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Case Report

Cholecystectomy management under dexmedetomidine sedation with thoracic epidural anesthesia in two high-risk geriatric patients: Case reports and literature review

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ABSTRACT

Cholecystectomy management under dexmedetomidine sedation with thoracic epidural anesthesia in two high-risk geriatric patients:Case reports and literature review.

Çağla Yazar, Nedim Çekmen

Thoracic epidural anaesthesia (TEA) is frequently used for anaesthesia and analgesia in today's practice. Although cholecystectomy is a surgical procedure performed under general anaesthesia (GA), many studies in recent years have shown that neuraxial techniques can be used safely. We aimed to present the anaesthesia management under dexmedetomidine sedation with TEA in high-risk patients who underwent laparoscopic cholecystectomy surgeries. Both patients were of geriatric age and had several comorbidities. In patients, we preferred TEA to avoid the cardiorespiratory effects of GA. Preoperative preparation of patients with a multidisciplinary approach, cooperation, and close follow-up is essential in preventing complications.

Keywords: cholecystectomy; dexmedetomidine; geriatric anesthesia; neuraxial anesthesia

Glossary of Terms*: Thoracic epidural anaesthesia (TEA), general anaesthesia (GA), thoracic epidural (TE), body mass index (BMI), electrocardiogram (ECG), transthoracic echocardiography (TTE), ejection fraction (EF), tricuspid annular plane systolic excursion (TAPSE), intravenous (IV), patient-controlled analgesia (PCA), intensive care unit (ICU).*

INTRODUCTION

In today's anaesthesia practice, thoracic epidural (TE) methods are frequently used for intraoperative anaesthesia and postoperative analgesia. Although cholecystectomy is a surgical procedure traditionally performed under general anaesthesia (GA), many studies in recent years have shown that neuraxial techniques can be used safely, especially in patients with significant cardiorespiratory dysfunction[1,2]**.** GA together impairs mucociliary activity, reduces functional residual capacity, and negatively affects respiratory functions. Thoracic epidural anaesthesia (TEA) provides a more stable hemodynamic management than GA and protects the patient from the harmful effects of positive pressure ventilation; it effectively reduces postoperative pain and ambulates patients as early as possible[3]. In these cases, we aimed to present the anaesthesia management under dexmedetomidine sedation with TEA in high-risk patients who underwent open and laparoscopic cholecystectomy surgeries.

CASE REPORTS

A. Case 1

An 89-year-old male (70 kg, 170 cm, body mass index (BMI) 24,2 kg/m2) had a history of chronic pulmonary thromboembolism, dementia, and prostate cancer. The patient was on antihypertensive and anticoagulant therapy. The anticoagulant medication was stopped 3 days before surgery. His presented laboratory parameters were within the normal range. An electrocardiogram (ECG) showed a normal sinus rhythm of 75/min and 1st degree atrioventricular block. In the transthoracic echocardiography (TTE), ejection fraction (EF) of 57 %, tricuspid annular plane systolic excursion (TAPSE) 18, and left ventricular diastolic dysfunction was detected. Bilateral atelectasis and minimally pleural effusion in computer tomography were detected. He had effort dyspnea during the preoperative period. The patient was evaluated by effort capacity class III and mallampati score III. Together with all the comorbidities patient was evaluated with an ASA III score.

After standard monitorization, heart rate was 84/min, blood pressure was 143/65 mmHg, and SpO_2 was 95. An 18 G intravenous (IV) access was provided, and after that, the patient was premedicated with midazolam® and fentanyl®. The epidural space (T5-T6) was identified with the patient in a sitting position using a midline approach and the loss-of-resistance technique. The epidural catheter was inserted approximately 4 to 5 cm into the epidural space (Figure 1).

The patient received a pre-induction TE injection of 0.5 % bupivacaine® (125 mg) after the adrenaline test (50 µg). Deep sedation was given with dexmedetomidine infusion.

