IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 10 Ver. VI (October. 2016), PP 45-49
www.iosrjournals.org

Maternal Near Miss at a Tertiary Institute in Manipur, India

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Abstract:
Background: *Maternal Near miss is new tool of obstetric care.*
Objective: *To determine the demographic characteristics, frequency and nature of maternal near miss.*
Methods: *This was a retrospective study done over a period of 3 years (January 2009 to December 2011) in a tertiary care centre of north eastern part of India (Manipur). The data was analyzed and presented in frequencies, percentages and proportions.*
Results: *There were 31,522 deliveries, 69 near misses and 30 maternal deaths in the last three years. The prevalence of near miss was 2.18/1000 live births. The ratio between maternal mortality and near misses for 3 years was 1:2.3 (1:1.1 in 2009, 1:2.1 in 2010, 1:5.2 in 2011). Previous history of cesarean section (27.5%) followed by hypertension (19%) acted as independent risk factors. Atonic post partum hemorrhage (40.5%) and uterine dysfunction (55%) was the commonest antecedent cause and organ dysfunction. Hysterectomy, vasopressors, ICU admission and massive blood transfusion were main life saving modalities.*
Conclusion: *The ratio between maternal mortality and near miss incidents had improved in the three years. The studied variables were comparable over years but further studies are required over longer durations to identify and analyze the hitherto unknown factors.*
Keywords: *Near miss, maternal mortality, atonic postpartum hemorrhage, hysterectomy.*

I. Introduction

World health organization (WHO) defines "Near Miss" as a woman who has nearly died but survived a complication that occurred during pregnancy, child birth or within 42 days of termination of pregnancy.[1] Signs of organ dysfunction that follows these life threatening events are used to identify the near miss cases so that the same classification of underlying cause is used for both maternal death and near misses. This consistency and a set of near miss indicators enables assessment of quality of care provided to pregnant women. Rate of near miss ranges from 1/1000 to 80/1000 live birth depending on population studied and definition/criteria used.[2] In India prevalence rate lies between 0.8 to 8.23%.[3]In India approximately 136,000 women die every year contributing to almost 20% of global burden.It is still a big burden for a single country but things have been looking up in the past decade. The current maternal mortality rate (MMR) rests at a rate of 212/100,000 live births (2007-2009).[4]As we have committed ourselves to United Nations mandated millennium development goal which specifies to bring down the MMR to 109 (can we do it?), steps need to be taken over our previous attempts.[5]Studies have revealed that near miss is a potentially useful tool for starting audits.Scrutiny of near-misses may be useful for several reasons and the ratio maternal deaths to near-misses can be calculated and could be compared between regions or over time.The near miss events were identified using organ dysfunction/failure specific criteria validated by WHO. These included cardiovascular (shock, cardiac arrest, continuous use of vasopressor drugs, severe hypo perfusion, severe acidosis, cardiopulmonary resuscitation), respiratory (acute cyanosis, gasping, severe tachypnea, bradypnea, hypoxemia, need for anesthesia unrelated endotracheal intubation), renal (severe oliguria, azotemia, need for dialysis), coagulation (DIC, severe thrombocytopenia, need for massive blood transfusion ≥5 units), hepatic (jaundice in pre-eclampsia, severe hyperbiliruenemia), neurological (prolonged coma, status epileptics, global paralysis, stroke) and uterine(hysterectomy due to infection or hemorrhage) dysfunction.

II. Material and methods

The study was conducted in the Obstetrics and Gynecology unit of Regional Institute of Medical Sciences, a tertiary care institution in the northeastern part of India. Near miss cases were retrospectively identified among women with pregnancy related complication admitted in our hospital from 1st January 2009 to 31st December 2011. A total of 69 case files of women whose diagnosis met the above mentioned criteria were retrieved from the record section. A total of 69 cases were retrieved and studied for demographic characteristic including age, parity, number of abortion in the past, gestational age at the time of sustaining near miss morbidity, underlying pathology, specific cause leading to the near miss events, organ system involved, ICU

admission, treatment given, requirement of massive blood transfusion (≥ 5 units), total length of hospital stay and perinatal outcome. The data was collected separately for three years, analyzed and then compared.

