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Original Research Article

Role of blood transfusion in saving mothers

Manjit K. Mohi, Sangeeta Aggarwal*, Satinder Pal Khurana

Department of Obstetrics and Gynecology, Government Medical College Patiala, Punjab, India

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***Correspondence:**

Dr. Sangeeta Aggarwal,

E-mail: drsangeetaaggrawal@gmail.com

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ABSTRACT

Background: Blood transfusion is recognised as one of the eight essential components of the comprehensive emergency obstetric care module which has been designed to reduce maternal morbidity and mortality rates after major obstetric hemorrhage and anemia.

Methods: This is a prospective observational study conducted between April 1, 2016 to September 30, 2018 in department of obstetrics and gynecology, Government Medical College, Patiala. The MNM cases given transfusion were analysed in respect of number of antenatal visits, type of admission, distance of place of first referral unit from tertiary health care facility, amount of blood transfused, indications of blood transfusion, causes of haemorrhage and intervention performed.

Results: During this period, there were 123 cases of MNM, 90 patients required blood transfusion and were considered in this study. Maximum number of cases (94.45%) were between 20-35 years of age. Majority of cases were primipara (52.22%). 47.77% cases were in 3rd trimester, 33.33% postnatal cases and 16.66% cases were in first trimester. 88.88% cases requiring transfusion belong to low socioeconomic status. There was no antenatal visit in 80% cases who required blood transfusion. 78.8% patients required more than 4 packed red cell transfusions. Haemorrhage was the indication in 60% cases for blood transfusion and anaemia in 40% cases. Postpartum haemorrhage (28.4%) was most common indication for blood transfusion followed by ruptured ectopic pregnancy (27.77%), antepartum haemorrhage (11.11%), rupture uterus (7.4%), rectus sheath hematoma (5.55%), placenta accreta (5.55%) and inversion uterus (3.7%). Surgical interventions were performed in 51 cases.

Conclusions: Prevention and timely treatment of anaemia must receive attention by more active participation in term of antenatal check-ups. Skilled management of patients at the first referral units is advocated. There should be familiarity with the local protocol of relevant members of staff for management of massive hemorrhage. All major hemorrhages should be reviewed to ensure that there is no delay in provision of blood products.

Keywords: Blood transfusion, Maternal near miss, Obstetric haemorrhage

INTRODUCTION

Blood transfusion is recognised as one of the eight essential components of the comprehensive emergency obstetric care module which has been designed to reduce maternal mortality rates. Postpartum haemorrhage is a major contributor which accounts for 25% of all pregnancy-related deaths.¹ While indications for transfusion in obstetrics may be emergent as well as nonemergent, the keystone of transfusion practice is that

it should be appropriate that is, not given when not required and not missed when required. Transfusion is necessary if Hb <6 g/dl and there are <4 weeks for delivery. When Hb is <7 g/dl in labour or in immediate postpartum period, blood transfusion is only indicated if there is previous history of bleeding or patient is prone for bleeding due to some medical condition. Transfusion is also indicated if Hb is 7 g/dl, for women with continued bleeding or at risk of further significant haemorrhage or for those presenting with severe

symptoms that need immediate correction (cardiac decompensation).^{2,3} Anaemia during pregnancy is responsible for 15% of maternal mortality. Early correction of anaemia avoids the need for transfusion and reduces maternal mortality. Obstetric haemorrhage continues to be the leading cause of maternal mortality, ranging from 13% in developed countries to 34% in Africa.⁴

An obstetric haemorrhage may occur before or after delivery, but >80% of cases occur postpartum, responsible for 25% of the estimated 358,000 maternal deaths each year.⁵ Visual assessment of blood loss is “notoriously” inaccurate and clinicians can underestimate blood loss by 50%.⁶ Definitions of massive haemorrhage vary and have limited value. It may arbitrarily be considered a situation where 1-1.5 blood volumes may need to be transfused acutely or in a 24-hours period where, normal blood volume in the adult is taken as approximately 7% of ideal body weight.⁷ Other definitions include 50% blood volume loss within 3-hours or a rate of loss of 150 ml/min. The common goals for transfusion in the obstetric patient is to achieve haemoglobin >8 g/dl, platelet count >75×10⁹/l, prothrombin time (PT) <1.5×mean control, activated PT <1.5×mean control and fibrinogen >1.0 g/l.⁸ Economically deprived, illiterate people with insufficient antenatal care were more likely to suffer severe acute maternal morbidity. Delays in recognizing and treating hemorrhage frequently lead to inadequate blood product replacement and concomitant development of disseminated intravascular coagulation (DIC).

