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Case Report

Awake laparoscopic cholecystectomy under thoracal segmental spinal anesthesia and intermediate cervical plexus block: A case series

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ABSTRACT

Laparoscopic cholecystectomy (LC) is the preferred approach for treating gallstone disease because of its minimally invasive characteristics. However, factors such as increased intra-abdominal pressure, pneumoperitoneum, and positional changes present significant challenges in anesthetic management. While LC is typically performed under general anesthesia, thoracic segmental spinal anesthesia and cervical plexus block have emerged as effective alternatives in patients for whom general anesthesia poses a high risk. This study reports the use of thoracic spinal anesthesia combined with cervical plexus block in patients where general anesthesia is considered risky. After obtaining informed consent for awake laparoscopic surgery, anesthesia was managed under appropriate monitoring. The combination of spinal anesthesia and cervical plexus block allowed for the successful completion of the procedure, with minimal complications observed in the early postoperative period. In conclusion, thoracic segmental spinal anesthesia and intermediate cervical plexus block offer a safe and effective alternative for patients at high risk for general anesthesia.

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1. Introduction

Laparoscopic cholecystectomy (LC) is viewed as a less invasive option compared to open surgery, offering benefits like smaller incisions, less postoperative discomfort, and quicker recovery times. It is commonly recognized as the preferred method for treating gallstone disease. However, despite its benefits, the procedure presents significant challenges in anesthetic management, particularly due to hemodynamic changes caused by increased intra-abdominal pressure, pneumoperitoneum, and positional changes [1].

Although LC is typically performed under general anesthesia, studies and case reports also describe its performance as awake under regional anesthesia [1–3]. Shoulder pain, which occurs in awake patients and can compromise patient comfort, as well as increase the need for additional anesthetic and analgesic intervention, also arises postoperatively in patients undergoing general anesthesia. To mitigate shoulder pain in laparoscopic surgeries, various regional techniques and pharmacological agents have been employed [4,5].

This case series aims to report the use of thoracic spinal anesthesia combined with cervical plexus block in patients at our clinic for whom general anesthesia posed significant risks.

2. Case Presentation

The descriptive characteristics of the patients are presented in Table 1.

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Table 1. Descriptive characteristics of patients.

Age	Gender	Risk for general anesthesia	Duration of Surgery (min)	Total dose of ephedrine (mg)	Total dose of analgesic (gr paracetamol)
68	Male	COPD	50	20	1
45	Female	Interstitial pulmoner fibrosis	30	10	0
38	Male	Difficult airway	80	10	2
43	Female	Difficult airway	65	0	0
20	Male	Myotonic Dystrophy	30	10	1
59	Female	History of failed intubation	50	0	2
26	Male	History of anaphlyaxis to intravenous anesthetic agents	35	10	3
63	Male	COPD	40	20	1

COPD: Chronic obstructive pulmonary disease.

The patients, whose descriptive characteristics are specified, were informed about the risks of general anesthesia and the plan for awake surgery under regional anesthesia. Informed written consent was obtained from all patients.

After being brought into the operating room, the patients were monitored with non-invasive arterial blood pressure, electrocardiography, and pulse oximetry. A 20G IV catheter was placed in the cubital region, and crystalloid infusion was initiated. After positioning the patients in the supine position with their heads turned to the opposite side, the midpoint of the sternocleidomastoid (SCM) muscle was identified, and the ultrasound probe was applied to visualize both the SCM muscle, investing fascia and the prevertebral fascia. An echoic 50mm peripheral nerve block needle (UltraplexTM, B.Braun, Melsungen AG, Germany) was used to inject 5-10 mL of 0.25% bupivacaine (Buvicaine 0.5%, 5 mg/ml Polifarma) into the intermediate cervical plexus (Fig. 1).