III. Results

During the reviewed period, there were 31522 deliveries, 30 maternal deaths and 69 near miss events. As the table 1 indicates the ratio between maternal mortality and near miss events over the three years combined was 1:2.3. The ratio for the year of 2011 was 1:5.2 which showed a reduction of more than 50% when compared to year 2009. It was noted that the number of maternal death has decreased and the number of maternal near miss has increased over years leading to a constantly improving ratio. The demographic characteristic of women who sustained near miss complication over the three years was comparable (table 2). More than half of the women in each group were between 20 to 34 years of age. Most women had 1-3 issues. Women in third trimester seemed to be at a higher risk. First trimester mishaps included MTP related complication and were seen in only 8.7% of total cases. They were illegal MTP's done by using oral abortificants except one in which the morbidity was due to uterine and bowel perforation following dilatation and evacuation in a private hospital. Majority of women had delivered in our hospital and about 30% cases were referred or unbooked. Cesarean section was 1.5 times more common than vaginal deliveries. Of all the cases studied, there was one case of molar pregnancy, one case of cornual ectopic and two cases of cervical ectopic pregnancy.

Pregnancy induced complication was the most common underlying pathology (table 3). When causes were analyzed separately over different years it was seen that the commonest underlying risk factor was post cesarean pregnancy in 2009 and 2011, and hypertensive disorders of pregnancy in 2010. About 50% of placenta praevia cases and 50% of adherent placenta cases had a history of cesarean in past. Several causes were detected which had been the direct reason for the obstetric mishaps, but the cause most consistently seen over the years was atonic postpartum hemorrhage (PPH) for all three years. It was followed by uterine rupture in 2011 and 2009 and eclampsia in 2010. Based on WHO's organ dysfunction based criteria, uterine dysfunction was commonest followed by cardiovascular dysfunction (table 4, table 5). Table 6 demonstrated that 90% of patients had to undergo procedure like dilation and curettage, manual removal of placenta under general anesthesia, laparotomy & repair or hysterectomy. The most common operation done as a life saving measure was hysterectomy. Vasopressor medication including dopamine and dobutamine was required in majority of patients in 2011 and 2009.Use of multiple antihypertensive and magnesium sulfate therapy was commonest in 2009 but it only reflected the observation that eclampsia was the most common maternal mishap in this time period. Around 40% of cases had to be managed in intensive care unit each year. Blood transfusion came up as a life saving measure for all these three years. Massive blood transfusion was required in 52% in 2011, 32% in 2010 and again 54% in 2009. Maximum blood transfusion received was 21 units for a patient of disseminated intravascular coagulation following abruptio placentae. Overall the need for blood transfusion was seen in 45% of cases. Then, mean hospital stay was between 9 and 10 days. The maximum hospital stay was 25 days.

IV. Discussion

In our study, strict adherence to WHO definition was practiced. The prevalence over three years was 2.18 cases/ 1000 live birth. Souja (2006) reported a mean of 8/1000 live birth for near miss events.[6]This variation may be due to difference in population studied and definition used. The maternal death and near miss ratio had constantly increased implicating that over these years we were able to convert more and more maternal death to near misses. The ratio for all years combined was 1:2.3 and for the year of 2011 it was 1:5.2. Fillipi et al stated this ratio to be ranging from 1:9 to 1:108 according to his study.[7]

Most patients were from 20 to 34 years. The mean age was 30.8 years. Complication in teenage pregnancy was rarely seen. Parity from 1 to 3 followed by nulliparous women were at a higher risk when compared to women of higher parity. Another study done by Souja et al stated that age more than 35 years and parity more than 3 were independent risk factor for near miss.[8]Third trimester women were at higher risk and the women in second trimester did not seem to be at risk at all. Oladapo's study was comparable to our study although 2nd trimester complication were also seen (2-6%).[9] Cesarean section was the most frequent mode of delivery in our study (62%). A study by Waterson states emergency cesarean section as an independent risk factor.[10]More than 3/4 of deliveries were conducted in our hospital and it included the booked, unbooked and referred cases. In one study two third of the cases had delivered in the hospital.[11]

