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The Burden of Major Obstetric Hemorrhage in Near Miss in a Tertiary Care Centre in Kerala

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ABSTRACT

Introduction: *Near-miss audit it now being increasingly used as a means to assess quality of care given to obstetric population. Major obstetric hemorrhage accounts for the largest proportion of Near misses. By analyzing these cases and identifying pitfalls in management quality of care given to these patients can be improved resulting is further reduction in MMR.*

Objective: *This study aimed to analyze major obstetric hemorrhage among SMO events during a period of two years from January 2011 to December 2012.*

Methods: *A cross sectional study was conducted at SAT hospital Government Medical College Thiruvananthapuram, a tertiary care center in South Kerala. All obstetric patients satisfying criteria for near-miss became the study population. Among these those with major obstetric hemorrhage were identified and studied in detail regarding antecedent causes, management options tried, blood and blood products required for therapy. Data were entered in structured proforma and analyzed.*

Results: *Total live births during this period was 18663. Total 114 cases of severe maternal outcome were identified. Out of these 26 expired and 88 became near-miss. Major obstetric hemorrhage was the cause of severe maternal outcome in 63 (55.26%) cases. Among these acute severe postpartum hemorrhage amounted to 44.73% of SMO and the percentage of atonic PPH was 23.68%. The most common emergency surgical procedure done was emergency laparotomy (22.2%) Hysterectomy had to be done in 44.4% of obstetric hemorrhages. Blood transfusions were given to 95.23% cases. Six cases expired and most common reason was non availability of blood.*

Conclusion: *Although well-equipped blood banks are a reality for tertiary care centers, first referral units still lack this facility. PPH deaths can be still reduced by strengthening of FRUS.*

Keywords: *maternal mortality, severe maternal outcome, Near-miss, major obstetric hemorrhage.*

Introduction

Sustainable development goal -3 by UN aims to reduce maternal mortality ratio to seventy by 2030[1]. Among the maternal deaths, embolism is the leading cause now in developed countries. However in developing countries, post-partum hemorrhage continues to be the leading cause accounting for 25-43% of maternal deaths[2].As maternal deaths have declined in developed countries, severe maternal morbidity has been suggested as the better indicator of quality of maternal care[3]. Major obstetric hemorrhage remains the main component of severe maternal morbidity worldwide.

major obstetric hemorrhage includes massive bleeding that occurs in a pregnant patient or immediately after delivery due to abortion,ectopic pregnancy,antepartum hemorrhage ,rupture uterus ,postpartum hemorrhage and hemorrhage due to rare causes like inversion .Major obstetric hemorrhage is defined differently in studies conducted across the world. Pavord[4]et alhas defined major obstetric hemorrhage as bleeding still ongoing after 1000ml of blood loss with loss of hemodynamic control.Study from Scotland by V Brace[5]has classified major obstetric hemorrhage as blood loss of 2500ml or more, requiring five or more units of blood transfusion This agrees to saving mother's lives 2003-05 (CEMACH)[6] which defines major obstetric hemorrhage as estimated blood loss more than 2500 ml or transfused five or more units of blood or received treatment for coagulopathy (FFP, Cryoprecipitate, platelets)[10]. WHO[3]near-miss approach in 2009 has also included massive transfusion of five units or more as severe maternal outcome.

Fourteen million cases of post-partum hemorrhage occur each year with a case fatality rate of 1%[7.] Water stone et al in his study has shown that of all obstetric complications the disease specific morbidity per 1000 deliveries was highest for hemorrhage[8]. This is especially troubling because severe PPH even when not fatal jeopardizes the women's fertility, exposes her to the risk of transfusion and intensive care and incurs cost[9]. Even the mild self-limiting cases has consequences for the patient's puerperium in the form of fatigue, tiredness, failure to breast feed, the possible need for hematinics and blood transfusion due to acute blood loss[10]. The cascade associated with intractable PPH remains a "terrifying" challenge to the attending clinician even today as PPH can transform a normal woman in labour to a critically ill patient within minutes[10]. Post-partum hemorrhage is commonly defined as blood loss of 500ml or more within 24 hours after birth[11]. PPH can be primary or secondary. Primary once it occurs within 4 hours and secondary once it occurs after 24 hours. Causes of PPH can be broadly classified as fours Ts[4]-Tone (atonic uterus), Tissue (retained products), Trauma-(Vaginal/cervical lacerations or hematoma, rupture uterus), Thrombin (coagulation failure). Prevention of PPH can be done by identifying antenatal women at risk for PPH earlier and referring them for high risk care, and by instituting active management of third stage of labour (AMTSL) as a routine in all laboring women. Active management of third stage of labour includes administration of oxytocin within one minute of delivery of baby, continuous and gentle traction of umbilical cord and uterine massage after delivery of placenta. AMTSL is the only intervention that has demonstrated significant reduction in maternal mortality in patients with PPH[12].AMTSL reduces the risk of PPH by 60% and the need for additional uterotonic agents by 50%[13.] Despite the reduction of PPH using AMTSL a considerable number of patients develop severe or massive bleeding[14].

