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General Anesthesia Technique in Postpartum Hemorrhage Patients with Anemia, Hypovolemic Shock

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Abstract. Maternal death can occur during pregnancy, childbirth, and the postpartum period. One of the causes of maternal mortality is postpartum hemorrhage that occurs within 24 hours to 12 weeks after childbirth. The main objective of this study is to manage postpartum hemorrhage patients with anemia and hypovolemic shock using general anesthesia techniques. This is a descriptive case study of a 36-year-old woman who experienced postpartum hemorrhage with anemia and hypovolemic shock, who will undergo an emergency hysterectomy with general anesthesia using a 7.0 size endotracheal tube as one of the options. Data were collected through observation during the pre, intra, and post anesthesia periods and data medical records. Data were taken on August 27, 2024, at RSU Duta Mulya Majenang, Central Java, Indonesia. During the intraoperative phase, fluid resuscitation and blood transfusion were performed to stabilize the patient's condition, and after the hysterectomy was completed, the patient was transferred to the ICU for closer monitoring to prevent ongoing bleeding.

1 Introduction

Maternal death can occur during pregnancy, childbirth, and postpartum periods. The number of recorded maternal deaths in 2022 was 3,572 cases and increased by 4,482 cases in 2023(1). Some of the causes of maternal mortality are bleeding, postpartum sepsis, eclampsia, anemia, abortion complications and some deaths are not directly (1). Cases of maternal mortality caused by postpartum hemorrhage are greatly increasing in Indonesia, there were around 300 cases in 2019 and 6,800 deaths in 2021(2). Postpartum hemorrhage is still the leading cause of infant mortality and morbidity in most of the world's major countries(3). With an incidence of 5% to 10% of all deliveries, postpartum hemorrhage is the primary cause of maternal death globally(4).

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Postpartum hemorrhage is a condition in which blood loss exceeds 0.5 liters within 24 hours. Postpartum bleeding according to the WHO World Health Organization is a condition in which the mother loses > 500 ml of blood within 24 hours after giving birth(5). Postpartum hemorrhage is an obstetric emergency that causes maternal mortality worldwide. The cause of postpartum bleeding can be caused by uterine atonia, placental retention, tearing of the birth canal and the presence of blood clotting disorders(6).

The illness known as anemia is characterized by a low concentration of hemoglobin or red blood cells(7). Because low hemoglobin reduces the body's ability to carry oxygen, the tissues' and important organs' physiological needs may not be satisfied(8). In research pregnant women with anemia are five times more likely to experience postpartum hemorrhage than mothers without anemia (9). Anemia results from a reduction in hemoglobin levels as bleeding occurs.

Shock is an acute syndrome brought on by cardiovascular disease and the circulatory system's incapacity to supply oxygen and nutrients to meet the essential organs' metabolic demands. Another name for hypovolemic shock is preload shock, which is defined by a drop in intravascular volume brought on by bleeding. Other bodily fluid loss can also result in hypovolemic shock. The term "hemorrhagic shock" particularly describes an acute, large-scale blood loss that leaves the circulatory volume insufficient.(10) When substantial bleeding occurs, patients may have hypovolemic shock symptoms.

WHO made several recommendations to treat postpartum hemorrhage and last effort for such treatment with hysterectomy(4). Postpartum hemorrhage can result in hypovolemic shock in the event of massive bleeding that causes hemodynamic instability. The anesthesia technique offered in the hysterectomy procedure is in the form of general anesthesia because it requires strict monitoring, maintaining the airway and fluid management which is very important to ensure the safety of patients with critical conditions (11).

Based on the description above, the researcher is interested in finding out how to treat postpartum hemorrhage patients with anemia, hypovolemic shock with general anesthesia techniques.

2 Method

The method in this study uses a case study description. In this study, the data is presented descriptively with narration. Samples were taken from cases of patients diagnosed with postpartum hemorrhage with anemia and hypovolemic shock. Data were collected through observation during the pre, intra, and post anesthesia periods and data medical records. Data were taken on August 27, 2024, at RSU Duta Mulya Majenang, Central Java, Indonesia. This research aims to describe the anesthesiology nursing care for patients with postpartum hemorrhage, anemia, and hypovolemic shock who will undergo general anesthesia.