Pregnancy induced complication were most commonly seen but it has a wide spectrum and includes many sub variables. On analysis it was seen that one or more cesarean section done in the past followed by chronic anemia acted as independent risk factors. There is a high degree of association between history of cesarean section in past pregnancy with placenta previa, adherent placenta or uterine rupture in present pregnancy thus increasing the risk of peripartum hysterectomy. As mentioned below, emergency peripartum hysterectomy is the most frequent lifesaving modality and its association with history of cesarean section in past was seen in significant number of cases by Knight etal.[12]

Many causes were seen directly associated with near miss. Atonic PPH was the leading cause followed by eclampsia over three years. However, in year 2009 eclampsia was the leading cause. Hemorrhage and hypertensive disorders were the most frequent events in study by Fillip V.[7]Maternal morbidity due to infection and septicemia was rare in both studies. Peripartum hysterectomy was the treatment modality which was most commonly resorted to in emergency situation in our set up for severe bleeding. In one instance of uterine rupture, the uterus could be saved by repairing the tear. The patient in this case was a primipara. Internal iliac artery ligation along with hysterectomy had to be done for two patients when the bleeding could not be controlled. Emergency peripartum hysterectomy was the major life saving procedure (29%) in a study by Mantel et al.[13]Vasopressor including dopamine and dobutamine in more than 30% and ICU admission in more than 45% of patients was required in all the three years. The mean hospital stay was between 9 to 10 days for all three years. In a study by Ciccati et al the most prevalent factor in both near miss and maternal mortality was use of vasoactive drugs.**[14]** Another study indicated the ICU admission to be 81.9% and mean hospital stay to be 10.3 days.[15]While assessing the fetal outcome, it was seen that majority returned home with a healthy baby.

V. Conclusion

The measurement of life threatening morbidity in regions with inadequate access to obstetric care is still a challenge. This study is an attempt to document the relation between different variables and near miss incidents and then they were compared over time and place. Some limitations were there like as it was a case sheet based study, it was prone to miss and uncollected data and relation to variables like maternal education, religion, socioeconomic status etc. could not be established. Demographic status wise it seemed that the underlying complications, specific antecedent events and management were comparable over time and to other parts of India and world and improvement could be seen over years. However, the women here were developing complications at an earlier age and at lower parities. It may be thus possible that there are still some hitherto unknown variables in this region and further studies in this direction needs to be taken up. Finally, maternal near miss is a strong tool for medical audits which can give us correct picture of maternal morbidity and obstetrical care. If same definition is to be used worldwide with the same criteria,results can be accurately compared without any bias.

Tables

Table 1: Ratio of maternal death to near miss

	2011	2010	2009	Total
Total deliveries	11347	10488	9687	31522
Maternal death	6	12	12	30
Near miss	31	25	13	69
Maternal death: near miss	1: 5.2	1:2.1	1: 1.1	1: 2.3

Table 2: Demographic status

	2011	2010	2009	TOTAL
Age (years)				
≤19	1	1	0	2
20-34	19(61.2)	18(72)	7(54)	44(63.7)
≥35	11	6	6	23
Range/Mean±SD	17-41/30.8±6.25	18-38/28.7±5.4	24-40/32±5.2	17-41/30.5±5.9
Parity				
0	7	9	1	17
1-3	20(64.5)	14(56)	11(84.6)	45(65.2)
>3	4	2	1	7
Range/Median	0-6/2	0-6/1	0-10/1	0-10/1
Booking Status				
Unbooked/Referred	10(32.25)	8(32)	4(30)	22(31.9)
Gestational age(Trimester)				
1st	5	2	0	7
2nd	0	0	0	0
3rd	26(83.9)	23(92)	13(100)	62(89.8)
Mode of delivery				
Vaginal	8	11	3	23
Instrumental	2	1	1	3
Cesarean	17(63)	11(47.8)	10(77)	38(62)
Place of delivery				
Home	3	4	1	8
PHC*/Private	4	1	1	6
Hospital	24(77.4)	20 (80%)	12(92.3)	55 (79.7%)