Treatment of major hemorrhage secondary to uterine atony should begin with utero tonic agents (oxytocin, methyl ergometrine and prostaglandins) Further conservative interventions are intrauterine balloon tamponade, uterine compression sutures (B lynch) different pelvic devascularzation techniques, vascular occlusion[15.] If above methods fail abdominal hysterectomy has be to resorted to.

Around 25% of cases of major obstetric hemorrhage are associated with coagulopathy

which results from varying degrees of consumption of clotting factors, dilution of remaining factors by fluid volume replacement and endothelial activation from hypothermia and acidosis.[4]

Major obstetric hemorrhage remains the leading cause of severe maternal morbidity in Indian scenario as evidenced by studies in Bangalore[2] and the ongoing confidential review of maternal death in the state of Kerala[16]. As per CRMD Kerala, incidence of major obstetric hemorrhage is 22.5% and 35% in near-miss review in Kozhikode[17]. No prior study has analyzed major obstetric hemorrhage as a risk factor for near-miss from this study setting.

This study aims to analyzemajor hemorrhage among the near-miss events which occurred in the study setting from January 2011 to Dec 2012. This study analyses the sociodemographic features, the causes of major obstetric hemorrhage, interventional procedures done to save the mothers and their outcome.

Materials and Methods

Clearance from institutional research committee and institutional ethics committee was obtained before starting the study. The study design was that of descriptive study done at SAT Hospital, Government Medical College, Thiruvananthapuram, and Kerala, India from January 2011 December 2012. The study setting one of the largest tertiary care centers in Kerala where antenatal cases are managed along with referred cases from 100Km surrounding the hospital.

The study participants include all the antenatal patients who have SMO either maternal death or near-miss. The definition of severe maternal[2] outcome was based on the WHO near miss approach criteria. WHO has identified severe postpartum hemorrhage,severe preeclampsia, Eclampsia, severe systemic infection and sepsis, uterine rupture, severe complications of abortion as severe maternal complications.Admission to ICU, interventional radiologylaparotomy (includes hysterectomy excludes caesarean section) use of blood products were considered as critical interventions/ICU use in the management of severe maternal outcome patients.

From the above SMO patients those with major obstetric hemorrhage was identified. As most of the patients in this study are referred from FRU actual amount of blood loss could not be assessed accurately. Those who had massive hemorrhage due to different obstetric causes like ruptured ectopic, antepartum and postpartum hemorrhage and who needed five units or more blood transfusions were taken to be having major obstetrics hemorrhage.

Hospitalnear miss events were identified by visiting maternal intensive care unit labourroom on daily basis. Data was collected using structured proforma from the time of admission or at a later moment during the patients stay at hospital. In addition to review of case sheets, interview of patient (for near miss cases) and bystander was also by using pre prepared questionnaire. Information contained socioeconomic background, obstetric scare, type of obstetric hemorrhage, the various interventions done and outcome.

Before the interview an informed consent was taken regarding the study and its objectives. No alteration in management was made for the sake of study. The number of total live births and maternal mortality and its causes in this institute during the study period was also found out.

Once data collection was over the information was entered in excel worksheet. The descriptive statistic were analyzed using SPSS software, chi-square test was used to examine difference among proportion.

