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The Role of Anesthetic Techniques and Drugs in Laparotomy Cases of Postoperative Ileus

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Abstract

Background: Ileus is a non-mechanical decrease in intestinal contents, affecting the neuroimmune system. It presents with bloating and abdominal distension. Diagnosis involves abdominal films and CT scans. Treatment involves treating the underlying cause, including infection, electrolyte abnormalities, and opiate use. Anesthesia procedures, recovery protocols, regional anesthesia, opioid-sparing analgesics, and laparoscopy improve postoperative ileus cases.

Case Presentation: The following is a 67-year-old male patient who presents with abdominal pain with a scale of 4 out of 10, diagnosed with ileus, which was planned for laparotomy surgery by general anesthesia with a supine position.

Conclusion: We conclude that anesthetic procedures are critical in ileus patients in performing laparotomy operations, both in selecting anesthetic techniques, anesthetic drugs, and supporting scores (Aldrete score). Before induction, anesthesiologists must carefully assess preoperative and monitor postoperative.

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INTRODUCTION

Ileus, also known as paralytic ileus or functional ileus, occurs when there is a non-mechanical decrease or stoppage of the flow of intestinal contents[1]. Ileus and bowel blockage are two prevalent intestinal conditions that have different course of treatment. A tumor, adhesion, or hernia can cause bowel obstruction, although ileus is frequently inevitable and can happen in severe patients receiving mechanical ventilation or septic shock. Although the exact origin of ileus is unknown, medical conditions and pharmaceutical drugs may increase the risk. Ileus is not always a common complication after laparoscopic surgery [2].

The patient generally appears with gradual onset abdominal distension and bloating, along with persistent pain that does not show any peritoneal symptoms. Symptoms that are frequently experienced include dysphagia, delayed flatus, nausea, and vomiting. In more severe stages, sepsis, fever, and dehydration could happen. Distinguishing between an ileus and a mechanical obstruction is aided by diagnostic imaging techniques such plain abdomen films. It is advised to get a computed tomography scan if the film is unclear. Identification of reversible causes of an ileus, such as hypokalemia or infection, requires laboratory testing. In order to rule out bleeding, a complete blood count must be performed. The electrolyte panel has to be inspected for anomalies and replaced if necessary.[3]

Treating the root cause of ileus is the most crucial treatment principle. Limiting oral intake, maintaining intravascular volume, correcting electrolyte abnormalities, particularly hypokalemia, halting the administration of the offending drugs, applying nasogastric suction, decompressing the rectum with a tube, and regularly shifting the patient's position are additional necessary actions. The majority of patients (85%) respond well to these conservative measures in an average of three days [4]. The most effective treatment for postoperative ileus is prevention5. Postoperative ileus cases have increased as a result of enhanced recovery procedures, regional anesthetic, opioid-sparing analgesics, and laparoscopy[2]. The key to managing postoperative ileus is providing supportive care. The ileus is nearly always resolved with supportive therapy and optimal care after serious or treatable illnesses have been ruled out. These interventions frequently involve the implantation of nasogastric tubes, early ambulation, intravenous fluid replacement, and electrolyte replacement. Certain therapies, including nasogastric suction, are intended to alleviate symptoms; however, there is insufficient data to support their overall efficacy.

To avoid or treat the ileus, a cautious balance between analgesics—especially opiate use—and postoperative pain management is essential. Opioid-free analgesics are recommended. It's critical to optimize other metabolites and electrolytes. Promoting walking as soon as possible after surgery is a straightforward yet crucial preventative and therapeutic approach. Clinical assessments should be performed on a regular and serial basis with an open mind to potential deteriorating problems or missed diagnoses[6].

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After an ileus, patients generally recover, but the duration of bowel function restoration is uncertain. Complications include extended hospital stays, potential procedures like NG tube implantation, TPN, and aspiration, and worsening nausea and vomiting may necessitate aspiration[1].

CASE PRESENTATION

A male, 67 years old, was referred to Soegiri General Hospital Lamongan with a chief complaint of abdominal pain for two days. His last defecation was five days ago, but he still had a history of flatus. The patient complained of nausea but had no history of vomiting, flu, or fever. The patient had a history of gallstone removal two weeks ago. There are no similar symptoms in the family. The patient also has no history of allergy.

