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Anesthesia nursing care for Mr. K diagnosis of ileus obstruction with hypovolemia, laparotomy surgery with general anesthesia: a case report

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Abstract. Ileus obstruction is a surgical emergency caused by mechanical intestinal obstruction. The method in this study is a descriptive case study approach to explore anaesthesia management for a 77-year-old male patient with ileus obstruction and hypovolemia, who underwent laparotomy at RSUD dr. R. Goeteng Taroenadibrata in August 2024. Through direct observation, we collected insight into his initial condition, the interventions administered, and his hemodynamic responses during and after anaesthesia. The results of this case study are as follows in the pre-anaesthesia; the patient showed signs of hypovolemia with an oxygen saturation of 86% which improved to 96% after using a non-rebreathing mask. During anaesthesia, a hypovolemic pre-shock caused blood pressure to drop significantly to 60/45 mmHg, but with careful administration of norepinephrine and ephedrine, stability was restored. After surgery, the patient was transferred to the ICU in stable condition, with a blood pressure of 150/78 mmHg and oxygen saturation at 98%. The conclusion of this case study emphasizes that managing anaesthesia for ileus obstructive with hypovolemia requires careful anaesthesia management, especially for high-risk patients. This study highlights the importance of thorough assessment and monitoring. Further research with a larger sample size could provide more insights into.

1 Introduction

Intestinal obstruction is the leading cause of morbidity and mortality, causing about 30,000 deaths and about 15% of emergency department visits due to abdominal pain in the United States (1). Every year, 1 in 1,000 people experience ileus. In Indonesia, 7,059 cases of paralytic ileus with obstruction without a hernia were hospitalized, and 7,024 patients were treated as outpatients (2). Ileus is a condition in which the intestines stop moving normally, causing a build-up of intestinal contents. Mechanical intestinal obstruction, often caused by adhesions, hernias, or volvulus, requires emergency surgery (3,4). Statistics show that ileus obstructive often requires surgical intervention, especially in the elderly group, and can pose a high risk of morbidity and mortality.

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Ileus is a condition in which the intestines stop temporarily to make wavy movements so that food and feces cannot be pushed out of the anus. A condition, when the intestinal wall is unable to push the contents of the digestive tract, is known as nonmechanical intestinal obstruction. Meanwhile, conditions caused by *adhesions, intestinal* adhesions, or blockages of something physical that prevent the contents of the intestines from moving are known as mechanical intestinal obstruction (5).

Abdominal pain is a problem that is often found in the Emergency Department room. As many as 10% of all those treated in the emergency department are caused by abdominal pain, 20%-25% are geriatric patients, and 22% of them require emergency surgery (6). The highest incidence of ileus obstructive patients undergoing surgery in the age group of 51-60 years reached 26.3%. Surgical procedure for ileus obstruction in men is 67.4% and in women 32.6% (5). In a study conducted across two teaching hospitals in Butembo, 921 patients underwent surgeries requiring general anaesthesia (GA) between 2011-2015. This prevalence reflects the frequent application of GA in major surgical procedures (7). The importance of proper selection of anaesthesia techniques, especially in patients with hypovolemia, is crucial to maintaining hemodynamic stability during the procedure. General anaesthesia was chosen because it provides better control of ventilation, whereas the use of regional anaesthesia can be risk in certain patients. Taking these factors into account, the treatment of hypovolemia in patients with obstructive ileus also needs to be carefully considered so that hemodynamic disturbances do not occur during surgery. This study aims to evaluate the effectiveness of anaesthesia nursing interventions in overcoming hypovolemia in ileus obstruction patients. This study emphasizes the urgent need for careful anaesthesia management in patients with ileus obstructive and hypovolemia, conditions that can quickly worsen and become life-threatening. The uniqueness of this research lies in its focus on personalized strategies to keep the patient's hemodynamic stable during and after surgery, especially for those at higher risk. Prompt intervention and continuous monitoring are key to ensuring patient safety and preventing further complications, making this study crucial for improving care and outcomes in such vulnerable patients.

