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# Opioid-Free Anesthesia with Epidural Analgesia in A Patient with Opioid Intolerance: A Case Report

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## ABSTRACT

Background: Opioid-Free Anesthesia (OFA) is an alternative anesthetic technique performed without the use of opioids or their derivatives. This approach has been associated with reduced postoperative nausea and vomiting, better hemodynamic stability, and faster recovery. Although widely studied, the application of OFA in patients with multiple drug allergies, particularly opioid hypersensitivity, is still rarely reported. Moreover, its implications extend to perioperative pain management in various surgical fields, including maxillofacial surgery where patients may present with similar anesthetic challenges.

Case Report: We describe a 14-year-old male patient weighing 37 kg, with a history of allergies to multiple drugs including paracetamol, NSAIDs, antihistamines, ondansetron, and fentanyl, who presented with acute abdominal pain and bowel obstruction requiring emergency bowel surgery. General anesthesia was induced with ketamine, midazolam, rocuronium, and lidocaine, followed by thoracic epidural catheter placement with continuous ropivacaine infusion. Intraoperative management and postoperative course were uneventful, with effective pain control (Numeric Rating Scale 0–3/10), hemodynamic stability, early bowel function recovery, and no complications related to the epidural catheter. The patient required no opioids or additional analgesics throughout perioperative care.

Conclusion: This case highlights the feasibility and safety of using opioid-free anesthesia with thoracic epidural analgesia in patients with multiple drug hypersensitivities undergoing emergency bowel surgery. Beyond gastrointestinal surgery, OFA may also be considered a valuable alternative in perioperative pain management for maxillofacial and other surgical patients with contraindications to opioids.

.**KEYWORDS**: Opioid Free Anaesthesia, Epidural Analgesia, Allergy.

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## INTRODUCTION

Opioid Free Anesthesia (OFA) is an anesthesia technique which does not use opioids or their derivatives to achieve balanced anesthesia. Recent randomized controlled trials in gynecological laparoscopic surgery showed a significant reduction in postoperative nausea and vomiting with OFA compared to opioid-based anesthesia (15.2% vs 34.8%, p = 0.03).1 This technique was chosen as an alternative due to several considerations such as the presence of contraindications to opioids, especially drug allergies. A meta-analysis and clinical studies show that OFA enhances early postoperative recovery, reduces PONV, and improves patient satisfaction, both in elective and emergency conditions.2,3

This OFA technique is not being implemented for the first time. There have been many cases presented and many pros and cons to this procedure. Several randomized controlled trials in abdominal and laparoscopic surgery have shown that OFA provides comparable intraoperative analgesia and reduces the need for postoperative rescue analgesia compared to opioid-based anesthesia.4 The advantages obtained from this technique are numerous enough to overcome postoperative pain and might serve as an alternative for patients with opioid intolerance. Rapid recovery of bowel function, decreased postoperative nausea and vomiting effects, and stable hemodynamics were the target effects to be achieved. The following case will present the application of the OFA technique in a patient with emergency abdominal surgery who has many drug allergies including opioids. The selection of this technique is based on anesthesiologist discretion. Reports of OFA in patients with hypersensitivity to multiple drugs are rare, making this case an important contribution to clinical literature.5 This case report provides new clinical insights into its feasibility and safety in emergency abdominal surgery.

## CASE REPORT

A 37 kg, 14 years old boy complained of abdominal pain around the umbilicus since 3 days before admission to the hospital. Pain is complained intermittently and worsening. He said that Numeric Rating Scale (NRS) for pain score was 8/10. The complaints were accompanied by nausea and vomiting containing green material. The patient also complained of flatulence and could not defecate and fart. The patient said that he last defecated and farted 1 day before admission to the hospital. The patient is a referral from a previous region hospital. He had a history of Laparotomy appendectomy caused by appendicitis perforation in November 2023. The patient had a history of allergies to many drugs including paracetamol, ibuprofen, ketorolac, mefenamic acid,

