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A RETROSPECTIVE STUDY OF MASSIVE BLOOD TRANSFUSION IN OBSTETRIC HAEMORRHAGE

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Abstract

Background: Obstetric haemorrhage is a leading cause of maternal mortality worldwide. New concepts involving the pathophysiology of haemorrhage have been described and include early activation of both the protein C and fibrinolytic pathways. New tendencies in haemorrhage treatment include the use of haemostatic resuscitation. Massive transfusion protocols involve the early utilization of blood products and limit the traditional approach of early massive crystalloid based resuscitation. The evidence behind haemostatic resuscitation is still limited. **Objective:** To study the common indications, complications & outcome of massive transfusions in obstetrics hemorrhage and to study the different components of blood & their ratios used during obstetric hemorrhage. **Methodology:** This is a retrospective study done at ESIC-PGIMSR Rajajinagar, Bengaluru, in department of Obstetrics of gynaecology. Between Jan 2016 to Dec 2021, data of number of obstetric patients who underwent blood product transfusion in our institution was manually abstracted from our medical record sections and blood bank. The following parameters were reviewed- Type and number of blood component transfused; Underlying obstetric risk factor in each case; Indication for each blood component transfusion noted; Patients who had **Massive Obstetric Haemorrhage** were further analysed to estimate the ratio of components transfused. **Results:** In our study a total of 38 obstetric patients had undergone massive transfusions, (which was taken for patients who underwent > 5 transfusions in 24hrs). 60.5% of patients needed 4-6 transfusions in 24hrs, 15.8% patients needed 7-10 PRBC transfusion & 1 patient (2.6%) needed >10 transfusions. Among these the transfusion protocol of Ratio of PRBC: Platelet: Frozen plasma transfused showed that , only in 29% of the patients the Massive transfusion protocol was followed.60.5% patients who required massive transfusions developed Disseminated intravascular coagulation (DIC), 55% of them developed pulmonary oedema , 44.7% of them developed Transfusion related lung injury, 34.2% had hepatic failure and acute renal failure. Among 38 mothers who had massive transfusions, 4 mothers died in spite of massive transfusions. 23.7% of them had morbidities.

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Conclusion: Haemorrhage is the most common form of shock in obstetric practice and remains a major cause of maternal mortality worldwide. Haemostatic resuscitation has emerged as a new concept, albeit based on limited prospective data. Massive transfusion protocols could improve outcomes in the bleeding patient not only due to early blood product administration but also secondarily to an early and aggressive multidisciplinary intervention.

Key words: Massive transfusion, Packed RBC, Postpartum haemorrhage

Introduction

In the world, obstetric haemorrhage is the most common cause of maternal death, causing 24% of, or an estimated 127,000, maternal deaths annually.[1] It has also been reported that massive (2,000 mL or more) and life-threatening obstetric haemorrhage occurs in 3–5%[2] and 0.1%[3] of deliveries, respectively, and blood product transfusion is required in 0.3–1%.[2,4]

In the terminal stage of pregnancy, where the coagulation system is enhanced and the fibrinolysis system is inhibited[5,6] MOH may be apt to induce consumptive loss of coagulation factors, which causes further haemorrhage, forming a vicious circle such as disseminated intravascular coagulation (DIC).[7] Accurate evaluation of blood loss is important to determine whether transfusion should be performed, but it is difficult in obstetric haemorrhage.[8,9,10] In addition, high-level capacity of pregnant women to tolerate obstetric hemorrhage[11,12] masks changes in their vital signs, resulting in a delay in the detection and treatment of hypovolemia, which causes further hemorrhage and hemorrhagic shock. Therefore, the comprehensive evaluation of not only blood loss but also the cause of hemorrhage, a patient's medical condition, age, vital signs, and blood biochemical data is required to determine whether transfusion is necessary.[13] Understanding the specificity of obstetric haemorrhage is also required for appropriate blood product support, which can effectively improve its pathophysiological condition, reduce the risk of DIC, and avoid the aggravation of hemorrhagic shock.[14]

The importance of transfusion medicine in the management of postpartum haemorrhage (PPH) cannot be overstated and is reflected in the historical record with the first series of successful human-to-human transfusions being performed by James Blundell in 1818, a London obstetrician treating patients with PPH.[15]

Estimates for PPH incidence vary in the literature but range from 3 to 5%, with less than 1% of obstetric patients being transfused, often in the direst of emergency situations.[16,17] This circumstance results in a lack of familiarity among obstetricians regarding the indications for the use of

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specific blood components, requesting appropriate laboratory assessment of coagulopathies, and, of equal importance, the mechanisms for ordering blood products emergently.