2 Research Methods

2.1 Research Design

This study uses a descriptive case study design to evaluate the management of anesthesia in patients with ileus obstruction accompanied by hypovolemia of laparotomy surgery. The selection of this design is based on the need to explore the interventions carried out and the results achieved.

2.2 Research Subject

The subject of the study was a male patient with age 77-year-old diagnosis of ileus obstruction accompanied by hypovolemia who underwent laparotomy with general anaesthesia at dr. R. Goeteng Taroenadibrata Hospital.

2.3 Research Location

The research was carried out in the operating room of dr. R. Goeteng Taroenadibrata Hospital in August 2024. The selection of this location is based on the researcher's experience in undergoing clinical practice and adequate facilities to conduct this research.

2.4 Data Collection Procedure

Data are collected through direct observation during the anaesthesia process. The information recorded includes the patient's initial condition, nursing interventions performed, and results observed after the procedure. Emphasis is placed on observation of the patient's hemodynamic response during and after the anaesthesia action.

3 Case History

3.1 Anamnesis

A 77-year-old male patient came to the central surgical unit (IBS) with complaints of abdominal pain, bloating, and inability to defecate for more than 4 days. Numeric Rating Scale (NRS) pain scale 4 out of 0-10, pain is felt in the lower left abdomen, pain increases when moving, and characteristics such as prickling, continuous, more than 10 minutes. Patients also have difficulty defecating. Other complaints of patients said weakness, nausea, and shortness of breath.

The results of the assessment from the anaesthesia focus data, the patient denied the existence of allergies, the history of routine treatment such as antihypertensive, digitalis, diuretic, antidiabetic, and anticoagulant was denied, the history of previous diseases such as diabetes mellitus, hypertension, kidney disorders, and family history of diseases was denied, the patient had a bad habit of smoking.

3.1.1 *Physical Examination*

The patient's general condition appeared weak with a total of 13 GCS E4M4V5 consciousness, blood pressure 166/98 mmHg, pulse rate 138 x/min, respiratory rate 26 x/min, temperature $36.5^{0}C$, oxygen saturation 86%, MAP 98, weight 48 kg and heights 165 cm. Based on the physical examination carried out by the 6B system, the results were obtained, there were no injuries on the face, mallampati score I, no airway obstruction, neck mobility within normal limits, vesicular breath sounds, anemic conjunctiva, pale skin, CRT 2 seconds, cardiac boundaries within normal limits, doctor pupils, parse (-), plegia (-), dark concentrated urine, oliguria (+), hypoactive bowel noise, nausea, lower left abdominal pain, spinal disorders of scoliosis, free mobility, active ROM, IV line attached in the left-hand size 20G.

3.1.2 *Supporting Examination*

Laboratory tests showed leukocytosis (18.1 10^3/uL), eosinopenia (0%), lymphocytosis (7%), and hypoglycemia with GDS 75.2 mg/dl.

The results of the radiological examination showed cardiomegaly, aortic classification, increased pulmonary bronchovesicular stenosis, suspected chronic bronchitis, no pleural effusion, and suspected scoliosis thoracic lumbales [figure 1].

Table 1. Laboratory Examination

Examination		Result	Normal Value	Unit
Date: 31/08/2024				
Routine blood				
Leukocyte	H	18,1	4,8-10,8	10^3/uL
Erythrocyte		5.2	4,4-5.9	10^6uL
Hemoglobin		15.5	11.5-19.5	g/dL
Hematocrit		45	26-54	%
Platelets		285	150-450	Ul
MCV		87	80-100	Fl
MCH		30	26-34	Pg
MCHC		34	32-36	g/dL
Eosinophils	L	0	1-3	%
Segment Netrophile	H	85	50-70	%
Lymphocytes	L	7	25-40	%
Freezing period	CT	4.30	3-5	minute
Bleeding period	BT	4.00	2-5	minute
Blood glucose				
Current glucose	L	75.2	76-150	mg/dl
Urine				
Urea		44.4	10-50	mg/dl
Creatinin		0.73	0.60-1.10	mg/dl

Fig 1. Rongent Thorac

Recto to sigmoid appears wide, distended, rectal prominent, isoechoic lesions in the distal rectum visualized irregular shape of the lesion largest diameter (measured 32.6 mm),

the mass of the recto wall thick sigmoid 2, other lesions. The shape of the lien (lymph) is normal, the echo parenchyma is normal, and the stone is not visible [figure 2].