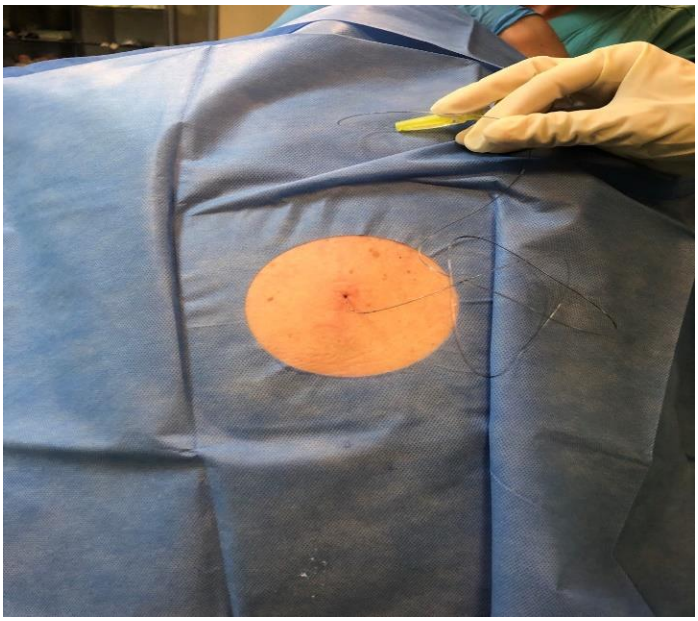

Figure 1. TE catheter insertion

The sensory and motor block were assessed using a pinprick test and the Bromage scale, respectively. When the level of sensory block reached T4, the Bromage scale was 0, and the operation was initiated 20 min after the epidural bolus dose. The patient tolerated the incision well, and nasal oxygen was given to the patient during the surgery. After 26 min of incision, surgery returned to the open cholecystectomy because of adhesive and fibrotic sac (Figure 2).

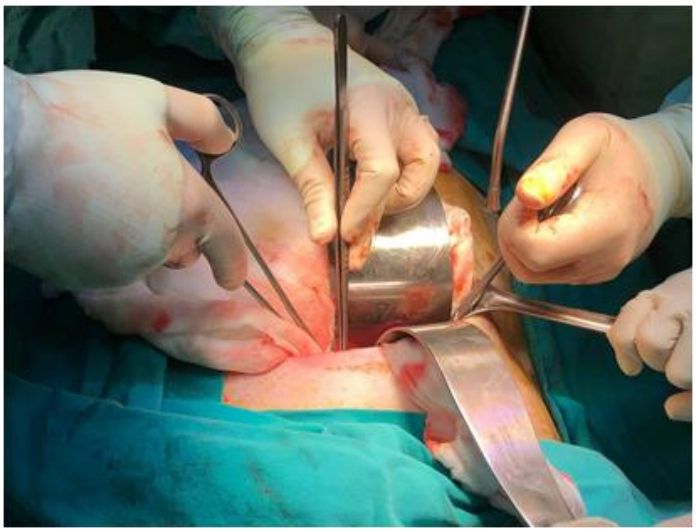

Figure 2. Case 1 open cholecystectomy procedure

The patient received a dexmedothymidine® IV infusion during the surgery, which lasted 115 minutes. The Infusion dose range was titrated according to hemodynamic changes and the Ramsey sedation scale. After the patient was kept in the recovery room, he was discharged to the ward with 0.1% epidural bupivacaine® patient-controlled analgesia (PCA). He was mobilized after the Bromage score was 4 at the postoperative 6th hour. The epidural catheter was removed the following day. The postoperative period was uneventful, and 2 days later, the patient was discharged home.

A. Case 2

A 72-year-old male (105kg, 175 cm, BMI 34,2 kg/m2), who had a history of coronary artery disease, atrial fibrillation (AF), heart failure with low EF, operated prostate cancer, epilepsy, bilateral stenosis of the internal carotid artery and occlusion in the left vertebral artery. The patient was on antihypertensive, anticoagulant, diuretic, antiepileptic, and beta-blocker therapy. The anticoagulant medication was stopped 3 days before surgery. An ECG showed AF of 77/min. In the TTE EF of 23 %, TAPSE 11 global hypokinesia and 2nd-degree tricuspid regurgitation were detected. After preoperative coronary angiography was performed on the patient whom the cardiologist evaluated, the operation was assessed as high risk because of occlusions in the coronary arteries. Furthermore, postoperative ICD insertion was recommended.

He suffered from several comorbidities and had effort dyspnea, limited effort capacity, and cooperation-orientation during the preoperative period. The patient was evaluated by effort capacity class III and mallampaty score II. Together with all the comorbidities patient was evaluated with an ASA IV score**.**

An 18 G IV access and left radial artery cannulation was provided; after that, the patient was premedicated with pheniramine®.

