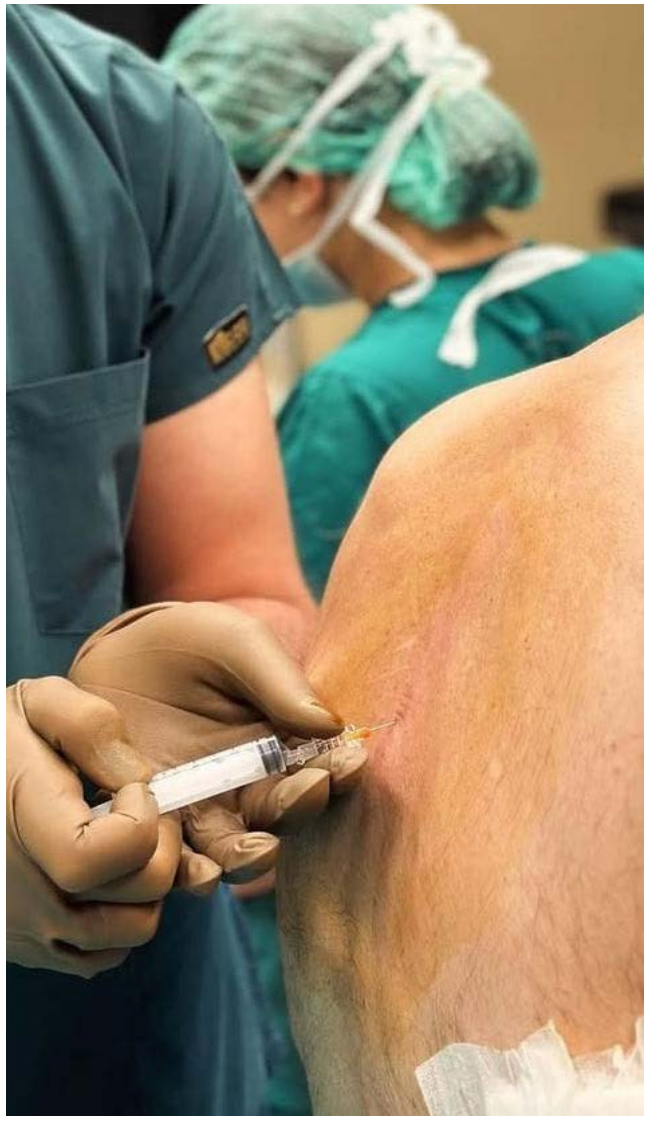

Figure 1. Thoracic spinal anesthesia at T6-T7 level.