Maximum values shown as percentages in parentheses

Table 3: Associated risk factors

Risk factors	2011	2010	2009	TOTAL
PRESENT PREGNANCY ASSOCIATED	**26 (83.8)**	**17 (68)**	**4 (30.7)**	**47 (68.1)**
Hypertensive disorders	4	8(32)	1	13(19)
Mismanaged labor	2	1	-	3
Prolonged labor	1	-	-	1
Incomplete MTP/ MTP complication**	4	2	-	6
Twin	1	-	-	1
Adherent placenta	2	2	0	4
Adherent placenta with post cesarean	2	1	1	4
Simple placenta previa	4	-	-	4
Placenta previa with post CS	3	1	1	5
Abruption placenta	-	-	1	1
Placenta succunturiata	1	-	-	1
Bilobate placenta	-	1	-	1
Retained placenta	2	-	-	2
Peripartum cardiomyopathy	-	1	-	1
MEDICAL COMPLICATION	**5**	**1**	**1**	**7**
Chronic anemia	3	2	5	10(14.4)
Hypothyroidism	-	1	-	1
RHD¥	1	-	1	2
Hepatitis C infection	1	-	1	2
POST CESAREAN PREGNANCY	**7(22.6)**	**6**	**6(54.5)**	**19(27.5)**

*Pregnancy induced hypertension, **Medical termination of pregnancy, ¥ Rheumatic heart disease,Highest values depicted as percentage in parenthesis

Table 4: Specific antecedent cause

Causes	2011	2010	2009	Total
Respiratory distress	1	-	-	1
Uterine rupture	5	3	2	10
Atonic Postpartum hemorrhage	12(38.7)	8(32)	8(61.5)	28(40.5)
Placental bed bleed	6	2	-	8
Retained product	4	1	-	5
Traumatic Postpartum hemorrhage	1	-	-	1
Uterine perforation	-	1	-	1
Disseminated intravascular coagulation	-	-	1	1
Cesarean complication	2	1	-	3
Eclampsia	3	8	1	12(17.3)
Acute Left ventricular failure	-	1	1	2
Ectopic rupture	-	1	-	1
Septic abortion in shock	1	-	-	1

Highest values given as percentage in parenthesis

Table 5: Organ dysfunction

SYSTEM	2011	2010	2009	TOTAL
Respiratory	1	-	-	1
Uterine	19 (61.3%)	10 (40%)	9 (69.2%)	38 (55.1%)
Central nervous system	3	8	1	12
Cardiovascular	7	7	2	16
Coagulation	-	-	1	1

Highest values given as percentage in parentheses

Table 6: Treatment

	2011	2010	2009	Total
Medication				
Vasopressor agents	10 (32.2)	10(40)	6 (53)	23(33.3)
Antihypertensive	3	8 (32)	1	12
Multiple antibiotic	4	2	1	7
Procedure				
Dilatation and curettage	3	-	-	3
Manual removal of	2	-	-	2

placenta				
Laparotomy	2	3	1	6
Hysterectomy	19 (61.3)	10 (40)	9 (69.2)	38 (55)
Internal iliac artery ligation	1	0	1	16
No procedure done	6	0	1	7
Intensive care unit	15 (48.3)	14(56)	7(54)	31 (45)
Massive blood transfusion	16 (51.6)	8 (32)	7(53.8)	31 (45)
Duration of hospital stay				
Range	4-25	5-15	7-20	4-25
Mean±SD	9.8±4.2	9.2±2.4	9.6±3.7	9.5±3.6

Highest values as percentage in parentheses

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