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Case Report

Emergency transfusion of different rhesus blood type: Will there be complications?

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Abstract

Objective: Antepartum hemorrhage (APH) is one of the leading causes of maternal and fetal mortality worldwide, complicating 2–4% of pregnancies. Considering the probability of blood transfusion, blood testing and cross-matching are essential for the anesthesiologist during perioperative management. Rhesus (Rh) is the second most significant blood group system after ABO. Hence, this blood type system needs to be taken into consideration. Furthermore, in Indonesia, Rh-negative blood types are rare.

Case Presentation: A 39-year-old woman with Gravida IV, three term pregnancies, no preterm pregnancies, no abortions, and three living children (GIVP3003) and gestational age 26 to 27 weeks arrived at the hospital with massive bleeding from the birth canal three hours before admission. The bleeding was fresh red, and the patient had changed diapers twice before arriving at the hospital. She presented hypovolemic shock, a blood pressure of 71/39 mm Hg, and anemic conjunctivas, with a history of B Rh (-) blood type, ongoing HIV therapy, and completed pulmonary tuberculosis (TB) treatment. The hospital's and PMI's (Indonesian Red Cross) blood bank had no Rh (-) bloodstock. An emergency cesarean section under general anesthesia was performed, and a 900 g neonate was delivered. The patient received a total of four stored whole blood (SWB) bags of type B Rh (+) blood products, one SWB bag during surgery, and three SWB bags during recovery in the intensive care unit (ICU).

Conclusion: Rh (+) transfusion in patients with Rh (-) should be the last option in an emergency. The transfusion reaction did not occur right away in the initial transfusion. Under prompt management, the transfusion response and the life-threatening condition were then successfully managed.

Keywords: Antepartum hemorrhage, Blood transfusion reaction, Emergency, Rhesus negative, Rhesus positive

Introduction

Antepartum hemorrhage (APH) is one of the obstetric emergencies that can cause maternal and fetal mortality. It can cause complications in about 2%–4% of all pregnancies (1). During perioperative management, blood tests and cross-matching are essential for anesthesiologists. Following blood grouping based on ABO, rhesus (Rh) is the second most significant among the 33 blood group systems (2). The red blood cell plasma membrane contains specific glycoproteins representing the rhesus antigen, dividing human blood groups into positive and negative according to the clotting responses between erythrocyte antigens and rhesus antibodies. A person is considered rhesus positive (Rh positive) if their erythrocytes have the D antigen and rhesus negative (Rh negative) if they do not. According to the Data and Information Center of the Indonesian Ministry of Health, in 2016, the population of Indonesia was 99.9% rhesus positive and 0.1% rhesus negative. Therefore, clinicians find it challenging to resuscitate patients with a negative rhesus blood type, especially when a blood transfusion is needed. Rh-negative is a rare blood type in Indonesia, and it is necessary to take screening measures for rhesus blood type to prevent hematology transfusion reaction and hematology disease of the newborn (3).

Case Presentation

A 39-year-old woman with GIVP3003 and gestational age 26 to 27 weeks arrived at the hospital with massive bleeding from the birth canal three hours before admission. The bleeding was fresh red, and the patient had changed diapers twice before arriving at the hospital. The patient was known to have a history of negative rhesus blood type, ongoing HIV therapy, and completed pulmonary tuberculosis (TB) treatment. The patient had undergone a cesarean section once.

During the physical examination, it was discovered that the patient had tachypnea with a respiratory rate of

24 breaths per minute. Oxygen saturation was 98% on a simple mask with 6 L/minute oxygen. Further assessment revealed that the patient was in hypovolemic shock, with a blood pressure of 71/39 mm Hg, a pulse of 126 beats per minute, and anemia (the initial examination showed a hemoglobin level of 9.3 grams per decilitre (g/dL)).

The results of her laboratory tests are presented in Table 1. The patient was fully alert. Immediately after the physical examination, resuscitation procedures were done. Two 16 Gauge Intravenous (IV) lines were placed on the patient's right and left hands, and then 750 mL of colloids and 1500 mL of crystalloids were loaded. A Doppler ultrasound was performed. The fetal heartbeat frequency was 142 beats per minute.

The hospital's blood bank and PMI's (Indonesia Red Cross) stock of negative rhesus blood were depleted. At first, there was a dilemma because the family refused to consent to the positive rhesus blood transfusion and an emergency cesarean section. Fortunately, they eventually agreed.

Afterward, the patient was taken to the operating room for an emergency cesarean section under general anesthesia. The patient was then intubated using the rapid sequence intubation technique, and an arterial line was placed. A 900 g, 36 cm neonate was delivered with appearance, pulse, grimace, activity, and respiration (APGAR) scores of 4-5-6, and cloudy amniotic fluid was found. A relatively hidden bleeding of approximately 1500 mL was found during the procedure. The patient's conjunctiva was pale, indicating that she was anemic. As her blood pressure was dropping even though hemodilution had already started, a transfusion with a bag of blood product type B Rh (+) was performed during the procedure to resuscitate the patient. The patient received 400 mL of blood product type B Rh (+), 1250 mL of colloids, and 500 mL of crystalloids throughout the surgery. At this first transfusion, there were no adverse reactions. After the surgery, the patient was taken to the intensive care unit (ICU).