While in the emergency room, the patient was assessed for a primary survey. The airway was clear, the breathing was vesicular, 20 times per minute and regular, and the saturation was 98%. The acral was red, warm, and dry. The capillary refill time was less than 2 seconds. The blood pressure was normal, 110/70mmHg and the heart rate was 78 times per minute and regular. The patient also came with GCS 456 and a temperature of 36.5 Celsius. After the ER doctor cleared the patient, the primary physician continued the physical examination. The pain scale was four subjectively. The head and neck, cardiac, and lung examinations were standard. From the abdominal examination, the abdomen was tender, and the bowel sound was joyous and tympanic, but the patient experienced pain while the abdomen was percussed.

The patient was advised to do a complete blood count and imaging studies. The complete blood count, blood glucose, electrolyte, and kidney function were normal. The liver function was shown to have elevated SGOT and SGPT but still has a standard range of albumin. The chest and abdominal x-ray also show normal findings. The patient took a CT scan of his abdomen.

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Figure 1. The patient's abdominal CT-Scan

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The CT scan shows a hepatic (pyogenic) abscess in the right lobe, IVb quadrant, with a volume of approximately 185 cc. There is also corpus alienum found in the gaster until the distal ileum, which causes gastric dilation and presumably causes the ileus. There is also splenomegaly lumbar osteoarthritis but no visible mass in the cavum abdomen. The patient was advised to do a gastroscopy; the result was a duodenal ulcer, upper GI bleeding with grade forest 2, and a tumor outside the gaster. The patient was diagnosed with abdominal pain et causa ileus and was prepared to do laparotomy in a supine position and using general anesthesia with PS ASA 2.

DISCUSSION

The patient was 67 years old, which, as an anesthesiologist other than the disease itself, needed to be aware of the geriatric condition. The ability to raise heart rate in response to hypovolemia, hypotension, or hypoxia was diminished in elderly patients compared to the general population. Other differences included decreased lung compliance, decreased arterial oxygen tension, difficulty coughing, reduced renal tubular function, and an increased risk of hypothermia. The patient's declining protective laryngeal reflexes and aging-related incompetence are the causes of the compromised coughing reflex; the doctor must be cautious of pneumonia brought on by aspiration[7].

Due to the obstruction along the gastric into the distal intestine, which causes ileus, the patient scored 4 out of 10 on the pain scale. Therefore, the patient was administered ketorolac thrice daily for the pain. The patient also complained of constipation; his last defecation was five days ago, presumably caused by the obstruction. This condition is also supported by the pain the patient experienced while the physician pressed the abdomen area.

The patient already went for a complete blood count, immunologic studies, blood glucose, hemostatic studies, and plasma albumin, which shows elevated SGOT and SGPT, which shows potential liver damage. The SGPT exceeded three times the standard value. Meanwhile, the increasing SGOT was one point five times. These findings support the finding of hepatic abscess in the CT scan of the patient.

As the patient ages, the fluid intake also needs to be altered. The surface area of globular lobulation for filtration was reduced, resulting in decreased glomerular filtration rate (GFR) even though the serum creatinine was still relatively constant. Therefore, as the patient age, the ability of the kidney to handle the excessive fluid also decline. For healthy people, daily basal fluid needs are 40cc/kg. Due to geriatric conditions, the daily basal fluid needs of elderly patients are 25-30cc/kg[8]. The patient's weight was 56kg by this formula, so 1500cc was an appropriate amount for the maintenance fluid.

The patient underwent gastroscopy and got upper GI Bleeding Forrest II, which shows multiple erosion. From the gastroscopy, the patient also got hyperemic mucosa and mucosal break on the gastroesophageal junction. At the duodenum, there is a mass squeezed from the outer lumen.

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The biopsy was also taken twice on the antrum and incisura, but the result has not come through yet. The classification of Forrest is widely used to determine the stage of peptic ulcer. Table 1. Shown below is the Forrest classification. This patient presents with Forrest classification II, which shows the recent hemorrhage. The patient was treated with Ranitidine administered three times a day.