Results

During the study period, the total number of live births in the study setting was 18663. Out of these, 114 cases (88 near miss and 26 maternal deaths) were identified to be having severe maternal outcome according to WHO 2009 criteria. Within this, 63 cases were identified to be having major obstetric hemorrhage. This comes to 55.26% of SMO and 0.337% of live births. Out of these, six expired. Among major obstetric hemorrhages,

acute severe post-partum hemorrhage was the leading cause which amounted to 51. That is 80.95% of severe obstetric hemorrhage, 44.73% of SMO cases and 0.27% of live births. Among the total acute severe post-partum hemorrhages, atonic PPH was the leading cause. (n= 27, 52.94%). This constitutes 42.85% of total obstetric hemorrhages, 23.68% of total SMO and 0.14% of total live births. Out of these 63 cases of major obstetric hemorrhage, 6 mortalities (9.5%) occurred and others (n=57,90.47%) became near miss.

Baseline socio demographic characteristics of the study population (n=63) showed majority (n=49, 77.7%) belonging to the third decade of life. Inhabitants of rural areas constituted 61 (91.82%) of the study population. Socio economically 52(82.54%) were in the below poverty line. This life threatening event occurred during the second pregnancy in 25 (39.68%) cases and during their first pregnancy in 22 (34.92%) cases. Caesarean section was the most common mode of delivery (n=31,49.20%). Most of the patients got live babies 47 (74.60%). (Table-1).

Among the total 63 cases of major obstetric hemorrhages, 50 (79.36%) were referred from first referral units. Reasons stated for referral were inadequate availability of blood and blood products, non-availability of second on call consultant for any surgical intervention to be done, absence of ICU facilities, laboratory facilities and man power for intensive monitoring.

Abruption was the second leading cause among major obstetric hemorrhages (n=6, 9.5% cases). There were two cases of ectopic pregnancies (3.1%), one was ruptured tubal ectopic in a sterilized patient, another was a case of cervical pregnancy which had torrential hemorrhage during evacuation leading to hysterectomy. There was one case of rupture uterus who was a third gravida with previous one caesarean section and one vaginal birth after caesarean, who came in labour as rupture uterus and hysterectomy had to be done. (table 2)

Emergency surgical procedure were required in 48 (76.19%) cases of severe obstetric hemorrhage. The most common surgical procedure done was emergency laparotomy (n=14, 22.22%). Immediate evacuation of uterus by caesarean section or hysterotomy were required in 13 (20.63%) cases. The third common surgical procedure required was relaparotomy after caesarean section due to hemorrhage (n=10, 15.87%). Details of other surgical procedures done are given in table 3.

Hysterectomy had to be done as a life saving measure in 28 (44.44%) cases of major obstetric hemorrhage. This amounts to 24.46% of SMO cases and 0.15% of live births. The most common obstetric condition which led to obstetric hysterectomy was placenta praevia including accreta and percreta (n=11, 39.28%) followed by atonic post partum hemorrhage unresponsive to other modalities of treatment (n=7, 25%). The aetiological factors that led to obstetric hysterectomy are given in table 4.

Internal iliac artery ligation was done in 13 (20.63%) cases of major obstetric hemorrhage. Among these 9 of them were done in cases of morbidly adherent placenta and 4 were done in intractable atonic PPH. Classical caesarean section was the mode of delivery in 3 (4.7%). All three of them were done for placenta percreta involving bladder. Intra operative bladder injury requiring surgical assistance of urologist was required in 6 (9.5%) cases. Among these four of them were cases of placenta percreta, two were inadvertant bladder injuries in previous caesarean patients during repeat caesarean section. Perineal tear involving anal sphincter occurred in 23 (7.1%) cases of traumatic PPH.

Intra vascular volume replenishment using whole blood was required in 60 (95.23%) cases. Among these 31 (49.2%) required five pints and 25 (39.6%) needed up to 10 pints. Three cases (4.76%) of atonic PPH which were referred from FRU without transfusing blood ended up in maternal mortality. Two were brought dead and one reached here in moribund state and could not be revived. Among blood products fresh frozen plasma was the one which was maximum used

(n=45, 71.42% cases). Majority (n=32, 50.79%) needed up to five units and 13 (20.6%) needed up to 10 units. Platelet transfusion was required in 21 (33.33%) cases and cryo precipitate in 2 (3.1%) cases. (Table 5). All the 63 cases were monitored in ICU set up. Ventilator was used as a life saving measure in 13 (20.63%) cases. (Table 5)

Although uterine atonicity contributed to the major proportion of severe post partum hemorrhage, a significant number (n=13, 25.49%) were due to placenta praevia including morbidly adherent placenta. Other causes were traumatic PPH (9,17.64%) and combination of atonicity along with trauma (n=2, 3.9%) (Table 6).