The ABCD of massive transfusion- Assessments, Blood products, Complications and drugs aid in management of complex situation. The need to establish a protocol for massive transfusion facilitates rapid dispensing of RBC's, plasma and platelets in a predefined ratio, thus, preventing the development of a dilutional coagulopathy on voracious replacement of crystalloid, colloids or RBC's for lost blood. There are no defined national guidelines for activating the massive transfusion protocol (MTP) in obstetric hemorrhage. Generally activated following a major bleeding event, an MTP is defined by the administration of fixed proportions of red blood cell concentrate (RBC), fresh frozen plasma (FFP), and platelet concentrates (PC) to the patient. A Massive transfusion protocol (MTP) should be used in critically bleeding patients anticipated to require massive transfusion. A diverse range of MTPs exists, supplemented with various other blood products including cryoprecipitate, fibrinogen concentrate, and recombinant factor VIII. Additionally, it is required for individual institutions to establish in-house ratios for administration of the respective blood-derived preparations.

Objective: To study the common indications, complications & outcome of massive transfusions in obstetrics hemorrhage and to study the different components of blood & their ratios used during obstetric hemorrhage.

Methodology: This was a retrospective study done at ESIC-PGIMSR Rajajinagar, Bengaluru, in Department of Obstetrics and Gynaecology, between Jan 2016 to Dec 2021. Data of number of obstetric patients who underwent blood product transfusion in our institution was manually abstracted from our medical record sections and blood bank. Further, details regarding indication of massive transfusion, complications and its outcome studied. The maternal morbidity and mortality was evaluated. Blood products involved in this study are packed Red Blood cells (PRBC), fresh-frozen plasma (FFP), and Random donor platelet concentrates (RDP), Single donor platelets (SDP), Cryoprecipitate (CRP). One unit of PRBC (approximately 290 + 20mL/unit), 1 unit of FFP (approximately 150-200 mL/unit), and 1 unit of RDP (50 -70 mL/unit), 1 unit of SDP (150ml /unit).

Our Management Principles for Blood Product Transfusion: Since blood loss in vaginal delivery or Caesarean section is difficult to evaluate accurately[11,12] and hemoglobin (Hb) concentration necessary to maintain appropriate hemodynamic and oxygen supply is ≥7 g/dL, Hb concentration < 7gm/dl was taken as indication for blood transfusion. In addition to this principle,

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the patient's age, medical condition, state of massive haemorrhage, and blood test data were taken into consideration for transfusions. Since the transfusion for patients with an Hb concentration ≥7 g/dL and stable vital signs may lead to excessive transfusion, PRBC transfusion was performed with a goal Hb concentration of 7-8 g/dL. FFP was concomitantly transfused until the coagulation function normalizes. We did not have any rule in advance to define the proportion of FFP to PRBC in the present study.

The following items were retrospectively evaluated: Underlying disorders which required blood product transfusion, types of blood product and their transfused volume, and data of hemoglobin (Hb) concentration, platelet count, liver function test, Renal function test, Total count, percent prothrombin activity (%PT; normal range: 84–117% in our institution), activated partial thromboplastin time (aPTT; 25–36 sec), and INR, before start of transfusion & same was repeated along with D-dimer during the course of transfusions.

Other data regarding the diagnosis, Indications for transfusions, complications during the management, delivery details and regarding the management of postpartum haemorrhage, neonatal and maternal outcomes were noted.

Statistics: Continuous data was analysed using descriptive statistics such as mean and SD. Categorical data was analysed using percentage. Correlations was assessed using Spearmans rank correlation coefficient, and equality of parameters among groups was analysed employing Kruskal-wallis or one way analysis of variance test, $p<0.05$ was regarded as significant.

Results: In our study a total of 38 obstetric patients had undergone massive transfusions, (which was taken for patients who underwent > 5 transfusions in 24hrs).Among them there were 22 primigravida and 16 cases were multiparous. The mean age of patients is 26.2years. There were 17 patients whose gestational age was >37wks , 13 cases were b/w gestational age of 34-37wks and 8 cases were < 34wks of gestation.

Table-1 Obstetric characteristics (N=38)

Characteristics	Number	Percentage
Parity		
Primipara	22	57.8
Multipara	16	52.2
Maternal age (mean, SD)	26.2	3.7
Period of gestation (weeks)		
<34	8	21.1
34-37	13	34.2
>37	17	44.7

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Diagnosis at admission		
Pre-eclampsia	16	42.1
Anaemia	12	31.6
Thrombocytopenia	13	34.2
Eclampsia	3	7.9
Dengue	5	13.2
Pancytopenia	2	5.3
Previous LSCS	10	26.3
HELLP	12	31.6
Abruptio placenta	6	15.8
Placenta previa	4	10.5
Adherent placenta	3	7.9
Twin pregnancy	1	2.6
AFLP	1	2.6

Table -2 Indications for blood transfusion

Indications	Number	Percentage
PPH	34	89.5
DIC	16	42.1
HELLP	12	31.6
Thrombocytopenia	15	39.5
Rupture uterus	1	2.6
Anaemia	9	23.7

