GSC Biological and Pharmaceutical Sciences
eISSN: 2581-3250 CODEN (USA): GBPSC2
Cross Ref DOI: 10.30574/gscbps
Journal homepage: https://gsconlinepress.com/journals/gscbps/

(REVIEW ARTICLE)

Check for updates

Massive transfusion in placenta percreta in obstetric patients, how far can an anesthesiologist go?

Yudi Pratama * and I Putu Kurniyanta

Department of Anesthesiology, Pain Management, and Intensive Care, Udayana University, Sanglah General Hospital Bali, Indonesia.

GSC Biological and Pharmaceutical Sciences, 2025, 31(02), 123-126

Publication history: Received on 13 March 2025; revised on 14 May 2025; accepted on 16 May 2025

Article DOI: https://doi.org/10.30574/gscbps.2025.31.2.0183

Abstract

Massive bleeding during obstetric surgery such as hysterectomy is the number one cause of maternal mortality and morbidity. Fluid resuscitation is mandatory in this case. Massive Transfusion Protocol is an important live-saving management in massive blood loss in obstetric case. We present a case of a healthy 38-year-old female with third pregnancy who was scheduled to have a Sectio Caesarean and hysterectomy procedure due to placenta acretta and have a massive bleeding intraoperatively.

Keywords: Hysterectomy; Fluid resuscitation; Liberal Fluid resuscitation; Massive Bleeding

1. Introduction

Massive bleeding during obstetric surgery such as hysterectomy is the number one cause of maternal mortality and morbidity. Fluid resuscitation is mandatory in this case. But how far can an anesthesiologist go with fluid resuscitation? Intraoperative guidelines and fluid requirements ideal formula that is perfect for every patient, anytype of surgery, and conditions was unrealistic. The main problem is the heterogeneity definition and terminology of hypotension, tissue perfusion, liberal/restrictive fluid balance that is still confusing and cause great variations of fluid prescription from the selection, timing, and doses of IV fluids. Restrictive and liberal fluid resuscitation during massive bleeding intraoperatively has always been a long debate. Liberal Fluid approach is associated with several complications such as tissue and pulmonary edema, coagulopathy, hyperchloremic acidosis, and transfusion-related diseases. While restrictive fluid administration is associated with tissue hypoxia and injury, along with hypoxia associated acidosis. Mean Arterial Pressure (MAP) less than 65 mm Hg intraoperatively, is associated with myocardial and kidney injury. The main goal for fluid replacement is maintaining cardiac output while avoiding the harmful side effect of overload fluid administration.[1,2]

Massive transfusion protocol (MTP) is a critical, systematic approach to managing massive blood loss, particularly in obstetric emergencies such as postpartum hemorrhage, uterine rupture, or placental abruption, where rapid and severe bleeding can be life-threatening. The protocol typically involves the timely administration of a balanced ratio of blood components—packed red blood cells (PRBC), fresh frozen plasma (FFP), and platelets—in a ratio of approximately 1:1:1 to restore circulating volume, oxygen-carrying capacity, and coagulation function. Early activation of MTP is essential to prevent the lethal triad of hypothermia, acidosis, and coagulopathy. In obstetric cases, coordination among obstetricians, anesthesiologists, hematologists, and blood banks is crucial to ensure rapid delivery of blood products and close monitoring of vital signs, hemoglobin levels, coagulation parameters, and acid-base balance. Additional considerations include the use of uterotonics, surgical interventions to control bleeding, calcium supplementation to counteract citrate toxicity from transfusions, and tranexamic acid to reduce fibrinolysis. Prompt recognition and

* Corresponding author: Yudi Pratama

Copyright © 2025 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution Liscense 4.0.

implementation of MTP significantly improve maternal outcomes by minimizing delays in treatment and reducing morbidity and mortality associated with massive obstetric hemorrhage.[3,4]

2. Case Presentation

A healthy 38-year-old female with third pregnancy G2P1002 at 34 weeks of gestation was scheduled to have a Sectio Caesarean and hysterectomy procedure due to placenta acretta with PAS 1, S1, Type 3, High Suspicios of Diffuse AIP, Marginal implantation cord insertion in plasenta. The patient had a normal pregnancy with no complaint and no history of chronic illness. The patient actual body weight was 73kg. With BMI of 27.2kg/m2. The preoperative blood work showed slight anemia with Hb 10.4 g/dL, Low albumin 2.8 g/dL, and slight low kalium 3.37mmol/L.

Before the anesthesia, we gave 1000ml of crystalloid. A Spinal Anesthesia was done using 15mg of Marcain 0.5% at L3-L4 level. The Skin prick test shows the sensory block at T6. The hemodynamic was stable after spinal anesthesia and the beginning of the surgery. We gain three peripheral vein access. And hemodynamic was invasively monitored using arterial line.