diclofenac sodium, diphenhydramine, ondansetron, and fentanyl patches. Clinical manifestations of allergies suffered by patients include urticaria to angioedema. On physical examination, the abdomen was found to be distended, and the production of Naso Gastric Tube (NGT) was increasing with faecal material content. The patient vital signs were 116/65 mmHg for Blood Pressure, Heart Rate 130 beats per minute and Respiratory Rate 24 times per minute, pulse saturation was 99% room air and axillary temperature 37.20ºC. The patient was still alert with catheter urine production in 1.1 ml/kg/hour. The patient had been fasted and given fluid replacement through intravenous fluids. The patient was planned for exploratory laparotomy.

In the emergency operating room, the patient was anesthetized with general anaesthesia of intubation with Rapid Sequence Intubation (RSI) technique. Induction was performed with reverse trendelenburg position, active NGT suctioning, pre-oxygenation with O2 100% for 3-minute, Midazolam 2 mg, Ketamine 40 mg, Rocuronium 50 mg, Lidocaine 40 mg then intubated. The patient was prepared for epidural catheter insertion. Patient was placed in Left Lateral Decubitus (LLD) position. Touhy needle was inserted at Th12-Th11 paramedian approach with a hanging drop technique and catheter is left in epidural cavity 5 cm long. After negative aspiration of blood and cerebrospinal fluid, a test dose with Lidocaine 1,5% and epinephrine 1:200.000 was injected through the catheter and the result negative. Then 5 ml of Ropivacaine 0.2% for loading dose was performed incrementally and continued with Syringe Pump (SP) at rate of 4 ml per hour. Sedation was maintained with volatile anaesthetic.

The incision performed midline approximately 10 cm above umbilicus. Intraoperative finding was pus with faecal material, interintestinal adhesions, multiple perforations at 10 points of ileum. Patient was carried out adhesiolysis and small intestine was resected at 135 cm from distal of Treitz ligament and 45 cm from the proximal of Ileocecal Junction (ICJ) and made double barrel ileostomy. The patient was inserted subclavian Central Venous Catheter (CVC) post-operative and decided for extubation. The patient underwent observation in the Intensive Care Unit (ICU) for 2 days with supplemental parenteral nutrition. Post-Operative Day (POD) 1, he achieved stable hemodynamic with NRS was 3/10 and POD 2 NRS was 0/10, with SP Epidural Ropivacaine 0.2% still being carried out. The patient was moved to a low care unit, and the epidural catheter was removed on the POD 5. In POD 3,4, and 5, patient does not complain pain in area of incision with NRS 0-1/10. Oral intake had been started incrementally with clear water and at the time of discharge from hospital, no complications from epidural catheter were reported.

## DISCUSSION

Pain is part of human rights.6 Pain is a problem that can be encountered in perioperative managements patients. Pain is currently considered to be the 5th vital sign. Reducing the pain will reduce complaints of discomfort in patients. Opioids have long been a solution to manage perioperative pain as well as surgical trauma and severe pain.7 However, the use of opioids does not mean free of risk however. Some risks associated with opioids such as nausea and vomiting, respiratory depression, delirium, sedation, and ileus can happen. In some cases the use of opioids is also associated with intolerance and hyperalgesia.7,8 In rare case the use of opioid can cause severe allergy reaction anaphylaxis which manifested by uritcaria and hypotension.9 The misused of opioid can create new problem such as addiction, and overdose.10 Nowadays, in general anesthesia the aim is to reduce the use of opioid by using multimodal anesthesia such as combination of neuraxial anesthesia, alpha-2 agonists, beta-blockers, gabapentinoids, magnesium, lidocaine, ketamine, and dexamethasone.11