Table 1. Forrest Classification on Peptic Ulcer

Endoscopic Findings	Forrest classification
Active bleeding	Ia (brisk bleeding)
	Ib (oozing)
Nonbleeding visible vessel	IIa (visible vessel)
Adherent clot	IIb (adherent clot)
Flat spot	IIc (flat pigmentation)
Clean base	III (clean base)

Due to the patient's gastrointestinal complex case, the patient was prepared for laparotomy, supine position with general anesthesia. Patient positioning is standard to maximize anatomic exposure for surgical procedures. Therefore, the patient's position during surgery is crucial for the anesthesiologist to determine the patient's morbidity. Despite most of our life spent in the supine position, that does not mean a model of physiologic position for humans. Patients with morbidity such as obesity or poor cardiovascular function should be cautious due to aortocaval compression. The supine position also has effects on hemodynamic changes. The mean arterial pressure, heart rate, and peripheral vascular resistance decrease in healthy adults, on the other hand increasing their cardiac output and stroke volume. Abdominal wall muscles and diaphragm took the breathing work of the supine position, while in the erect position, the rib cage muscle took the predominant role[9]. Improvement of ventilation-perfusion matching occurs in supine patients due to uniform ventilation per unit lung volume[10]. The main complications due to the supine position are backache and ischemic pressure injuries. The ischemic pressure injuries were caused by a lack of tissue perfusion in the affected area, which could result in ischemia and alopecia. To respond to this problem, we need to evaluate the possible pressure points and provide adequate padding. Remembering the patient's age, anesthesiologists need to care for the backache problem, which is exacerbated in the elderly or in patients who have pre-pre-existing back pain problems. The loss of normal lordotic curvature of the lumbar spine caused the back pain problem. The anticipation was positioning the patient on a lawn chair position. The lawn chair position is where the patient is positioned with the head and thorax slightly elevated and the hips and knees flexed, as shown in Figure 2. This position improves venous return and ventilation in the lung by situating the diaphragm away from the abdominal organs[11].

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Figure 2. Lawn-chair position

The patient was graded according to the American Society of Anesthesiologists' physical status (ASA), and this case was presented with ASA 2 due to the diagnosis of ileus, history of peptic ulcer, hepatic abscess, and no apparent comorbidities. PS ASA 2 has mild systemic disease (no functional limitation). ASA 2 cases definition is a patient with mild systemic disease has comorbidity like mild asthma or well-controlled hypertension. There is no significant impact on daily activity; therefore, there is unlikely impact on anesthesia and surgery[9]. The importance of grading the Patient with PS ASA correlates significantly linearly with 48-hour mortality, where a higher PS ASA stage increases the risk of 48-hour mortality[12].

During preoperative evaluation, an anesthesiologist should propose the anesthetic plan during perioperative until postoperative care. Anesthesiologists should provide the patient with psychological support and give informed consent to the patient.[7] From this patient, we can obtain no history of allergy; the patient also did not consume any medication. The past illness was gallstone removal two weeks before, his last meal was at 3:00 a.m., and the event was laparotomy. An anesthesiologist should take a thorough examination for the pre-anesthesia visit. These should include a history taking, physical examination, diagnostic data review, PS ASA assignment, and a discussion regarding future anesthesia care[9]. Affirmative history is represented by the acronym A2, B2, C2, D2, E2, F2, and G2 in the pre-anesthetic check. Airway blood hemoglobin, blood availability, and blood loss estimation Inhaling, clinical analysis, Comorbidities, medications the patient is taking, specifics of earlier procedures and anesthesia, Analyze the research, Endpoint to handle the surgical case, Adaptable state, Abstinence, Describe your bodily state, Obtain agreement[13]. Usually, AMPLE history was taken, which is a valuable mnemonic for Allergies, Medication currently used, Past illness/ pregnancy, and Even/environment[14].

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The patient was taken into preoperative assessment. The patient's vital signs were normal, except the blood pressure was abnormal at 150/80. His weight was 56 kg, and he was 161 cm tall. His pain scale is still on four out of ten, like the time of admission. On general physical examination, there is no abnormality in the head, neck, thorax, abdomen, and extremities. The planned anesthesia was General Anesthesia, with the route of administration being intravenous and laryngeal mask airway (LMA).