Fig 2. USG Lymph

Decreased hepatic echo parenchyma, starry sky appearance (+), acute hepatitis [figure 3].

Fig 3. USG Liver

Irregular thick VU walls lead to cystitis [figure 4]. There were no abnormalities in lien, VF, Pancreas, right Ren, and left Ren [figure 5].

Fig 4. USG Bladder

Fig 5. USG Kidney

3.2 Data Analysis

Data analysis is a grouping of problematic and risk data based on the study's results grouped into anaesthesia periods. In one case, subjective data were the patient complained of weakness, nausea, and shortness of breath. The patient's skin appeared pale, tachypnoea, and hyperventilation on observation or objective data. Blood pressure was recorded as 166/98 mmHg, pulse frequency at 138 beats per minute, respiratory rate at 26 breaths per minute, and oxygen saturation at 86%. This indicated disruption of blood flow in the heart, leading to insufficient oxygen supply to the lungs. This caused hypoxemia, tachypnoea, and hyperventilation, all pointing toward a risk of impaired respiratory function.

In the first five minutes following general anaesthesia, the patient showed a blood pressure of 150/102 mmHg, pulse frequency of 161 beats per minute, and respiratory rate of 26 breaths per minute, with oxygen saturation at 96%. However, in the third five minutes, a dramatic change occurred blood pressure dropped to 60/45 mmHg, while pulse frequency

decreased to 80 beats per minute. This presented signs of ileus obstruction, severe fluid loss, and inadequate tissue perfusion, potentially leading to hypovolemic shock.

After administering 2500 cc of the crystalloid solution, the output was only 250 cc, with dark and concentrated urine. The patient showed signs of sopor consciousness and had a blood pressure of 150/78 mmHg, a pulse rate of 120 beats per minute, and an Aldrete score of 6. This indicated post-operative status with significant fluid loss, oliguria, and changes in urine output and colour. This posed a risk to meet the patient's fluid and electrolyte needs.

3.2.1 *Pre-Anaesthesia Care Process*

The patient underwent a series of examinations, such as anamnesis, physical examination, and assessment of vital signs, oxygen saturation was difficult to read by oximetry. Based on the physical examination results, it showed pale skin colour, tachypnoea, and hyperventilation. Based on supporting examinations showing leucocytosis, lymphocytosis, hypoglycaemia with a blood glucose of 75.2 mg/dl, cardiomegaly, increased pulmonary broncho vascular syndrome, suspected chronic bronchitis, suspected thoracic lumbales scoliosis and a history of acute hepatitis, then the patient was designated as ASA III E who was planned to undergo a laparotomy with general anaesthesia intubation. The patient had been injected into the left-hand measuring 20G, then given remediation of ondansetron 4 mg as an antiemetic. In pre-anaesthesia, respiratory function disorders occur characterized by pale skin colour, oxygen saturation of 86%, and respiratory rate of 26 x/minute. The interventions that have been carried out are monitoring the patient's respiratory status, monitoring breathing patterns, and providing oxygenation with the installation of a 10 L/minute non-rebreathing mask. After the intervention, oxygen saturation increased to 96%.

3.2.2 *Intra-Anesthesia Care Process*

The patient entered the operating room in a supine position. After the standard monitor was installed, the test results showed blood pressure of 150/102 mmHg, pulse rate of 161 x/min, respiratory rate of 26 x/min, and oxygen saturation of 96%. Pre-induction assessment, checks are carried out regarding the readiness of infusion fluids, anaesthesia machines, STATICS injections, and anaesthetic drugs. An ECG is performed because the oximetry results are not effective enough to read oxygen saturation and pulse. Once everything is ready, the patient is given 75 mcg of fentanyl, 60 mg of propofol induction, and 10 mg of rocuronium muscle relaxant. The patient was given pre-oxygenation using 100% oxygen at 6 L/minute. After the oxygen is sufficient and the patient has entered the anaesthesia stage, the patient is intubated using a size 7 endotracheal tube and 10 cm long fixation and then connected to a machine with a control ventilator mode, the ratio of O2 and N_2O is 60:40 with a low flow of ± 4 Liters. Then the eyes were covered with gauze and then plastered. After the patient is intubated, a nasogastric tube is installed in emergency surgery to prevent aspiration and gastric decompression in patients who are not fasting enough. When the first incision is performed, the inhalation agent sevoflurane is raised to 6% MAC. Then sevoflurane maintenance ± 2% MAC.