What about the patient with intolerance to opioids? The patient had a history of allergy to many pain killers. The patient found it during previous hospital admission. Not only opioids, other drugs we used for induction can also cause allergies.12 Opioid allergy reactions can be vary in wide range, from simple rash until anaphylaxis.13 The incidence of opioid hypersensitivity still rare, some studies stated around 2% cases and it is likely to be an overestimate because lack of testing.14 Opioid allergy is rarely because of IgE-mediated reaction, because there is a theory that endogenos production of opioid-like subtances, true IgE-mediated allergies to opioid do not exist, but many opioids possess the ability to cause mast cell degranulation and subsequent histamine release which mimicking IgE-mediated reaction.15 One potential approach in promoting patient safety and avoiding harm is by considering the use of Opioid Free Anesthesia (OFA) technique. This technique offers various advantages including improved management of postoperative pain, prevention of hyperalgesia caused by surgery or opioid medication, decreased risk of respiratory issues in patients with respiratory conditions like COPD, sleep apnea, and obesity, assistance in managing chronic pain and patients on chronic opioid therapy, as well as aiding in the recovery of patients with addiction or undergoing treatment for opioid use disorder with medications like methadone or buprenorphine-naloxone. By implementing OFA, there is also a potential reduction in postoperative cognitive issues and the occurrence of other opioid-related side effects like nausea, itching, immune system suppression, urinary problems, and constipation.10 We can perform intraoperative induction and maintenance of analgesic without using opioids. An alternative of intraoperative and postoperative analgesic which can be used for abdominal surgery is thoracal epidural technique.16