The patient was placed in a sitting position, and the TE catheter was inserted at the T 4-5 intervertebral space under aseptic conditions like case 1 (Figure 1). Bupivacaine 0.5% 25mL injected through the catheter with sensory loss up to T4 dermatome. Dexmedetomidine infusion was titrated to provide bispectral index values between 40- and 60 for deep sedation. In the intraoperative period, the patient was desaturated and ventilated with positive pressure by inserting the airway for 5 minutes, and the dexmedetomidine infusion dose was reduced. Throughout the operation, Bromage score was 1, and Ramsey's sedation score was 6. At the end of the operation, the patient opened his eyes to tactile and painful stimuli and made meaningless sounds, but he was inclined to sleep, and his SpO_2 was between 86-92%. He was transferred to the intensive care unit (ICU) for further examination and close follow-up. His Glasgow coma score was (GCS) 10, and his Apache II score was 19 when he was admitted to the intensive care unit. Since there

was no increase in GCS, diffusion MRI was performed, and acute infarction was observed in the right posteroparietal and temporooccipital regions. Pulmonary CT angiography revealed a thrombus in the right atrium. The patient, whose general condition improved after the treatment, was discharged from the ICU on the second postoperative day and from the service on the fourth postoperative day.

DISCUSSION

The laparoscopic cholecystectomy procedure has become the standard method for treating gallbladder stones because It is less invasive and allows shorter hospital stays, and early ambulation, thus reducing hospital costs. Its adverse effects are mainly related to inflation of the peritoneal cavity, the use of CO_2, and postural changes. Pneumoperitoneum affects hemodynamic parameters because of an increase in systemic vascular resistance and pain due to stretch, leading to intraoperative tachycardia and hypertension[1]. If the intra-abdominal pressure is > 15 mmHg, venous return is reduced due to compression of the inferior vena cava, and hypotension is observed. Therefore, we adjusted the maximum value of intra-abdominal pressure to 12 mmHg in our limited cardiac reserve patient. GA with endotracheal intubation is the most preferred method for laparoscopic cholecystectomy surgery. It facilitates intra-abdominal surgery by providing muscle relaxity and the opportunity to manage hypercarbia due to carbon dioxide pneumoperitoneum[1,2]**.** Besides all these, GA has recently started to be replaced by epidural anaesthesia (EA) because it is associated with significant postoperative complications such as pain, nausea/vomiting, airway trauma, and pressor responses to intubation/extubation and due to pneumoperitoneum, increases myocardial oxygen consumption due to sudden hemodynamic changes, impaired intracerebral perfusion, worse pain control, and neuroendocrine response compared to neuraxial methods[2,3]. EA enables stable hemodynamic and respiratory management in the intraoperative period; It also enables early discharge from the hospital, primarily by reducing opioid use in elderly patients, reducing the incidence of postoperative delirium, and enabling early mobilization and rapid return of bowel movements. Geriatric patients have high morbidity and mortality due to reduced physiological capacities, comorbidities, multiple drug use, cognitive dysfunction, and increased frailty[4]. Comorbid diseases can also be seen frequently in these patients, so all factors should be considered when choosing the anaesthesia method. Our patients were geriatric, high-risk ASA III and IV patients with several comorbidities. In the light of the literature, we planned to combine TEA with dexmedetomidine infusion to protect our patients from the harmful effects of general anaesthesia. TEA is not considered a safe technique. The two main concerns are a greater risk of damaging the spinal cord with the needle du-

ring the dura puncture and ventilatory impairment caused by an extensive thoracic nerve block. During follow-up, we did not observe any ventilatory complications, hypotension, or bradycardia in our patients.

Dexmedetomidine® is a selective α2-adrenergic receptor agonist, sedative, anxiolytic, sympatholytic, and analgesic agent. It also has a neuroprotective role, especially in elderly patients. Hun et al. showed that dexmedetomidine® was effective on postoperative delirium and emergence agitation in elderly patients. They associated this with a stable hemodynamic profile and a decrease in IL-6, a pro-inflammatory agent[5]. We preferred dexmedetomidine® in both cases and we had to adjust the dose due to bradycardia, Ramsey sedation scale, and BIS values in our patients.

In conclusion, TEA is a technique that can be used safely compared to general anesthesia with careful patient selection in abdominal surgeries. Preoperative comprehensive preparation of the patient with a multidisciplinary approach, preparation for resuscitation, cooperation with the surgery team, and close postoperative follow-up are very important in preventing complications.

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