Among patients who had atonic post partum hemorrhage, 7 (11.11%) had multiple pregnancy as ante partum risk factor (6 cases of twins and one case of triplets). All the placenta praevia cases had previous history of caesarean sections, and three of them had previous two caesarean sections. In seven cases the placenta was morbidly adherent. Four cases of placenta percreta and three were accreta. Cardiac arrest occurred during caesarean section due to hypotension in one case of placenta percreta who could be revived by timely interventions. Acute kidney injury necessitating dialysis was required in two cases of acute severe post-partum hemorrhage following prolonged hypotension (one case of atonic PPH, one case of placenta accreta). One patient had postpartum psychosis.

Different management options were tried in 20 cases (74.07%) of atonic PPH. Obstetric hysterectomy was done in 7 (25.9%) cases. (Table7). Among obstetric hysterectomies for atonic PPH, five were done for postpartum collapse after LSCS, general condition not allowing conservative approach and two were done for failed condom tamponade, B'Lynch suture and de vascularization. Six cases of atonic PPH were medically managed, two of them became near-miss and four became maternal mortality. All four were referred cases and adequate intravascular replacement was not given and two of them were brought dead. Total six maternal mortalities were there in this study population (n=63), the two others had ante partum hemorrhage, one had associated COPD and in spite of adequate volume replacement, desaturated and died, the other underwent emergency LSCS and hysterectomy in the periphery, due to placenta praevia, had sigmoid colon injury during the procedure, referred late and was brought dead.

Shock requiring continuous vaso active agents were documented in 32 (50.79%) cases. Disseminated intravascular coagulation occurred in 20 (31.74%) cases. Majority of them (n=57, 90.47%) could be saved by adequate blood and blood component therapy.

Table -1 Baseline socio demographic characteristic (n=63)

Age	Number	Percentage
less than 20	5	7.9
21-30	49	77.7
More than 31	9	14.2
Place of residence		
Rural	61	96.82
Urban	2	3.17%
Socio Economic Status		
Below Poverty line	52	82.53
Above poverty line	11	17.46
Time of occurrence of the event in relation to pregnancy		
First pregnancy	22	34.92
Second pregnancy	25	39.68
Third Pregnancy	13	20.63
Fourth Pregnancy	2	3.1
Fifth and more	1	1.5
Mode of delivery		
Vaginal	27	42.85
Caesarean section	31	49.20
Hysterectomy	3	4.7
Baby details		
Live born	47	74.6
Dead born	11	17.46

Table-2 Causes of obstetric Hemorrhage (n=63)

Cause	Number	Percentage
Post partum hemorrhage	51	80.95
Abruption	6	9.5
Ectopic	2	3.1
Inversion	2	3.1
Rupture uterus	1	1.5
Intra peritoneal bleed from uterine surface	1	1.5

Table-3 Surgical procedures performed (n=63)

Procedure	Number	Percentage
Emergency laparotomy	14	22.22%
Emergency LSCS or hysterotomy	13	20.63
Relaparotomy	10	15.87
Suturing of vaginal and cervical tear	9	14.28
Manual removal of placenta	1	1.5
Manual repositioning	1	1.5
	48	76.19

Table -4 Indications for obstetric hysterectomy (n=28)

Indication	Number	Percentage
Placenta praevia including morbidly adherent placenta	11	39.28
Atonic PPH	7	25
Broad ligament laceration and hematoma	3	10.7
Atonic and traumatic PPH	2	7.1
Abruption, couvelaire uterus	1	3.5
Inversion, failed manual repositioning	1	3.5
Rupture uterus	1	3.5
Bleeding from the surface of uterus	1	3.5
Cervical pregnancy, failed evacuation	1	3.5