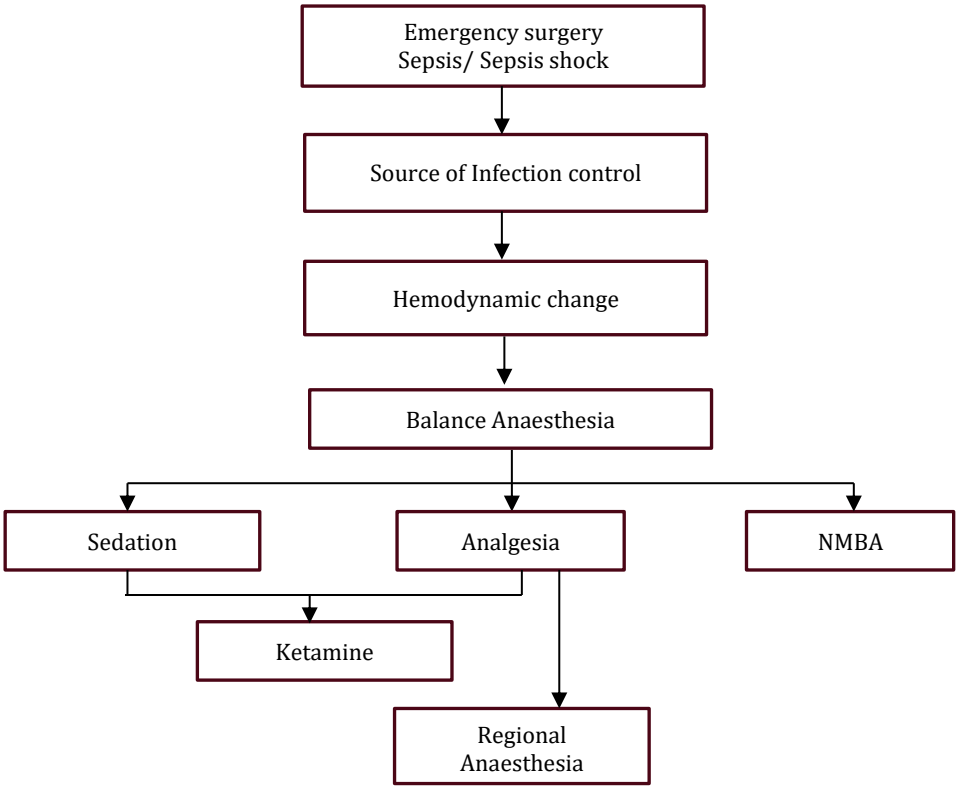


**Figure 1: Management of Anesthesia in Emergency Sepsis Surgery**

Insertion of an epidural catheter can improve gut motility by causing sympathectomy that leaves the parasympathetic innervation of the gut in the thoracolumbar segment and also as a pain relief agent, therefore can reduce the sympathetic stress response.16 Paralytic ileus can happen as a life-threatening complication of abdominal surgery. There are several considerations which can contribute to decreasing intestinal motility and ileus such as operation technique, excessive fluid replacement which can induce gut oedema, and systemic opioid. By using epidural catheter with specific local anaesthetic, it can block sympathetic and keep the gut work.17,18

Opioid Free Anaesthesia (OFA) is defined as new approach of general anaesthesia technique in which opioids are not used in the intra-operative period even systemic, neuraxial or intracavitary and substituted with non-opioid analgesics.19 A study of OFA by 8 consider that OFA to be quite an effective technique in preventing Post Operative Nausea Vomiting (PONV). Moreover, OFA even can perform 45% reduction in nausea at 24 hours after surgery.9 On the other hand, OFA appears to be useful in reducing postoperative sedation and shivering.8 Patients undergoing OFA showed higher quality of recovery score than opioid, better hemodynamic profile, reduced nausea vomiting, pruritus and less requirement for post operative analgesia.20

In this case, we use Ketamine hydrochloride (ketamine) as drug to induction in a part of RSI technique to reduce the risk of aspiration because increasing of abdominal pressure in this patient. Ketamine has effect of sedation and analgesic from the dissociative effect and pain receptor which is attached. It acts as a non-competitive antagonist of NMDA-glutamate receptors by inhibiting the release of potassium from cells, leading to the inhibition of depolarization and transmission of pain signals.19 Ketamine has many role in OFA, other than induction agent, the use of subanesthetic dose of ketamine can replace the use of opioid in intraoperative pain management, reduce incidence of PONV and combination with magnesium provide effective postoperative analgesia.21 The use of ketamine for intraoperative and postoperative pain management can help in early gastrointestinal function such as shorter period for postoperative time of first flatus.22 Many combination can be with ketamine to maintain pain free intra and postoperative period, continuous infusion of dexmedetomidine, ketamine and lidocaine can be used for bariatric surgery and is opioid free.23 We also give the patient Dexamethasone for reduce the effect of histamine release from the drug induce that we do not know because the patient had history of many drugs intolerance. Indeed, this steroid is a potent corticosteroid that does not have mineralocorticoid effects. When administered at a dose of 50 mcg/kg after induction, it exhibits anti-emetic properties. At doses exceeding 100 mcg/kg, it is believed to further decrease the requirement for analgesics during the postoperative phase. It can also serve as a supplement to pain management, reducing postoperative nausea and vomiting for up to 24 hours after surgery.19

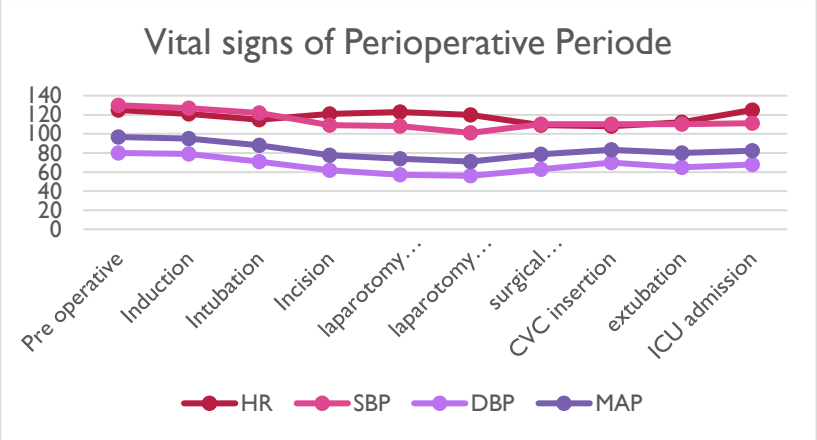


**Figure 2: Vital Signs of Perioperative period. HR, Heart Rate; SBP, Systolic Blood Pressure; DBP, Diastolic Blood Pressure; MAP, Mean Arterial Pressure, ICU, Intensive Care Unit**