In the intra-anaesthesia phase, hypovolemia occurs characterized by a pre-shock phase, namely pulse frequency 160 x/minute, blood pressure 148/102 mmHg, 5 minutes after which there is a significant drop in blood pressure to 60/45 mmHg, and pulse frequency 80 x/minute. The interventions given were the ideation of signs and symptoms of hypovolemic shock, identification of ABC (airways, breathing, circulation), collaboration of the administration of

strong anti-hypotension, inotropic vasoconstriction, namely norepinephrine 3.0 ml/hour using a syringe pump. After previously being given 10 mg of ephedrine, it was not strong enough to raise blood pressure to 120/65 mmHg, pulse rate 90 x/minute. Hemodynamic were stable during 1 hour and 50 minutes of surgery. The fluid that entered during the operation was 2500 cc Asering, and 250 cc concentrated urine, with minimal bleeding. The patient was transferred to the ICU with a ventilator, norepinephrine titration of 3.0/hour, and postoperative analgesics were given a ketorolac drip of 30 mg in a 500 cc Asering 20 drops/minute.

3.2.3 *Post-Anaesthesia Care Process*

The post-anaesthesia phase has the risk of meeting fluid and electrolyte needs. The interventions given in this phase are monitoring fluid intake and output, monitoring urine output, observing vital signs, identifying signs of hypovolemia, measuring Aldrete Score, and transferring the patient to the intensive care unit. The patient was transferred to the ICU with a general state of consciousness of blood pressure 150/78 mmHg, pulse rate 120 x/min, respiratory rate 20 x/min, oxygen saturation 98%, the final result of Aldrete Score 6 assessment, during treatment in the ICU hemodynamic and the patient's respiration was stable. Based on the recommendation of the anaesthesiologist, namely norepinephrine titration, and O_2 SIMV mode ventilator, if the patient is fully conscious and breathing is good, it can be extubated. Treatment of nausea and vomiting is given ondansetron 2x4 mg. Then check routine blood, albumin, blood glucose, urea creatinine, and electrolytes. When the pain VAS > 4, fentanyl titration and ketorolac drip 60 mg in Ringer Lactate 500 ml 20 drops/min.

4 Discussion

Ileus obstruction is a condition in which the contents of the gastrointestinal tract cannot be reached due to a blockage or mechanical obstacle due to damage to the intestinal lumen, then necrosis occurs in that part of the intestine (8). Ileus obstruction is the leading cause of pain and death, causing about 30,000 deaths and more than 3 billion in medical costs each year, with 20% of cases requiring surgery (4).

Ileus obstruction is generally caused by adhesions. Previous research stated that the four main causes of obstruction are hernia, adhesions, volvulus, and intussusception (9). Patients will experience flatulence that lasts slowly, in contrast to sudden symptoms that occur due to mechanical obstruction. The pain usually spreads and persists without signs of the peritoneum. Other common symptoms include nausea and vomiting as well as delayed or no bowel movements, infrequent or even absent bowel movements, and loss of ability to tolerate oral food intake (10).

Obstruction of the small intestine is characterized by dehydration and hypovolemia due to fluid loss. Sufferers of ileus obstructive are often characterized by abdominal pain, nausea or vomiting, balance disturbances, excessive thirst, and hypovolemic shock (11). It should be noted that fluid intake in adults' daily averages 2500 ml, including 300 ml as a byproduct of the body's metabolism. The fluid loss per day is 2500 ml and usually 1500 ml comes out in the form of urine, 400 ml through respiratory evaporation, 400 ml through skin evaporation, 100 ml through sweat, and 100 ml through faeces (12).