Aims and objectives

- To study importance of socioeconomic factors in maternal near miss patients of hemorrhage and anemia.
- To study role of antenatal care in maternal near miss cases requiring blood transfusion.
- To analyse indications of blood transfusion in maternal near miss cases.
- To analyse the importance of the distance from which the maternal near miss cases requiring blood transfusion were referred.
- To analyse the causes of haemorrhage and interventions performed to manage these cases.

METHODS

This is a prospective observational study of maternal near miss (MNM) cases requiring blood transfusion, conducted between April 1, 2016 to September 30, 2018 in department of obstetrics and gynecology, Government Medical College, Patiala, Punjab, India.

A maternal near miss is defined by WHO as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.

WHO near miss criteria 2011 include

Cardiovascular dysfunction

Shock, cardiac arrest (absence of pulse/heart beat and loss of consciousness), use of continuous vasoactive drugs, cardiopulmonary resuscitation, severe hypoperfusion (lactate >5 mmol/l or >45 mg/dl), severe acidosis (pH <7.1).

Respiratory dysfunction

Acute cyanosis, gasping, severe tachypnea (respiratory rate >40 breaths per minute), severe bradypnea (respiratory rate <6 breaths per minute), intubation and ventilation not related to anesthesia, severe hypoxemia (Oxygen saturation <90% for ≥60 minutes or PAO₂/FIO₂ <200).

Renal dysfunction

Oliguria non-responsive to fluids or diuretics, dialysis for acute renal failure, severe acute azotemia (creatinine ≥300 μmol/ml or ≥3.5 mg/dl).

Coagulation/hematological dysfunction

Failure to form clots, massive transfusion of blood or red cells (≥5 units), severe acute thrombocytopenia (<50,000 platelets/ml) Hepatic dysfunction - Jaundice in the presence of pre-eclampsia, severe acute hyperbilirubinemia (bilirubin >100 μmol/l or >6.0 mg/dl).

Neurological dysfunction

Prolonged unconsciousness (lasting ≥12 hours)/coma (including metabolic coma), stroke, uncontrollable fits/status epilepticus, total paralysis.

Uterine dysfunction

Uterine haemorrhage or infection leading to hysterectomy.

Inclusion criteria

- Maternal near miss cases as per WHO criteria requiring blood transfusion were included in this study.

Exclusion criteria

- MNM cases who were not given blood transfusion were excluded from the study population.

The MNM cases were analysed in respect of their age, parity, gestational age, socioeconomic status, number of antenatal visits, type of admission, distance of place of first referral unit from tertiary health care facility, amount

of blood transfusion given, indications of blood transfusion, incidence of haemorrhage according to obstetric period, causes of haemorrhage and intervention performed.

RESULTS

During April 01, 2016 to September 30, 2018 there were 6166 total deliveries, 5461 live births, 50 maternal deaths and 123 MNM cases according to WHO criteria. Out of 123 maternal near miss cases, 90 patients were given blood transfusion.

Table 1: Inclusion of cases.

Maternal near miss	No. of patients	Percentage
Total	123	-
Required blood transfusion	90	73.17%

The patients requiring blood transfusion in the present study were 73.17% out of total 123 maternal near miss cases (Table 1).

Table 2: Age wise distribution of cases.

Age	Number (N=90)	Percentage
<20 years	01	1.11%
20-35 years	85	94.45%
>35 years	4	4.44%

Maximum number of cases (94.45%) requiring blood transfusion were between 20-35 years of age only 1 patient was of less than 20 years of age and 4 patients were of more than 35 years of age (Table 2).

Table 3: Parity distribution of cases.

Parity	Number (N=90)	Percentage
Primipara	47	52.22%
Multipara	43	47.78%

A total 47 (52.22%) of cases were primipara and 43 (47.78%) were multipara (Table 3).

Table 4: Distribution according to gestational age.

Gestational age	Number (N=90)	Percentage
<13 weeks	15	16.66%
13-28 weeks	02	2.22%
>28 weeks	43	47.77%
Postnatal	30	33.33%

A total 47.77% cases were in 3rd trimester and 33.33% were postnatal cases and 16.66% cases were in first trimester. There were only 2 cases in second trimester (Table 4). A total 80 MNM cases i.e. 88.88% requiring transfusion belong to lower or lower middle socioeconomic class according to Kuppaswamy scale. 10

patients (11.11%) were belonging to upper middle class (Table 5).