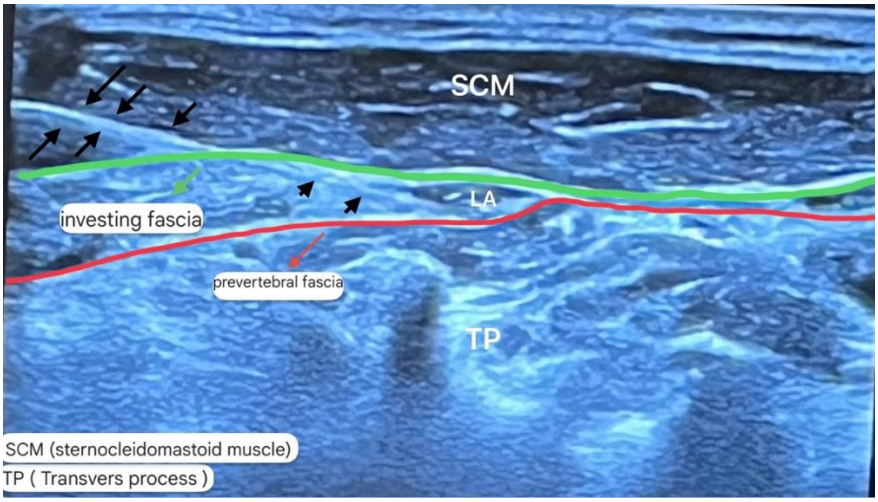

Fig. 1. Ultrasound image of the intermediate cervical plexus block.

Once the patients were seated and sterile conditions were ensured, a paramedian approach was used to access the subarachnoid space through the T7-8 intervertebral space with a 26G pencil-point spinal needle. After observing the flow of cerebrospinal fluid, 7.5 mg of 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 to induce spinal anesthesia. Sensory block was assessed after the procedure using the pinprick test, and sensory block between T4-L1 was confirmed before starting the surgery. Oxygen support was provided, and capnography was used for respiratory monitoring. 0.02 mg/kg midazolam was administered to patients that experiencing anxiety or discomfort. Due to the risk of conversion to general anesthesia caused by failed spinal block, prolonged surgical duration, and surgical complications, difficult airway equipment (e.g., laryngeal mask airway, video laryngoscope) was prepared in the operating room for patients preoperatively assessed as having a difficult airway. For the patient with a history of anaphylaxis, equipment for rapid fluid resuscitation and airway management was prepared. Adrenaline for intravenous use was readily available in the operating room. In case of hypotension (20% or greater decrease in mean arterial pressure compared to the baseline measurement), ephedrine and atropine were planned for bradycardia (heart rate < 50bpm) (Fig. 2).

