

## Opioid-free Anesthesia Technique in Laparoscopic Hysterectomy: A Case Report

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How to cite: Monika TI, et al, Opioid-free Anesthesia Technique in Laparoscopic Hysterectomy: A Case Report. Jurnal Komplikasi Anestesi. 13(2): 2026.

Receive: July 11, 2024  
Accepted: March 8, 2026  
Publish: March 28, 2026

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### ABSTRACT

**Background:** The use of opioid-free anesthesia techniques is increasingly recognized in efforts to reduce the risk of opioid-related postoperative side effects.

**Case:** This case report describes the use of opioid-free anesthesia technique in laparoscopic hysterectomy in a 50-year-old woman with multiple myomas. The patient had a history of fentanyl allergy and was classified as ASA I. Anesthesia induction was performed with a combination of dexmedetomidine, ketamine, and rocuronium, maintained with sevoflurane, rocuronium, and lidocaine. The patient did not experience any complications during postoperative monitoring.

**Discussion:** This case highlights that an opioid-free anesthesia approach can be safely implemented in patients with opioid allergies. The combination of dexmedetomidine, ketamine, and lidocaine provides adequate analgesia and hemodynamic stability, supporting its role as an effective alternative to opioid-based anesthesia

**Conclusion:** This anesthesia technique demonstrates good pain control without the use of opioids and minimizes opioid-related side effects.

**Keywords:** Opioid-free anesthesia, opioid, laparoscopic hysterectomy, postoperative pain, multimodal analgesia

## INTRODUCTION

The use of opioids in anesthesia practice remains the standard for potent analgesia. However, with the advancement of anesthesia techniques, the implementation of Enhanced Recovery After Surgery (ERAS) has brought positive impacts for patients undergoing surgery. Concerns regarding the risks of respiratory depression, gastrointestinal dysfunction, postoperative nausea and vomiting, pruritus, urinary retention, postoperative delirium, and prolonged recovery associated with opioids have prompted the development of alternative opioid-free anesthesia techniques.<sup>1</sup> One approach that is gaining attention is opioid-free anesthesia technique, which aims to reduce these risks while still providing adequate pain control.

The technique in this case report was performed using a combination of dexmedetomidine, ketamine, and rocuronium during induction and maintained with sevoflurane, rocuronium, and lidocaine. Although there is increasing interest in opioid-free anesthesia techniques, research regarding their effectiveness and safety is still limited. This case report aims to report our experience in implementing opioid-free anesthesia technique in a patient undergoing laparoscopic hysterectomy.

## CASE

A 50-year-old woman, 50 kg, 162 cm, presented for laparoscopic hysterectomy due to abnormal uterine bleeding caused by multiple myomas. The patient had experienced heavy and prolonged menstrual bleeding for the past six months, leading to anemia with a hemoglobin level of 8 g/dL. Physical examination revealed no abnormalities. Mallampati score was 1. The patient had no comorbidities but had a history of allergy to fentanyl. Prior to surgery, the patient was optimized with a blood transfusion of 450 ml packed red blood cells (PRC). Preoperative electrocardiogram, chest x-ray, and laboratory tests showed no abnormalities. The patient was classified as ASA I and scheduled to undergo the procedure under general anesthesia. Before anesthesia administration, the patient was

asked to consent to undergo general anesthesia without opioid administration.

Upon arrival in the operating room, the patient received preemptive analgesia with intravenous paracetamol 1 g drip and was induced with a dexmedetomidine loading dose of 1 mcg/kg over 10 minutes, followed by a maintenance dose of 0.4 mcg/kg/hour, combined with a bolus of ketamine 20 mg. Once the patient was confirmed to be asleep, rocuronium 40 mg intravenously was administered. Oxygenation was ensured, and endotracheal intubation was performed. Following induction, the patient experienced hypotension and bradycardia but responded to a bolus of 10 mg ephedrine. Anesthesia maintenance was achieved with sevoflurane at 0.5 minimum alveolar concentration (MAC) along with a combination of rocuronium at 0.02 mg/kg/minute and lidocaine at 1 mg/kg/hour.

The patient underwent the procedure for 3 hours with a total administration of 500 ml of crystalloid fluid and a total blood loss of 200 ml. Dexmedetomidine administration was discontinued upon laparoscopic gas deflation. After the procedure, the patient was given sugammadex 2 mg, granisetron 3 mg, and parecoxib 40 mg. Extubation was performed once tidal volume and respiratory rate were achieved for approximately 10 minutes. The patient was monitored in the recovery room for 60 minutes. During the 0 to 6 hours postoperative period, the patient's VAS score

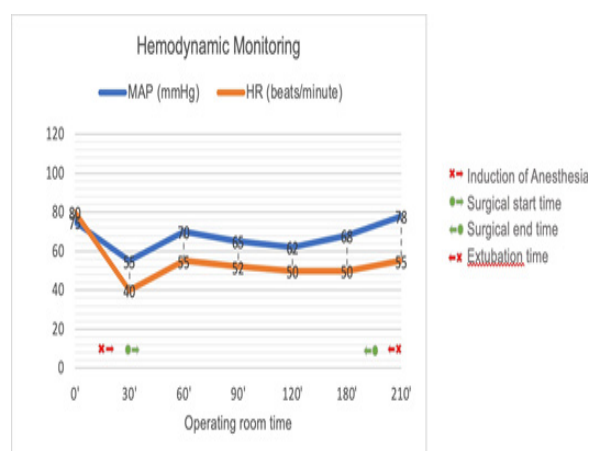


Figure 1. Patient's Hemodynamic Monitoring in Operating Room

was 0. From 12 to 18 hours postoperative, the VAS score was 1. At 24 hours postoperatively, the VAS score was 2. The patient began drinking water and was able to mobilize to the toilet. On the second postoperative day, the patient's analgesic regimen was changed to oral medications, comprising etoricoxib 120 mg once daily and paracetamol 1 g three times daily, and the urinary catheter was removed. The patient was discharged on the third postoperative "the postoperative course reflected effective pain control.