3 Case History

Ms. A 36 year old weighing 58 kg, Admitted to the hospital on August 27, 2024 in the emergency room, the patient said that post SC H 27 and bleeding since 3 pm as many as 5 underpads of bleeding ± 500 cc were carried out 1000ml liquid loading action, previously the patient was rushed to the health center there had been given Rl 1000ml liquid loading, tranexamic acid 1 gr, Phytomenadione 10mg, methylergometrine maleate. Judging from the

anamnesis, there was no food or drug allergy, the patient had no history of systemic diseases, had a history of Sectio Caesarea + IUD surgery for 27 days, at the LEMON examination there were no difficulties, on the B2 examination it was seen that the conjunctiva looked anemical, the acrals were warm, looked pale, bleeding occurred in the uterine area. The patient was diagnosed with a history of post SC + H27 IUD with P3A1 PPV, anemia, hypovolemic shock. In this case, the patient must undergo immediate surgery to overcome hypovolemic shock and to prevent death in the mother. Determined physical status of ASA 2E and planned hysterectomy with general anesthesia technique with endotracheal tube (ETT) requires immediate surgical action. From the emergency room, the patient was taken to the VK room and given ceftriaxone 500 mg as an antibiotic, the patient was fitted with an intrauterine balloon or tamponade condom which is used in the treatment of postpartum bleeding due to uterine atonia but bleeding still occurs, therefore a Pro Hysterectomy procedure is performed.

3.1 Pre Oprative

Preoperative evaluation, there is still massive bleeding that causes hypovolemic shock in patients, monitoring of hemodynamic status is needed such as blood pressure 80/50 mmHg, pulse rate 80 x/min palpable but not strong, respiration 20 x/min, SpO2 97%. Preparation of complete STATICS equipment, non-invasive monitors and ecg. Because the patient is bleeding, prepare with two IV access points (intravenous) no 18, order 3 blood clots. There was a decrease in awareness of the state of apathy of GCS V4M4E4. In the supporting examination, there were hemoglobin (6.8g/dL), erythrocytes (2.4510^6/µL), hematocrit (21.4 %10^6/µL), platelets (14210^6/µL), MCH (27.8pg), MCHC (31.9g/dL), PO2 (193 mmHg), SO2 (100%), Lactate (2.7 mmol/L) GDS (221.9 mg/dL) Sodium (148.8 mmol/L), Chloride (121.8 mmol/L), HCO3 (21.2 mmol/L), Beecf (-4.4 mmol/L), TCO2 (22 mmol/L)[Figure table 1] . Laboratory results conclusion shows, hemoglobin, erythrocyte, hematocrit, thrombocyte, MCH, and MCHC levels are low due to hemorrhagic shock, high leukocyte levels are due to infection or other disease causes, triggered by bacterial infection, the higher the PO2, the higher the hemoglobin binding capacity (oxygen saturation), lactate levels are too high, it causes the blood to become too acidic; lactate accumulation occurs due to low oxygen entering the blood, high GDS levels are caused by lactate accumulation, and high sodium and chloride levels are due to fluid deficiency. RL is installed iv in both hands to meet fluid needs.

Table 1. Laboratory Test Result

Test	Result
Hemoglobin	6.8g/dL
Erythrocytes	2.45 10^6/µL
Hematocrit	21.4 % 10^6/µL
Thrombocytes	142 10^6/µL
MCH	27.8pg
MCHC	31.9g/dL
PO2	193 mmHg
SO2	100%
Lactate	2.7mmol/L
HCO3	21.2mmol/L
Beecf	-4.4mmol/L

TCO2	22 mmol/L
Random blood glucose	221.9 mg/dL
Sodium	148.8mmol/L
Chloride	121.8 mmol/L

The [Figure 1] below shows the results Cor,CTR = 0.67, no bilateral pleural space enlargement is seen, both diaphragms are smooth, not horizontal, the intact visualized skeletal system, effect Pulmo within normal limits. The result cor and pulmo within normal limits.