After the baby was delivered the surgeon starts the hysterectomy. During the hysterectomy, the surgeon has difficulty controlling the bleeding since the adhesion was found in several big arteries and veins and there is also adhesion to the bladder which cause fourth degree of bladder rupture. Norepinephrine (0.1 -0.3 mcg/kg/minute), Dobutamine (5mg-15mcg/kg/minute) and Epinephrine (0.1-0.3 mcg/kg/mnt) the added to help keeping the MAP above 65. Patient urine output was difficult to assess since the patient has 4th degree of bladder rupture. We decided to switch to general anesthesia, and patient was then intubated using rocuronium and ketamine, and fentanyl. The bleeding was active until the third hour and with total bleeding of 9000 liters. We keep delivered crystalloid and crystalloid with ratio about 3:1 and 4 packs of Packed Red Blood Cells. Total Crystalloid was 6500lt, Colloid 1500lt, and PRC 926lt, FFP 368 ml, TC 412ml. The assessment of Periorbital edema, pulmonary edema was assessed every 30 minutes. After the fourth hour and bleeding can be controlled, the urologist repaired the bladder and close the wound. The patient was transferred to the ICU still intubated. The post operative Hb was 7,2 g/dL and another 3 packs of PRC was given untul the Hb was 9.8g/dL. The hemostasis blood work show slight increase in INR into 2.3. The hemodynamics postoperatively was relatively stable and the norepinephrine was able to be titrated down and off after 36 hours.

After observation in the ICU, the patient has no ronchi or periorbital edema, The patient was able to be extubated after 2 days with no compolication.

3. Discussion

Massive bleeding during obstetric surgery is the number one cause of maternal mortality and morbidity. Pregnant women can tolerate bleeding up to 1500ml due to hemodilution and high cardiac output during pregnancy there's a drop in hemoglobin or clinical symptoms. Hemodilution may play a beneficial role in this patient since the massive diluted bleeding can slow the rate of the actual RBC out of the body, So we can catch up the bleeding with PRC transfusion. And the DO2 can still be maintained. This causes dilutional anemia which is a relative reduction in hemoglobin (Hb) concentration. [1,2,3]

Massive transfusion protocol (MTP) is a standardized, rapid-response strategy designed to manage patients experiencing massive hemorrhage, including those in obstetric emergencies such as postpartum hemorrhage (PPH), placental abruption, uterine rupture, or invasive placentation. In obstetric cases, massive blood loss is typically defined as blood loss exceeding 1000 mL with ongoing bleeding and signs of hemodynamic instability. The goal of MTP is to restore circulating blood volume, maintain adequate oxygen-carrying capacity, and correct coagulopathy that may develop due to dilution, consumption, or hypothermia. A balanced transfusion approach, often using a ratio of 1:1:1 (packed red blood cells : fresh frozen plasma : platelets), is commonly applied to mimic whole blood and reduce the risk of coagulopathy and other transfusion-related complications.[1,4] In this patient, the massive transfusion of PRC, TC and FFP intraoperative is aimed to instantly replaced the massive blood loss and avoid the further hemodynamic collapsed. But the fluid and blood replacement alone is not enough to support the blood loss and 3 types of vasopressor is needed to support the hemodynamic.

Early activation of MTP in obstetric settings is critical for improving maternal outcomes. It involves a multidisciplinary team approach including obstetricians, anesthesiologists, hematologists, and nursing staff. Alongside transfusion, monitoring of coagulation parameters (e.g., fibrinogen levels, PT/aPTT, platelet count) and use of adjuncts such as tranexamic acid (TXA) and fibrinogen concentrate may be necessary. Special attention must be paid to preventing the

"lethal triad" of hypothermia, acidosis, and coagulopathy. Warm IV fluids and blood products, maintaining normothermia, and close monitoring of acid-base status are essential components of care. Massive transfusion in obstetrics is time-sensitive and life-saving, and proper implementation of MTP protocols can significantly reduce maternal morbidity and mortality in severe obstetric hemorrhage. [3,4]