The patient was already fasting by 3 a.m., entered the operation room at 11.05, and started to be induced at 11.20. The sedative medication that would be given will press the protective airway reflex, possibly leading to aspiration; hence, fasting is routinely asked before the procedure. According to the guideline ASA, the patient should be fasting from clear liquid 2 hours prior, light meals 6 hours prior, and fried or fatty meals 8 hours before the procedure[15]. Thus, the patient was suitable because he was fasting 8 hours before the surgery. The patient also took Ranitidine before, which is recommended according to the guidelines due to its function in reducing gastric volume and acidity. Therefore, administering antiemetic or antacid is not recommended before the procedure[15]. The anesthetic drug given was sulfat atropine 2.5mg, Midazolam 3 mg, Fentanyl 100 mg, Propofol 100 mg, Notrixum 25mg, and isoflurane 1-1.25.

The patient was given isofluran 1-1.25 during the operation for general anesthesia. Sedation monitoring during surgery has the expected results. Induction and maintenance of general anesthesia are achieved through various sites of action. The most likely of these sites are inhibiting neurotransmitter-gated ion channels such as GABA, glycine, and N-methyl-d-aspartate (NMDA) receptors in the central nervous system (CNS). Inhibition of these receptors helps to produce the amnesia and sedation needed for adequate surgical conditions.

Other sites of action have organ system-specific effects. Regarding cardiac function, isoflurane has minimal impact on left ventricular function but does cause a dose-dependent decrease in systemic vascular resistance due to mild beta-adrenergic stimulation. This action would lead to decreased cardiac preload and, in turn, decreased cardiac output, but a rise in heart rate mitigates the decrease in cardiac output[16].

Isoflurane also affects the respiratory system by causing a significant decrease in tidal volumes with a minimal increase in respiratory rate, leading to an overall decrease in minute ventilation. The decrease in minute ventilation causes an increased PaCO2. At concentrations greater than 1 MAC, isoflurane causes an increase in cerebral blood flow and intracranial pressure. Although blood flow is increased, the cerebral metabolic rate is decreased, and concentrations of 2 MAC can produce an electrically silent electroencephalogram. Isoflurane also produces a dose-dependent decrease in renal and hepatic blood flow with no clinical effect on renal or hepatic function[17].

The patient exited the operation room at 12:40 p.m. and was transferred to the Recovery Room. The anesthesiologist then monitors the B6, which is breathing, blood, brain, bladder, bowel, and

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bone. The patient was also given several drugs such as fentanyl and Antrain as pain-med, ondansetron for nausea, and maintenance fluid 1500cc for 24 hours.

The patient was assessed with the Alderte score as the parameter for the patient transferred to the ward. The score was taken three times: as the patient arrived at the recovery room fifteen minutes later and transferred to the ward. The patient was allowed to be transferred back to the ward after he reached an Alderte score of more than or equal to 8. Table 2 below will show the Alderte score of the patient.

Table 2. Alderte Score of the Patient

SCORE		Criteria	Arrived at RR	15'	Exit RR
Motoric	2	Can move four extremities			2
	1	Can move two extremities	1	1	
	0	Unable to move extremities			
Respiration	2	Able to breathe deeply and cough	2	2	2
	1	Dispneu			
	0	Apneu			
Circulation	2	BP difference <20% from pre-anesthesia BP	2	2	2
	1	BP difference <20%-50% from pre-anesthesia BP			
	0	BP difference >50% from pre-anesthesia BP			
Awareness	2	Fully awareness	2	2	2
	1	Wake up when called.			
	0	No response			
Peripheral	2	Red skin	2	2	2
	1	Pale			
	0	Cyanosis			

Patients transferred to the ward will be monitored on vital signs and status. Therefore, there should be a comprehensive patient history so the primary physician will know the patient's progress and condition.

CONCLUSION

Ileus refers to the intolerance of oral intake due to inhibition of the gastrointestinal propulsion without signs of mechanical obstruction. The diagnosis is often associated with surgery, medications, trauma, peritonitis, or severe illness. Mechanical obstruction must be ruled out, and

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the diagnosis of ileus depends on radiographic evidence, usually on a CT scan or small bowel series. Therefore, careful preparation of surgical and anesthetic procedures is required.

We conclude that anesthetic procedures are critical in ileus patients performing laparotomy operations, selecting anesthetic techniques, anesthetic drugs, and supporting scores (Aldrete score). Before induction, anesthesiologists must carefully assess preoperative and monitor postoperative.

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