Table -5 Supportive treatment given (n=63)

Indication	Number	Percentage
ICU admission	63	100
Ventilator use	13	20.63
Blood transfusion	60	95.23
Fresh frozen plasma	45	71.42
Platelet	21	33.33
Cryoprecipitate	2	3.1

Table-6 Types of post partum hemorrhage (n=51)

Indications	Number	Percentage
Atonic PPH	27	52.94
Placenta pracvia	13	25.49
Traumatic PPH	9	17.64
Atonic and traumatic	2	3.9

Table-7 Management of atonic PPH (n=27)

Management	Number	Percentage
Medical management alone	6	22.22
Condom tamponade	6	29.62
B Lynch and step wise devascularisation	8	37.03
obstetric hysterectomy	7	25.9

Discussion

Major obstetric hemorrhage accounted for the largest proportion of maternal outcome in the present study which agrees to waterstone[8] et al, Mantel[18] et al, Prual[19] et al and Brace[20] et al. The burden of major obstetric hemorrhage is calculated to be 0.337% of live births in the present study which agrees to studies conducted in Scotland[5] and UK[21] but lower than studies conducted in Norway[22]. The definition of major obstetric hemorrhage in Norway study was blood loss of more than 1500ml or blood transfusion. This might have resulted in difference of observation. The present study followed WHO 2009 Near-miss identification criteria of requiring five or more units of blood to be transfused as a life saving measure. Acute severe PPH amounted to 44.73% of severe maternal outcome. This also agrees to the results from Scotland[20]. Grand multi parity is not found as a risk factor in this study which agrees to A1Zirqiet al[22]. Any woman who gives birth can have post-partum hemorrhage which threatens her life[10]. Severe PPH incidence unresponsive to standard medical treatment was found to be 0.27% in the present study which agrees to study conducted at Nigeria[23].

Uterine aonicity leading to massive blood loss is responsible for the majority of primary PPH [15, 17,18,20]. Present study also agrees to this observation. Caesarean section is the most common mode of delivery in these cases [5,22]. Caesarean hysterectomy occurs in around 0.1% usually for morbidly adherent placenta but is associated with high incidence of hemorrhage and hospitalization in intensive care[24]. Hysterectomy if performed for uterine atony there should be documentation of other therapy attempts [25]. But delay in carrying out post partum hysterectomy can be catastrophic[10]. The present study agrees to the above observations.

Uterus conserving approaches were successful in 66.6% in the present study which agrees to studies from Scotland[5] and Nigeria[23]. Higher success rates are reported from UK[4], but the cutoff for major

hemorrhage adopted in this study was blood loss more than 1000ml.

Shock and disseminated intra vascular coagulation occurred in a significant proportion in the present study. According to Y. Fouche et al [26] early use of plasma prevents onset of coagulopathy. Vaso active drugs were used for treatment of shock for more than 40 years[27]. In severe ongoing hemorrhage survival is improved when RBC and plasma are used in 1:1 basis[28]. Timely transfusion of platelets at 1:1:1 rates is even more important to prevent coagulopathy[29].

Use of vaso active agents and blood transfusion was adequate in all the survived patients. Inadequate transfusions along with inadequate measures taken to check ongoing hemorrhage in the transit period resulted in the four mortalities due to post partum hemorrhage. Platelet transfusion even though was not used in 1:1:1 rate in this study, it was not associated with any serious adverse outcomes.

Conclusions

Voluntary blood donation is to be promoted, well equipped blood banks with round the clock availability of blood and blood products to be set up at fixed distances from FRU to tertiary care centres, so that early transfusion can be resorted to or made available in transit. Anaesthetist should be available in all FRUs conducting delivery round the clock so that for those who are referred adequate intravenous access can be ensured. On call senior obstetrician should see all these critically ill patients and condom tamponade or B'Lynch sutures to be put before referral so that ongoing blood loss can be checked. Morbidly adherent placenta to be diagnosed antenatally and referred sufficiently early to tertiary care centres. Management not to be attempted at FRUs. ICU with ventilator facility to be set up at least at Taluk hospitals if resources permit. Transport facility with trained nurse who should ensure patency of intravenous access and oxygen delivery system should be available round the clock in all FRUs conducting deliveries.

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