Another important aspect of the massive transfusion protocol (MTP) in obstetric cases is the monitoring and correction of coagulopathy, which often accompanies severe hemorrhage. As large volumes of red blood cells are transfused, the dilution of clotting factors and platelets can lead to a coagulopathic state, increasing the risk of ongoing bleeding. Therefore, frequent laboratory monitoring—including prothrombin time (PT), activated partial thromboplastin time (aPTT), fibrinogen levels, and platelet counts—is essential to guide targeted transfusion therapy. In obstetrics, maintaining fibrinogen levels above 2.0 g/L is especially crucial, as low fibrinogen is strongly associated with poor hemostasis and adverse outcomes. Point-of-care testing such as thromboelastography (TEG) or rotational thromboelastometry (ROTEM) can provide real-time assessment of coagulation status and help direct specific interventions more rapidly than conventional labs. In addition, the use of antifibrinolytic agents like tranexamic acid (TXA) within three hours of bleeding onset has been shown to significantly reduce maternal mortality due to hemorrhage. Thus, beyond volume resuscitation, effective MTP requires a proactive strategy to identify and correct coagulopathy early, optimize clot formation, and ultimately achieve hemostasis. [5,6] In this patient the patient showed post opeative increase in INR but, the post operative bleeding is controlled and minimal. This abnormality is resolved after 2 days in the ICU.

Volume overload and its effect is the main concern of a large volume of fluid administration. This can cause pulmonary , interstitial, and encapsulated organ edema; Hemodiluted coagulopathy and thrombocytopenia; hemodiluted anemia, hypoalbuminemia and acidosis especially in hyperchloremic acidosis when the patient was given large volume of normal saline.[7] Through goal-directed approach with close hemodynamic monitoring to guide the anesthesiologist in fluid, vasopressor, or inotropic prescription intraoperative, we can avoid the volume overload based on fluid responsiveness. Even after intensive monitoring, volume overload is still difficult to predict or avoid. Monitoring of volume overload signs should be done especially at the first 24 hours so early 'de-resuscitation' can be done using albumin or diuretic to promote diuresis. In this patient, besides clinical signs of volume overload, we used an invasive arterial line and USG (IVC distensibility index) to check patient volume status and fluid responsiveness. In this patient the patient showed no post operative edema, such as lung or periorbital edema, and it is check every 2 hours using lung ultrasound.[5,8]

4. Conclusion

In conclusion, the implementation of a massive transfusion protocol (MTP) in obstetric cases of massive blood loss is a critical, life-saving intervention that ensures timely and balanced replacement of blood components, correction of coagulopathy, and stabilization of the patient's hemodynamic status. By following a structured, multidisciplinary approach and utilizing a balanced transfusion strategy—alongside careful monitoring and adjunctive therapies—MTP significantly reduces the risk of maternal morbidity and mortality associated with severe obstetric hemorrhage. Early recognition, rapid activation, and coordinated team response are essential to achieving optimal outcomes in these high-risk situations.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Thurn, L.; Wikman, A.; Westgren, M.; Lindqvist, P.G. Massive blood transfusion in relation to delivery: Incidence, trends and risk factors: A population-based cohort study. BJOG 2019, 126, 1577–1586.

[2] Khan, K.S.; Wojdyla, D.; Say, L.; Gulmezoglu, A.M.; Van Look, P.F. WHO analysis of causes of maternal death: A systematic review. Lancet 2006, 367, 1066–1074.

[3] Kramer, M.S.; Berg, C.; Abenhaim, H.; Dahhou, M.; Rouleau, J.; Mehrabadi, A.; Joseph, K.S. Incidence, risk factors, and temporal trends in severe postpartum hemorrhage. Am. J. Obstet. Gynecol. 2013, 209, 449.e1–449.e7

[4] Mitra, B.; Cameron, P.A.; Gruen, R.L.; Mori, A.; Fitzgerald, M.; Street, A. The definition of massive transfusion in trauma: A critical variable in examining evidence for resuscitation. Eur. J. Emerg. Med. 2011, 18, 137–142.

[5] British Committee for Standards in Haematology; Stainsby, D.; MacLennan, S.; Thomas, D.; Isaac, J.; Hamilton, P.J. Guidelines on the management of massive blood loss. Br. J. Haematol. 2006, 135, 634–641.

[6] Malone, D.L.; Hess, J.R.; Fingerhut, A. Massive transfusion practices around the globe and a suggestion for a common massive transfusion protocol. J. Trauma Acute Care Surg. 2006, 60, S91–S96.

[7] Mhyre, J.M.; Shilkrut, A.; Kuklina, E.V.; Callaghan, W.M.; Creanga, A.A.; Kaminsky, S.; Bateman, B.T. Massive blood transfusion during hospitalization for delivery in New York State, 1998–2007. Obstet. Gynecol. 2013, 122, 1288–1294.

[8] Nunez, T.C.; Young, P.P.; Holcomb, J.B.; Cotton, B.A. Creation, implementation, and maturation of a massive transfusion protocol for the exsanguinating trauma patient. J. Trauma 2010, 68, 1498–1505.