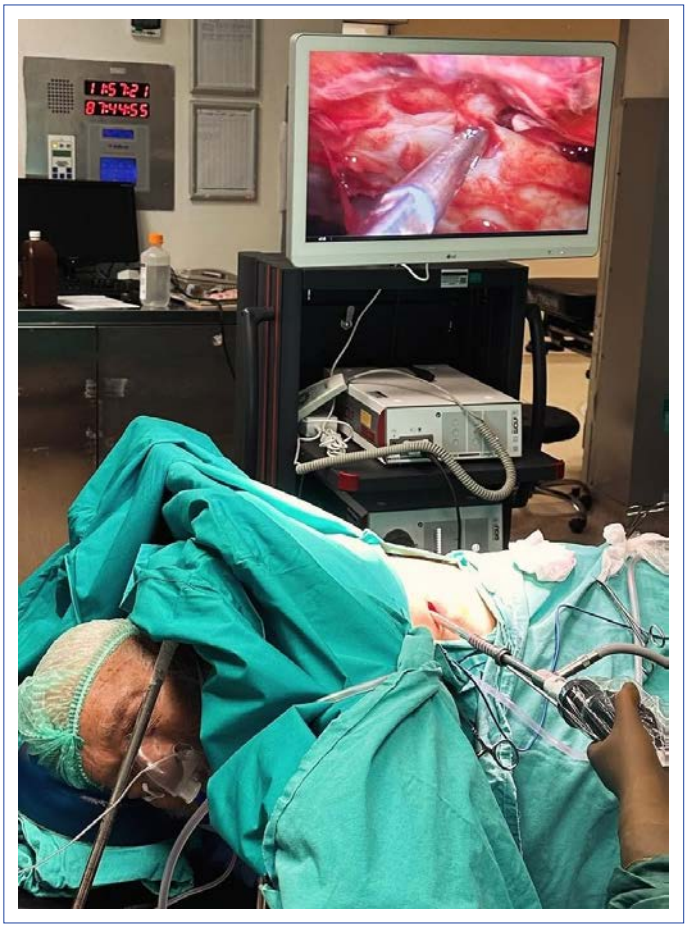

Figure 2. Patient status during surgery.

Discussion

Thoracic spinal anesthesia, which entails administering anesthesia to the thoracic region of the spinal column, has gained attention in various surgical settings due to its unique advantages and specific clinical implications. Research has explored its application in procedures such as laparoscopic cholecystectomy, back lipoma excisions, breast cancer surgeries, and abdominal cancer surgeries, highlighting its effectiveness and associated benefits.[5,6]

Additionally, thoracic spinal anesthesia has been evaluated as a viable alternative to general anesthesia in diverse surgical contexts, including laparoscopic cholecystectomy, cesarean deliveries in cases of severe preeclampsia, and major abdominal surgeries in elderly patients with high surgical risk. Evidence suggests that thoracic spinal anesthesia offers favorable hemodynamic control, minimal postoperative complications, sufficient sensory blockade, stable hemodynamics, and high levels of patient satisfaction, underscoring its suitability for these procedures.[7–9]

Although TSSA offers numerous advantages, its application at the thoracic level raises certain concerns that limit its use. The primary concerns are related to the hemodynamic depressive effects of thoracic sympathectomy and the potential risk of neurological complications arising from the mechanical effects of the spinal needle.[10,11] However, studies have demonstrated that the hemodynamic effects of TSSA are generally mild, and potential complications such as hypotension and bradycardia can be effectively managed with vasoactive agents.[10,11] On the other hand, Imbonelli et al.[12] reported that in thoracic spinal anesthesia procedures, the incidence of paresthesia was 4.7% with a sharp needle and 8.67% with a pencil-point spinal needle. They also noted that these rates were similar to those observed in lumbar spinal anesthesia procedures, and no neurological sequelae were encountered.[6,12]

In awake VATS procedures, various regional anesthesia techniques have been used as primary anesthetic methods. Thoracic epidural anesthesia is considered the gold standard for thoracic surgeries due to its efficacy in providing both anesthesia and postoperative analgesia. However, failure rates of up to 30% have been reported.[13] In a study involving major thoracic surgeries under awake anesthesia, conversion to general anesthesia was required in 11% of cases.[2]

In procedures utilizing local anesthesia with sedation for awake VATS, sedation regimens including midazolam, remifentanil, and propofol infusion were employed, with postoperative pain scores comparable to those of the general anesthesia group.[4] Yanık et al.[14] described the use of a thoracic paravertebral block in two patients undergoing awake VATS. The block was achieved with injections at four different points, and approximately 25 minutes were required to achieve a sensory block. Similarly, Manici et al.[15] employed various interfascial blocks in awake VATS procedures and used moderate sedation during these applications.

In the presented case, neither additional sedative nor analgesic agents were required. Compared to other techniques, thoracic segmental spinal anesthesia offers several advantages, including easier applicability, the ability to perform the procedure with a single injection, shorter procedural times, and a faster onset of sensory blockade.

Conclusion

Thoracic segmental spinal anesthesia appears to be a promising, effective, and safe option for awake VATS procedures. Further controlled studies involving larger patient populations are needed to better define its risk-benefit profile and establish its role in thoracic surgeries.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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