The patient was kept sedated on a ventilator for one hour post-surgery and given norepinephrine support. The patient was given 1.500 mL/24h crystalloid infusion, 1 g/12h cefazoline injection, 500 mg/8 h tranexamic acid, and 10 mg/8h metoclopramide. In addition, 20 IU/24 h oxytocin was given to maintain uterine contractions. For nutrition, the patient was given a low-dose enteral diet. At this point, the postoperative hemoglobin level was 5.8 g/dL,

Table 1. Laboratory examination results

Parameter	Normal range	Initial results	1 hour after surgery	24 hours after surgery
Complete blood count				
Hemoglobin (g/dL)	11.0–14.7	9.3	5.8	9.2
White blood cells (10^3/µL)	3.37–10.0	22.4	26.7	21.2
Platelets (10^3/µL)	150–450	351	220	135
Hematocrit (%)	35.2–46.7	27.6	17.4	27.2
Clinical chemistry				
Blood sugar (mg/dL)	< 200	150	-	103
Blood urea nitrogen (mg/dL)	7–20	10	-	9.6
Serum creatinine (mg/dL)	0.15–1.2	0.9	-	0.6
Albumin (g/dL)	3.4–5.0	2.88	1.88	2.8
SGOT (U/L)	0–37	9	-	-
SGPT (U/L)	0–55	5	-	-
Sodium (mmol/L)	135–145	129	136	140
Potassium (mmol/L)	3.5–5.0	4.1	4.7	3.6
Chloride (mmol/L)	98–107	102	102	104
Partial thromboplastin time (s)	9–12	10	-	17
Activated partial thromboplastin time (s)	23–33	32	-	36.2
Arterial blood gas analysis				
pH	7.38–7.42	7.43	7.46	7.34
pCO_2 (mm Hg)	38–42	24	23.8	36
pO_2 (mm Hg)	75–100	109	181	104
Bicarbonate (mmol/L)	22–28	16.2	17.1	19.4
Base excess	-2 to +2	-8	7	-6.4
Arterial oxygen saturation (%)	94–100	99	100	98

SGOT: serum glutamic oxaloacetic transaminase; SGPT: serum glutamic pyruvic transaminase; pH: acid-base balance; pCO_2: partial pressure of carbon dioxide; pO_2: partial pressure of oxygen.

and the decision was made to administer three more bags of blood product Rh (+) type B. After the transfusion of the third bag, palpebral edema developed. Fortunately, no other signs of transfusion reaction occurred. The palpebral edema resolved after a dose of 10 mg dexamethasone and 10 mg diphenhydramine. Norepinephrine was tapered off on the first day.

On the second postoperative day, the hemoglobin level increased to 9.2 grams per decilitre (g/dL).

Due to the improved condition, ventilator weaning was started, and extubation was performed. The patient was then transferred to the ward.

Discussion

Transfusion in bleeding patients who have Rh (-) is challenging for clinicians (4). Moreover, Rh (-) is a rare blood type in Indonesia. This emergency occurred in our case; the blood group B Rh (-) stock in the hospital blood bank and the PMI was empty. The patient was found to have hypovolemic shock, low blood pressure, and anemia during the initial examination. When acute blood loss occurs, mean arterial pressure, central venous pressure, acute base deficit, peripheral pulse, and blood pressure change (5). When blood pressure drops sufficiently low, coronary blood flow and the heart muscle contractile capacity will be reduced. If this condition persists, there will be a decrease in cardiac output, leading to severe shock. Considering the severity and high mortality rate of hypovolemic shock, immediate and adequate management can prevent mortality (6). According to previous studies, most mothers with APH who are also found to have anemia and shock need a blood transfusion (7). Therefore, to prevent severe complications, we decided to perform a section cesarean and blood transfusion despite the different rhesus blood types, after receiving consent from the family.

The patient received one stored whole blood (SWB) bag of blood product type B Rh (+) during surgery, and there were no adverse reactions. Even though the D antigen is known to be immunogenic and that parenteral administration of the RhD (+) RBC volume as little as 0.1 ml can cause sensitization in RhD (-) individuals, previous studies have observed a decrease in seroconversion in RhD (-) patients in shock transfused with RhD (+) blood and reported that these patients do not necessarily develop rhesus alloimmunization (4). Patients with Rh (-) exposed to blood products with Rh (+) may not immediately appear to have an adverse reaction. However, the immune system will respond to these antigens by producing antibodies (anti-D) (8). After anti-D has formed, a subsequent transfusion will cause it to attack the red blood cells. Jaundice and hemoglobinuria may result from clots, response mismatches, and hemolysis of blood cells. The outcome could be minor, significant, or even fatal (9). In our case, the transfusion response occurred when the three additional SWB bags were transfused in the ICU. Palpebral edema was discovered after the transfusion of the third bag. The patient's palpebral edema resolved after she was given dexamethasone 10 mg and diphenhydramine 10 mg. Even though transfusion reactions can be successfully managed, to avoid fatal transfusion reactions, Rh (+) transfusions in patients with Rh (-) should only be performed when an emergency occurs.

Our management of this case had limitations caused by the unavailability of anti-D immunoglobin (to prevent the formation of D antibodies) and our inability to detect anti-D antibody formation due to a lack of facilities. Therefore, we closely monitored the patient until she was stable and could be discharged.

Conclusion

Rh (+) transfusion in patients with Rh (-) blood type should be the last option during an emergency. The transfusion reaction did not occur immediately during the initial transfusion but was discovered after the transfusion of the third post-surgery SWB B Rh (+) bag while the patient was recovering in the ICU. The transfusion reaction resolved after administering 10 mg dexamethasone and 10 mg diphenhydramine. Thus, the transfusion response and the life-threatening condition were successfully managed.

Authors' Contribution

Conceptualization: Albert Hardy Wu and Mariza Fitriati.
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Investigation: Albert Hardy Wu, Disa Edralyn, and Adriana Jardine.
Methodology: Albert Hardy Wu and Mariza Fitriati.
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Supervision: Mariza Fitriati.
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Writing–review & editing: Mariza Fitriati.

Competing Interests

None.

Ethical Approval

The patient provided written informed consent for the publication of this report.

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