Table 5: Distribution according to socioeconomic class.

Class	Number (N=90)	Percentage
Lower	67	74.44%
Lower middle	13	14.44%
Upper Middle	10	11.11%

In 72 (80%) cases, there was no history of any antenatal visit and 8.9% cases had only 1 or 2 antenatal check-ups and only 8 cases had history of more than 3 antenatal visits (Table 6).

Table 6: Distribution of cases as per number of antenatal visits.

No. of antenatal visits	No. of patients (N=90)	Percentage
No antenatal visit	72	80%
3 or more antenatal visits	10	11.1%
Less than 3 antenatal visits	08	8.9%

A total 80 (88.8%) of patients were referred from outside and only 10 (11.11%) patients had direct admission (Table 7).

Table 7: Distribution of cases as per type of admission.

Total	No. of patients (N=90)	Percentage
Referred from outside	80	88.8%
Direct admission	10	11.11%

A total 53.6% cases were referred from distance of 50-100 km, 43.9% from less than 50 km and 3.33% patients were referred from more than 100 km distance (Table 8).

Table 8: Distance from health care facility.

Distance	No. of cases (N=90)	Percentage
Less than 50 km	39	43.9%
50-100 km	48	53.6%
More than 100 km	3	3.33%

Table 9: Amount of blood transfusion given.

No. of units of packed red cells transfused	No. of patients (N=90)	Percentage
1 unit	6	6.66%
2 units	8	11.1%
3 units	5	5.55%
4 or more units	71	78.88%

Table 10: Indications of transfusion.

Indication	Number (N=90)	Percentage
Anemia without haemorrhage	36	40%
Haemorrhage	54	60%

In this study, 78.8% patients were transfused more than 4 units of packed red cells, 5.55% required 3 units, 11.1% 2 units and in 6.66% cases only 1 unit was transfused (Table 9). Haemorrhage was the most common indication for blood transfusion i.e. in 54 (60%) cases and anaemia was indication for blood transfusion in 36 (40%) cases (Table 10).

Maximum number of cases (42.6%) of haemorrhage were in immediate postpartum period, 27.7% cases were in first trimester, 18.5% were in third trimester and 11.11% were intrapartum (Table 11).

Table 11: Incidence of hemorrhage according to obstetric period.

Period	No. of cases (N=54)	Percentage
First trimester	15	27.7%
Antepartum 3 rd trimester	10	18.5%
Intrapartum	06	11.11%
Postpartum	23	42.6%

Out of 54 cases of haemorrhage, 28.4% cases were of postpartum haemorrhage followed by ruptured ectopic pregnancy (27.77%), accidental haemorrhage (11.11%), placenta previa (7.4%), rupture uterus (7.4%), rectus sheath hematoma (5.55%), placenta accreta (5.55%), retained placenta (3.7%) and inversion uterus (3.7%) (Table 12).

Table 12: Causes of haemorrhage.

Cause	Number (N=54)	Percentage
Ruptured Ectopic	15	27.77%
Atonic PPH	13	24.07%
Accidental hemorrhage	06	11.11%
Traumatic PPH	02	3.70%
Placenta previa	04	7.40%
Rectus sheath hematoma	03	5.55%
Rupture uterus	04	7.40%
Retained placenta	02	3.70%
Placenta accreta	03	5.55%
Inversion uterus	02	3.70%

In this study, 51 interventions were performed in total. Exploration for intractable postpartum haemorrhage was done in 7 (13.72%) cases. 4 cases had laparotomy for ruptured uterus and 15/51 for ruptured ectopic pregnancy. Six cases underwent peripartum hysterectomy. Repair of

major genital injuries and manual removal of placenta was done in two cases each. Two cases had repositioning of an inverted uterus. Emergency LSCS was done in 10 (19.60%) cases due to severe accidental haemorrhage and major degree placenta previa (Table 13).

Table 13: Management and intervention performed.