The main source of hypovolemic shock is the gastrointestinal tract, one of which is intestinal obstruction. The digestive system usually excretes 3 to 6 litters of water daily. However, most of this fluid is returned and only 100-200 ml is lost through the stool. Volume

loss occurs when the digested secretions exceed the reabsorbed secretions. This dehydration occurs when severe vomiting, diarrhoea, intestinal obstruction, or external drainage through a stoma or fistula. Hypovolemic shock can be caused by a decrease in intravascular fluid due to extracellular fluid loss as well as blood loss (13). Hypovolemic shock occurs when blood flow is disrupted due to a loss of internal volume (water or blood). Reduction of effective blood circulation leads to tissue hypoperfusion and tissue hypoxia. If left untreated, hypovolemic shock can cause ischemic damage to vital organs and lead to multi-organ failure (14).

Impaired respiratory function, impaired electrolyte and acid-base balance, and hypovolemia are anaesthesia health problems. The clinical caused by intestinal obstruction can be systemic, such as dehydration, hypovolemia, oliguria, electrolyte imbalances, and flatus-negative (15). In this case, the results of the hypoxemia examination with 86% oxygen saturation are difficult to read by pulse oximetry, tachypnoea, and hyperventilation. The history of chronic bronchitis, acute hepatitis, and cardiomegaly suffered also worsened the patient's condition. Low blood oxygen levels or hypoxemia is one of the side effects of hypobaric hypoxia that can also be caused by dehydration. Hypoxemia occurs due to various reasons, such as insufficient blood supply to the lungs and impaired blood flow to the heart.

Electrolyte balance disorders appear in the form of hypovolemia. Some of the symptoms of hypovolemia are blood pressure below normal limits and low temperature in the periphery. The pre-shock stage is characterized by a compensatory mechanism with increased pulse frequency, increased cardiac contractility, and peripheral vasoconstriction. When the volume of body fluids continues to decrease, especially when the volume reaches 25-30% of the effective blood volume, the patient will experience shock with a decrease in systolic blood pressure, tachycardia, and oliguria. As a result, the delivery of oxygen to all major organs of the body cannot meet the oxygen needs. Cells switch from aerobic to anaerobic metabolism, producing lactic acid. As the sympathetic nervous system develops, it diverts blood flow from other organs to keep blood flowing to the heart and brain. These differences in blood alliances cause ischemic tissue and widespread lactic acidosis. If left untreated, decreased hemodynamic, refractory acidosis, and further decline in cardiac output can lead to multiple organ failure and death (13).

In hypovolemic patients susceptible to the side effects of vasodilators, inhaled anaesthetic agents, propofol, and histamine release-related drugs, the need for medication should be reduced to compensate for the decrease in the amount of distribution. Hypovolemic patients are particularly susceptible to sympathetic nerve blockades caused by spinal or epidural anaesthesia. If anaesthesia is given before hypovolemia resolves, the selection of general anaesthesia is safer to use (12).

The patient's clinical condition looks pale, the rectal is palpable, the patient is given an analgesic of opioid fentanyl 75 mcg, induction of propofol 60 mg and rocuronium 10 mg in doses that have been adjusted for hypovolemic conditions can minimize the risk, and increase safety during the surgical procedure. Management of hypovolemic shock, one of which is by administering a strong anti-hypotension inotrope, norepinephrine with a syringe pump. However, it should be noted that hypovolemia due to hypovolemia must be with fluid resuscitation (16).

In this case, an intervention related to intraoperative electrolyte administration with 2500 ml crystalloids to correct fluid needs during surgery is the right approach to overcome fluid loss caused by bleeding, evaporation, and anaesthetic effects. Evaporation loss is essential for thermoregulation because the amount reaches 20%-25% heat loss (12). The choice of intravenous fluids during and after surgery is greatly influenced by isotonic fluids, with hypotonic crystalloids accounting for 3% of intraoperative fluid and 9% in the postoperative

period. In severe volume depletion, not due to haemorrhagic acid, crystalline resuscitation is preferred over colloidal solution. The type of crystalloid used for patient resuscitation is adjusted based on laboratory values, estimated resuscitation volume, and acid-base status (13). Resuscitation of the right type and amount of fluid is necessary to improve blood circulation because therapy can increase blood vessel flow and increase cardiac output, which is the most important part of the treatment of hypovolemia. The main management of hypovolemia is fluid therapy to replace lost body fluids or blood. Crystalloid administration is continued if hemodynamic improves. If there is no improvement in hemodynamic, the choice of colloids is indicated and prepared for blood transfusion (14).