This patient had comorbid of many drugs allergy with severe underlying disease risk in emergency condition. Source control of infection must be carried out immediately, but optimization of postoperative conditions must also be emphasized. Planning and assessing volume status were important because the patient undergone dehydrated and an epidural technique will be performed. Effective epidural analgesia has many benefits such as reduce requirement for other analgesic, analgesia at rest and movement, reduce pulmonary complication or improve respiratory function, reduce cardiovascular complication, reduce incidence of ileus, and reduce surgical stress response.24 Surgical stress response as a result of tissue damage and pain. They will increase neurohormonal and inflammatory responses. They induce sympathetic activation and cascade of coagulation will release catabolic hormone which induce immunosuppression. Continuous epidural analgesia for post operative pain will reduce the risk CPSP (Chronic post-surgical pain).24 Compared to pain management using NSAID and paracetamol, the use of local anesthetics for epidural analgesia made better outcome for patients gastrointestinal function, and patient recovery.25 Severe complications of epidural analgesia included vertebral canal haematomas, spinal cord ischaemia, vertebral canal abscess, and other neurological injury could happen. Careful patient selection with particular consideration of perioperative anticoagulation and risk of infection must be done. Ensuring a proper aseptic technique during epidural insertion is crucial to avoid nerve injury that could result from chlorhexidine reaching the epidural space through the needle. It is important to prevent contact between the catheter and needle with chlorhexidine, and the skin should be completely dry before starting the procedure. In addition, there may be challenges in achieving sufficient pain relief, which may necessitate improved skills. Other side effects to consider are hypotension and motor block, which can diminish the benefits of the procedure.17

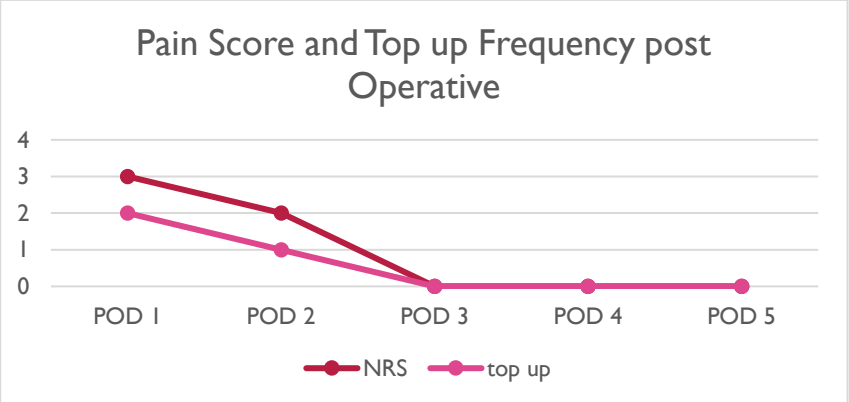


**Figure 3: Pain Score and Top Up Frequency Post Operative. POD, Post Operative Day; NRS, Numeric Rating Scale**

## CONCLUSION

OFA could be an alternative of anesthesia technique for patient with opiod intolerance. The principle of patient safety should be a priority thought. Avoiding the anaphylaxis reaction caused by opioid use may be first consideration. Epidural analgesia can be an answer because it has many benefits for perioperative. However, it has precaution and side effect should be paid attention. Epidural analgesia with local anesthetic continuous pump will improve gut motility for patient undergoing emergency exploration laparotomy.

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