Table-3: MOH (PRBC)

MOH	Number	Percentage
<4	8	21.1
4-6 (mild)	23	60.5
7-10	6	15.8
>10	1	2.6

Table 4: Protocol followed

Protocol followed	Number	Percentage
Yes	11	29.0
No	27	71.0

Table-5 Descriptive statistics for PRBC, FFP, RDP, SDP and CRY

MOH	Mean	SD	Median	Min	Max
PRBC	5.3	2.3	5	3	12
FFP	7.9	3.7	7.5	4	20
RDP	10.3	4.4	10	4	26
SDP	0.8	0.9	1	0	3
CRY	1	2.2	0	0	10

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Table-6 Maternal complications

Complications	Number	Percentage
DIC	23	60.5
Pulmonary oedema	21	55.3
ARF	13	34.2
Hepatic failure	13	34.2
TRALI	17	44.7
MODS	3	7.9
Anaemia	6	15.8
Metabolic acidosis	12	31.6
Septicaemia	16	42.1
PPCM	2	5.3

Table-7 Foetal outcomes

Foetal outcomes	Number	Percentage
Term alive	21	55.3
Preterm alive	7	18.4
Term dead	3	7.9
Preterm dead	7	18.4

Table-8 Delivery outcomes

Delivery outcomes	Number	Percentage
Normal	4	10.5
LSCS	9	23.7
Instrumental delivery	1	2.6
Peripartum hysterectomy	2	5.3
Re-exploration	2	5.3
Laparotomy	2	5.3

Table-9 Maternal outcomes

Maternal outcomes	Number	Percentage
Dead	4	10.5
Alive	25	65.8
Alive with morbidity	9	23.7

Table-10. Number of days of admission in hospital and ICU

Admission	Mean	SD	Median	Min	Max
Hospital	15.9	18.6	11.5	2	120
ICU	5.4	6.4	3	1	38

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Table-11 Intubation

Intubation	Number	Percentage
No	15	39.5
Yes	23	60.5
Duration of intubation (days) n=23		
1-3 days	17	73.9
> 3 days	6	26.1

DISCUSSION

In our study a total of 38 obstetric patients had undergone massive transfusions, (which was taken for patients who underwent > 5 transfusions in 24hrs). Among them there were 22 primigravida and 16 cases were multiparous. The mean age of patients is 26.2years. There were 17 patients whose gestational age was >37wks, 13 cases were b/w gestational age of 34-37wks and 8 cases were < 34wks of gestation.

42% of cases had preeclampsia and associated complications like HELLP syndrome, Abruptio placenta, and eclampsia. There were 26.3% of patients with previous LSCS. 60.5% of patients needed 4-6 transfusions in 24hrs, 15.8% patients needed 7-10 PRBC transfusion & 1 patient (2.6%) needed >10 transfusions. Among these the transfusion protocol of Ratio of PRBC: Platelet: Frozen plasma transfused showed that, only in 29% of the patients the Massive transfusion protocol was followed, the MTP was not followed in 71% of patients.

89.5% of patients needed Transfusions for Post- partum Haemorrhage, 23.7% for Anaemia, 40 % of patients for Thrombocytopenia.60.5% patients who required massive transfusions developed Disseminated intravascular coagulation (DIC), 55% of them developed pulmonary edema, 44.7% of them developed Transfusion related lung injury, 34.2% had hepatic failure and acute renal failure.55.3% had a term live baby, 18.4% preterm alive baby, 26% had term and preterm dead babies.

23.7% of cases underwent Lower segment caesarean section, 10.5 % had Normal delivery, 5.3% underwent peripartum hysterectomy for severe postpartum haemorrhage, 5.3% cases had re -exploration following a LSCS, one for rectus sheath

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haematoma and second case for spontaneous posterior uterine wall rent after LSCS which led to severe intraperitoneal bleeding. 5.3% case underwent laparotomy for rupture uterus. Among 38 mothers who had massive transfusions, 4 mothers died in spite of massive transfusions. 23.7% of them had morbidities.

Conclusion:

Haemorrhage is the most common form of shock in obstetric practice and remains a major cause of maternal mortality worldwide. Haemostatic resuscitation has emerged as a new concept, albeit based on limited prospective data. Massive transfusion protocols could improve outcomes in the bleeding patient not only due to early blood product administration but also secondarily to an early and aggressive multidisciplinary intervention. Blood transfusion is lifesaving essential component of obstetric care. Acute obstetric blood loss is usually unpredictable and sudden. The decision to transfuse should be time taken to maintain adequate tissue oxygenation in the face of acute haemorrhage. Identifying the risk factors for haemorrhage in antenatal period and anticipating bleeding is essential in managing obstetric haemorrhage. A pre - planned, multidisciplinary protocol yields the best results in the management.

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