In the pre-anaesthesia phase, a thorough assessment of the patient's condition is very important, especially in patients with ASA III E status that indicates the presence of comorbidities. In general, the purpose of pre-anaesthesia assessment is to ensure that the patient can tolerate the planned activity and reduce the risk of anaesthesia complications such as respiratory and cardiovascular complications (17).

In these cases, the risk of impaired respiratory function characterized by the presence of hypoxia and a decrease in oxygen saturation requires immediate intervention. Oxygen administration with a 10 L/min non-rebreathing mask can increase oxygen saturation from 86% to 96% indicating the success of the intervention, in line with previous findings indicating that proper oxygenation will improve patients' clinical outcomes. After administering oxygen with a non-rebreathing mask of 10 L/min, oxygen saturation increased from 82% to 93% (18).

The intra-anaesthesia phase indicates the occurrence of hypovolemia. The measurement results showed a pre-shock phase, namely high pulse frequency and blood pressure, then a significant decrease in blood pressure and pulse frequency. In the early stages of shock, the pulse pressure increases due to vasoconstriction, but eventually, hypotension occurs. The initial treatment for hypovolemic shock is volume expansion with crystalloid drugs (19). Synthetic colloids increase the risk of kidney failure and death, especially in septic shock. Emergency resuscitation focuses on the use of erythroid fluids, except in cases of severe bleeding or severe injury. Crystalloid fluids are ideal for use in first aid because they can quickly increase intravascular volume through the administration of a small amount of fluid, improve heart function, and do not cause undepleted narcotics in the intravascular space. Currently, colloidal fluid is more suitable for use in medicine than crystalloids, so it lasts longer as a protective fluid in the circulatory system (20). Fluid resuscitation is carried out in hypovolemic shock patients with the administration of crystalloids of 20 – 40 cc/kgBB (21).

The administration of norepinephrine as a vasopressor represents a critical step in managing the patients hemodynamic. Previous research has stated that norepinephrine is an adrenergic receptor agonist that increases peripheral resistance and blood pressure through the effects of peripheral vasoconstrictors. Norepinephrine is such a concentrated drug that the administration of norepinephrine must first be diluted in a dextrose solution before being administered. Norepinephrine administration is the first choice if the patient has hypotension during or after fluid resuscitation to maintain a MAP (mean arterial pressure) greater than 65 mmHg (22). Other research has also shown that norepinephrine is effective in increasing blood pressure in patients with hypovolemic shock (21).

In the post-anaesthesia phase, monitoring fluid and electrolyte needs is important, especially for patients with hypovolemia. These measurements are important for determining water needs and preventing problems such as dehydration or excess fluids (23). In these cases, observation of the output of concentrated urine indicates dehydration, which requires more attention. The fluid that entered during the operation was 2500 cc crystalline, 250 cc of concentrated urine, minimal bleeding, and the final result of the Aldrete Score 6 assessment.

The patient was transferred to the ICU on a ventilator. Patients undergoing general anaesthesia are monitored according to the criteria determined by the Aldrete score. If the Aldrete score is 9, the patient can be transferred to the treatment room, less than 9 patients are transferred to the ICU room (24).

5 Conclusion

Ileus obstructive is a critical condition that requires careful anaesthesia management to prevent serious complications. For patients with higher risk levels, like those with ASA III E, a thorough assessment before anaesthesia, quick response to signs of hypovolemia, and close monitoring after surgery are essential to keep the patient stable and safe. This study highlights how a compassionate, evidence-based approach can improve outcomes in critical conditions. Although our findings are limited by the small sample size, future studies with more participants could provide deeper insight into effective anaesthesia care for complex cases.

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