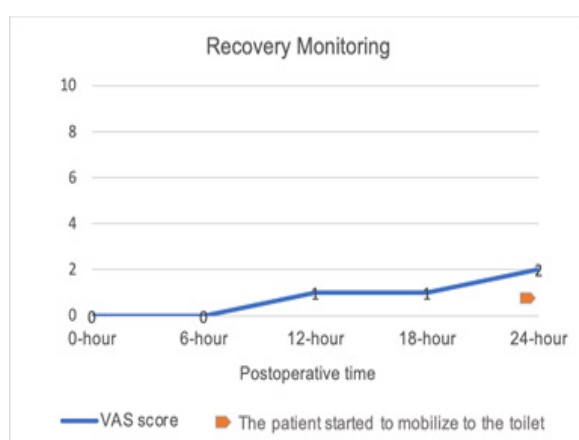


Figure 2. Patient's Recovery Monitoring

## DISCUSSION

Opioid-free anesthesia technique is a method in which no opioids are administered through any route, including systemic, neuraxial, or tissue infiltration during the intraoperative period. Known nonopioid analgesic strategies include the use of acetaminophen, nonsteroidal anti-inflammatory drugs or specific cyclooxygenase-2 inhibitors, and nonpharmacological supports. Commonly considered adjunctive analgesics include steroids, gabapentinoids, intravenous lidocaine infusion, and ketamine.

The paradigm of opioid-free anesthesia involves administering several nonopioid analgesics and adjunctive medications, along with infusions of dexmedetomidine, magnesium, and  $\beta$ -blockers, in various combinations.<sup>2</sup> In this case, we chose to use a combination of dexmedetomidine and ketamine for anesthesia induction, followed by maintenance using

sevoflurane, rocuronium, and lidocaine. This decision was based on considerations to avoid opioid use due to the patient's history of allergy to fentanyl.

The anesthesia induction proceeded smoothly, although the patient experienced hypotension and bradycardia post-induction, which were managed with ephedrine administration. Dexmedetomidine acts as an  $\alpha_2$  receptor agonist, exerting sedative and anesthetic effects by activating G protein in the brainstem and resulting in the inhibition of norepinephrine release. These unwanted side effects include an increased risk of hypotension and bradycardia during surgery, as well as prolonged sedation effects postoperatively.<sup>3</sup>

Ketamine, as a co-induction agent in intravenous anesthesia, is valued for its analgesic properties and its ability to stabilize hemodynamics. Its mechanism of action involves the inhibition of NMDA receptors, opioid receptors, muscarinic receptors, and voltage-sensitive calcium channels, particularly within the dorsal horn neurons of lamina I and lamina V. Ketamine has minimal hemodynamic changes due to its sympathomimetic effects on the sinus node, thereby reducing hemodynamic depression. In this case, ketamine was administered as a single dose, and the patient did not exhibit any side effects.<sup>4</sup>

Ideally, objective nociceptive monitoring is required to assess the pain response of patients under hypnosis or paralysis. In conscious individuals, nociceptive stimuli elicit hemodynamic responses (tachycardia and hypertension), changes in ventilation (hyperventilation), and behavioral responses (withdrawal), in addition to discomfort. Under adequate hypnosis (BIS 40-60) and paralysis, tachycardia and hypertension serve as clinical indicators of inadequate antinociception.<sup>5</sup> This forms the basis for nociceptive monitoring during the use of opioid-free anesthesia techniques in this case report.

During the monitoring period, the patient's postoperative condition reflects effective pain management, as evidenced by Visual Analog Scale (VAS) scores ranging from 0-1 in the initial hour post-surgery and 1-2 in the subsequent

hour during coughing. Effective postoperative pain control is crucial for patient comfort, optimal recovery, and the prevention of chronic postoperative pain.

Furthermore, there were no postoperative complaints of nausea and vomiting reported by the patient. This indicates that the anesthesia regimen and postoperative pain management have been successful in reducing the risk of side effects such as postoperative nausea and vomiting, which are often associated with the use of opioids and laparoscopic procedures due to the effects of intraperitoneal carbon dioxide insufflation.<sup>6</sup>

Although the findings in this case demonstrate favorable outcomes of opioid-free anesthesia technique, it is important to remember that the lack of high-level evidence studies leaves uncertainty surrounding the benefits and risks of this technique. Further studies with larger sample sizes are needed to strengthen the evidence regarding the effectiveness of opioid-free anesthesia technique in postoperative pain management.

## CONCLUSION

The opioid-free anesthesia technique can be implemented safely and effectively, although nociceptive monitoring and selection of alternative drugs are necessary during perioperative.

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