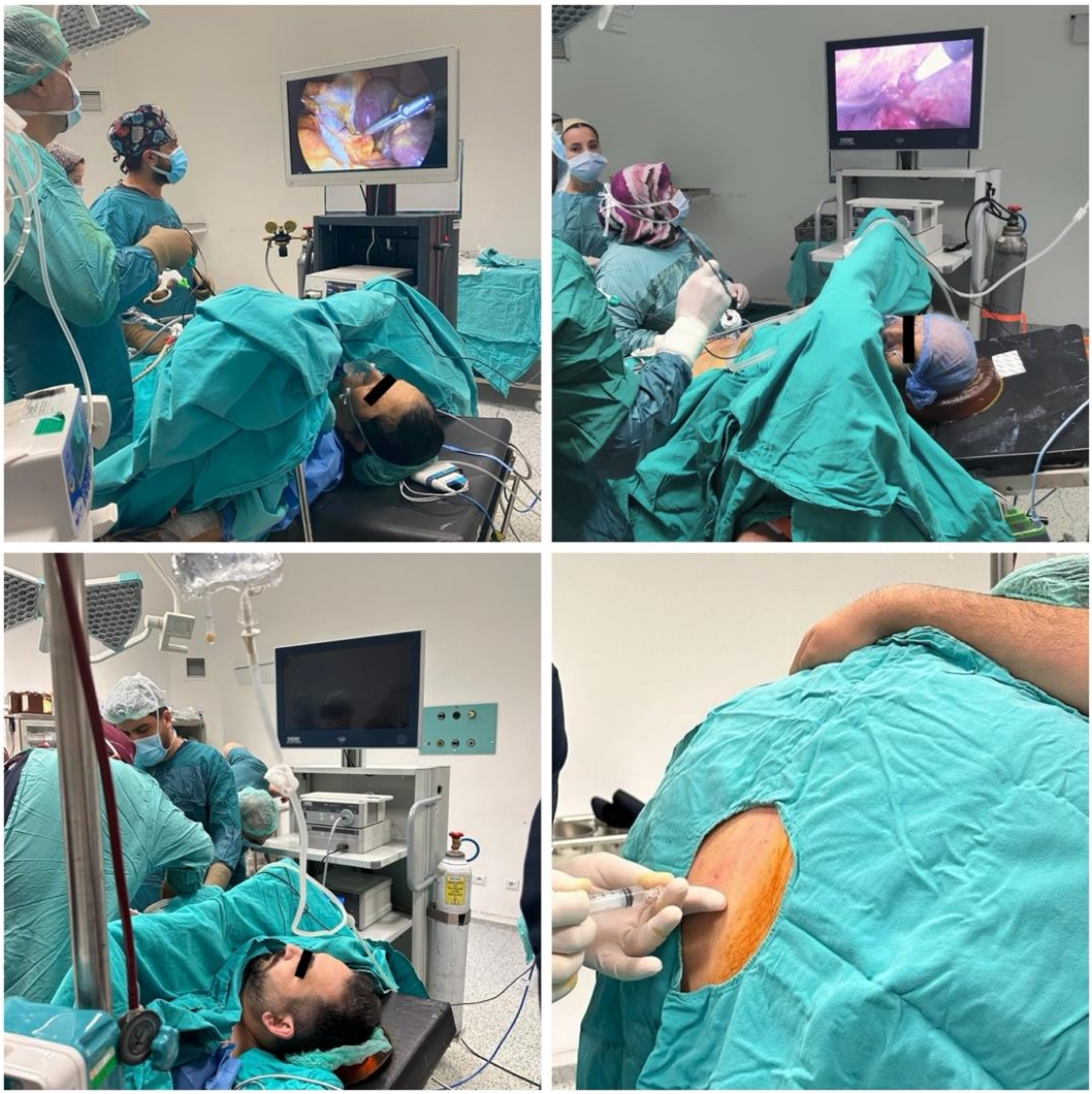

Fig. 2. Intraoperative status of the patients.

The surgery was performed using the standard 3 or 4 port technique. During both the insufflation phase and the surgical procedure, the intraperitoneal pressure was maintained at 8-10mmHg. The anesthesia management was found to be effective and successful in all patients. Mild hypotension was observed early in the postoperative period in all patients, which was controlled with ephedrine (10 mg-20mg). No bradycardia, respiratory depression, or apnea was observed.

Mild shoulder pain was noted in two patients, but no additional analgesic or anesthetic agents were administered. At the end of the surgery, patients were monitored in the recovery room for at least 30 minutes before being transferred to the surgical ward. During the postoperative period, neurological and pain assessments were conducted on the patients. For pain assessment, the Numeric Rating Scale (NRS) was used. Patients with a pain score of 4 or higher during the first 24 hours were administered 1 gram of paracetamol. No complications (such as hypotension, bradycardia, respiratory depression, apnea, back pain, paresthesia, or radiculopathy) were encountered during the first 24 hours of monitoring.

3. Discussion

Thoracic spinal anesthesia has become a viable and effective option for patients at high risk for general anesthesia. It has been safely and successfully utilized in various procedures, such as breast surgeries, abdominal cancer surgeries, nephrectomy, and laparoscopic operations [6]. van Zundert et al. [2] have reported that thoracic segmental spinal anesthesia can be safely and effectively applied in laparoscopic cholecystectomy surgeries. Ellakany [1], in a study comparing general anesthesia and thoracic segmental spinal anesthesia in laparoscopic cholecystectomy, found that the spinal anesthesia group had a shorter discharge time and higher satisfaction rates.

Shoulder pain in laparoscopic surgeries is often attributed to irritation of the phrenic nerve branches arising from the C3-C5 roots. Because cervical plexus blocks can target the cervical roots, they have been used to prevent shoulder pain during laparoscopic surgeries. Kanawati et al. [7], in a case series of awake sleeve gastrectomy, reported that a combination of spinal anesthesia and superficial cervical plexus block was sufficient in

preventing both surgical and shoulder pain. Another study showed that cervical plexus block under spinal anesthesia was effective in preventing shoulder pain during laparoscopic surgeries, with ultrasound-guided blocks proving to be superior to the landmark method [8]. Intravenous dexmedetomidine, used for sedative and analgesic purposes, was compared with cervical plexus block for preventing shoulder pain in laparoscopic surgeries, and it was found that the cervical plexus block was more effective [9]. Although the superficial cervical plexus block is considered easier and safer among cervical plexus blocks, the intermediate cervical plexus block has been shown to provide deeper and more potent analgesia in deep tissues contributing to the visceral distribution of pain [10]. In robotic-assisted laparoscopic prostatectomy, intermediate cervical plexus block, performed alongside thoracic spinal anesthesia, enabled the surgery to be conducted in an awake state [11].

4. Conclusions

In conclusion, we believe that thoracic segmental spinal anesthesia combined with intermediate cervical plexus block provides an effective and efficient anesthetic management option for awake surgery in patients for whom general anesthesia is risky.

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Data Availability
The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate
Not applicable.

Author Contributions
Nezir Yilmaz: *conceptualization, investigation, methodology, patient management, writing – original draft, visualization, supervision.*
Yunus Bozok: *validation, data curation, writing – review & editing.*

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