Intervention performed	Number (N=90)	Percentage
Laparotomy due to ectopic	51	29.41%
LSCS I/V/O APH	10	19.60%
Exploration of PPH	7	13.72%
Peripartum hysterectomy	06	11.76%
Drainage of rectus sheath hematoma	04	7.84%
Hydrostatic reduction of inversion uterus	02	3.92%
Manual removal of placenta	02	3.92%
Post LSCS laparotomy due hemoperitoneum	01	1.96%
Repair of rupture uterus	01	1.96%
Balloon tamponade	03	5.88%
Total	51	

DISCUSSION

Patients requiring blood transfusion throughout the present study were 90/123 (73.17%) of maternal near miss cases during study period. According to MNM review pilot project done by Purandare et al, 86% (227/264) of MNM women received blood transfusions which is almost similar to this study. Yelikar et al also noted that percentage of MNM cases managed by multiple blood component transfusion was around 86% of cases.^{9,10} In this study, maximum number of cases were between 20-35 years of age constituting 94.45% of the cases requiring blood transfusion. Majority of cases requiring blood transfusion were primipara (52.22%). 47.77% cases were in 3rd trimester, 33.33% were postnatal cases and 16.66% cases were in first trimester. Maximum cases requiring transfusion belong to low socioeconomic status.

In this study, there was history of no antenatal visit in 80% cases who required blood transfusion. This finding is similar to study done by Pandya et al, who stated that the incidence of blood transfusion was higher (86%), in patients who took less than 3 antenatal visits. Lack of antenatal care was noted in 30.7% (81/264) of all MNM cases by Purandre et al.^{9,11} Majority of cases (88.8%) were referred in from outside. 78.8% patients required more than 4 packed red cell transfusions. Haemorrhage was the most common indication (60%) for blood transfusion and 40% cases required blood transfusion because of anaemia. In the study conducted by Pandya et al, 68% patients required blood because of obstetric hemorrhage and 32% patients required blood because of anemia of pregnancy.¹¹

In the present study, out of 54 cases of haemorrhage, postpartum haemorrhage (28.4%) was most common cause requiring blood transfusion followed by ruptured ectopic pregnancy (27.77%), antepartum haemorrhage(11.11%), rupture uterus(7.4%), rectus sheath hematoma (5.55%), placenta accrete (5.55%) and inversion uterus (3.7%).

According to a MNM review pilot project by Purandre et al, a detailed break-down of women with haemorrhage showed that most of the critically ill women with haemorrhage were in the postpartum phase (37%), 24% occurred in late pregnancy, 16% were associated with ruptured uterus, 19% occurred in early pregnancy and 4% were intrapartum.⁹ In this study, 51 interventions were performed. Exploration for intractable postpartum haemorrhage was done in 7 (13.72%) cases. 4 cases had laparotomy for ruptured uterus and 15/51 for ruptured ectopic pregnancy. Six cases under went peripartum hysterectomy. Repair of major genital injuries and manual removal of placenta was done in two cases each. Two cases had repositioning of an inverted uterus. Emergency LSCS was done in 10 (19.60%) cases due to severe accidental haemorrhage and major degree placenta previa.

In MNM review pilot project by Purandre et al, a total of 488 interventions were performed 18.2% (48/264) underwent laparotomy for intractable postpartum haemorrhage, ruptured uterus or ectopic pregnancy, 14.8% (39/264) had hysterectomy, 4.9% (13/264) had repair of major genital injuries, 1.1% (3/264) had manual removal of placenta, 0.8% (2/264) had repositioning of an inverted uterus, 1.5% (4/264) had internal iliac ligation, and 51.9% (137/264) of women underwent other interventions including version, cervical and vaginal tear repair, or drainage of vulval or broad ligament haematoma.⁹

CONCLUSION

Hemorrhage was the most important direct cause of maternal near miss cases and anemia accounted for indirect cause of maternal morbidity. Prevention and timely treatment of anaemia during antenatal period, early diagnosis of ectopic pregnancy and management can decrease the incidence of MNM. More active participation in term of skilled management of patients at the first referral units is advocated. All major hemorrhage should be reviewed to ensure that the communication chain worked and that there was no delay in provision of blood products.

There should be local protocols for management of massive hemorrhage in obstetrics and familiarity with the local protocol of relevant members of staff (clinicians, midwives, biomedical scientists, porters).

Building the skills of healthcare providers in procedures such as repair of cervical and vaginal tears, resuscitation of adults, medical and surgical management of postpartum haemorrhage, B-lynch suture to manage atonic postpartum haemorrhage, stepwise devascularisation and internal iliac artery ligation and peripartum hysterectomy is advocated.

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