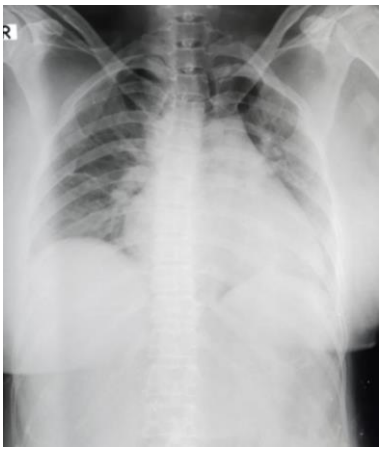

Figure 1. Thorax AP

The obgyn doctor suggested that the intrauterine balloon be removed first. because the bleeding has not stopped, surgical intervention was performed, specifically a hysterectomy. The patient fasted for 4 hours. after the patient enters the operating room, the first thing done are given preremediation of ondansetron 8 mg, ketolak 30 mg, dexamethasone 10mg, tranexamic acid 1gr. During hysterectomy surgery, the patient was given blacket to avoid hypothermia due to blood transfusion, vital signs were observed every 5 minutes.

3.2 Intra Operative

Intra-patient monitoring is positioned as supine, non-invasive monitor is installed, bleeding cannot be conditioned after that preoxygenation with 100% oxygen without positive pressure ventilation, continue to administer opioid drugs sufentanyl citrate 10 mcg, ketamine 100 mg, ketamine can be recommended for patients at risk of hypotension, rocuronium bromide 10 mg is given through IV, make sure the onset of muscle paralysis drugs reaches the onset then oral intubation with endotracheal Tube (ETT) no 7.0 and drugs maintenance of O2 anesthesia: N2O = 2:2, sevoflurane 6% at the beginning after intubation ends sevoflurane is lowered to 2%. Given 1 gram of tranexamic acid to stop bleeding. fluid output input was evaluated periodically, urine production reached 1300cc. Resuscitation therapy was carried out with the administration of crystalloid fluid, colid and blood transfusion had been inserted HEST 1000 cc, RL 200 cc and blood transfusion 400ml/2kolf slowly, after one hour 1 gr of paracetamol and Nacl 300 were given.

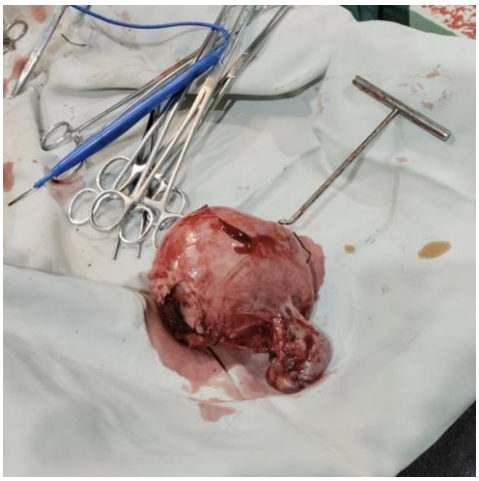

Figure 2. Hysterectomy Total

The [Figure 2] above shows the condition after a total hysterectomy has been performed.

3.3 Post Operative

The surgery lasted for 2 hours, hysterectomy surgery was completed, atropine sulfas and neostigmin were given to eliminate the effects of non-depolarizing muscle paralyzing drugs in anesthesia, then conscious extubation was carried out on high-risk patients such as airway difficulties. Monitoring of the Aldrate score was conducted; the patient can only move two upper extremities. The patient is on a non-rebreather mask with 10 liters, blood pressure is 110/95 mmHg, and the respiratory rate is 21 times per minute. The patient wakes up when called, has a pale face, and an aldrate score of 5 was obtained. the patient was transferred to the ICU for further monitoring.

4 Discussion

According to the American College of Obstetricians and Gynecologists (ACOG), bleeding is defined as the loss of blood >1000 or equal to 1000 ml accompanied by signs or symptoms of hypovolemic shock that appear within 24 hours after childbirth or the method of delivery(3). The reason of postpartum bleeding in this instance is uterine atony. Research findings (Henriquez et al., 2019) that indicate uterine atony is the most frequent cause of postpartum bleeding lend credence to this(12). Uterine atonia is defined as the absence of uterine muscle contractions after childbirth, uterine atonia itself can cause patients to experience anemia(6). The condition of women who experience anemia with hemoglobin levels of <11 g/dL will be easily disturbed. According to Prawirohardjo, if there is excessive bleeding, there can be changes in vital signs, for example a decrease in consciousness, a < 90 mmHg and a pulse > 100 x/min, pale face, cold ears, shortness of breath, so it must be treated as soon as possible(6). Due to a decline in hemoglobin, erythrocytes, hematocrit, platelets,

MCH, and MCHC all of which carry oxygen to the body the patient exhibited symptoms indicating a danger of hypovolemic shock and was given oxygen.

Shock is a disorder in blood circulation characterized by a lack of oxygen transport to tissues that can interfere with hemodynamics(13). This makes the heart unable to pump enough blood to the body or causes severe anemia to carry oxygen to the body(14). Uncontrolled blood loss conditions can result in hypovolemic shock where the sudden loss of blood volume is drastically reduced and can interfere with the function of the body's organs and blood circulation is not optimal, clinical signs and symptoms of hypovolemic shock tachicardia, tachypneu, dizziness, pallo. Interventions carried out for the treatment of hypovolemic shock ensure patent airways, ensure oxygenation by applying positive pressure, prepare intubation and mechanical ventilation if needed, ensure 2-line IV access, monitor urine production, monitor bleeding, administer fluids (cristraloids, colloids, and blood products), check the level of basal , make sure there is no trauma in the patient's body, all this is done during and after surgery (13).

Hysterectomy is an indication of medical management of endometriosis, fibroids, abnormal uterine bleeding, or prolapse(15). A peripartum hysterectomy is an emergency measure aimed at stopping severe obstetric bleeding. The indication for hysterectomy is uterine atonia(16). Hysterectomy surgery can be performed with regional anesthesia or general anesthesia techniques. However, in the above case, there is excessive bleeding which causes hypovolemic shock with symptoms of pale skin, rapid pulse, decreased blood pressure (hypotension), decreased consciousness, therefore the anesthesia technique chosen is general anesthesia. General anesthesia is performed to reduce the occurrence of hypotension and decreased consciousness due to bleeding, lack of fluids and the risk of aspiration due to unfulfilled fasting time. The theory is supported by (Hasibuan et al., 2024) research result which state that when patients with spinal anesthesia experience bleeding and fluid intake also increases, which can cause hypothermia and end in shivering(17). This study is in line with research (Chandraningrum et al., 2022) stating that hypotension occurs more frequently in patients using spinal anesthesia compared to general anesthesia(18).

The selection of drugs for induction of anesthesia greatly impacts the success of the procedure and hemodynamic stability(19). The administration of ketamine during anesthesia induction can be a choice because its effects on the cardiovascular system and respiratory depression are less compared to using propofol. Ketamine has an induction dose of 1-4.5 mg/ml, and its effect can lead to an increase in hemodynamics(20).

Excessive or massive bleeding is the rapid loss of blood volume, the need for resuscitation and blood transfusion treatment in the patient. Patients who experience massive bleeding can potentially be life-threatening(21). The principle in resuscitation therapy is to optimize oxygen delivery and perfusion to the organs and reduce O2 consumption. One of the risk factors for bleeding is obstetric emergency. In patients with postpartum hemorrhage, the need for large blood transfusions is frequent(22). Therapy for resuscitation during surgery is to make sure the primary ABCDE, give crystalloid fluids, colloids or blood transfusions according to the blood lost(23). Next, administer vasopressor in case of severe hypotension to maintain coronary perfusion, lower the dose of inhaled anesthetic drugs, replace with the administration of ketamine or opioids, administer resuscitation in a ratio of (1:3) 100ml of blood loss is replaced with 300ml of crystalloid, and blood transfusion is performed if bleeding >30% of blood volume (adult men 70ml/kg, and women 65ml/kg), give 1g of tranexamic acid in 10 minutes.

5 Conclusion

The most dangerous obstetric emergency is postpartum hemorrhage. One of the treatments to stop the bleeding is balloon tamponade, but when tamponade treatment cannot stop the bleeding, the last step according to WHO is to perform a hysterectomy. Preoperative assessment and thorough preparation are necessary for surgical procedures in patients with postpartum hemorrhage. Initial anesthesia preparation is needed to determine the perioperative plan, including blood preparation and the implementation of massive transfusion protocols. General anesthesia technique with an endotracheal tube (ETT) can be an option, as it can prevent hypotension, decreased consciousness, difficulty breathing, and the risk of aspiration due to bleeding. Postoperative care is conducted in the intensive care unit (ICU) for close monitoring.

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