

Clinical Analysis on Near Miss Events in a Tertiary Care Hospital

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I. Introduction

A maternal death is one of the most devastating events in obstetrics with widespread implications on both the family and the medical staff involved. Every woman goes through a risk for this sudden and unexpected event during pregnancy, childbirth and after delivery. Maternal near miss case is defined as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.¹

In practical terms, women are considered near-miss cases when they survive life threatening conditions. Fortunately, most of the obstetrical complications can be prevented or managed provided a timely and proper intervention is taken.

The advantage of evaluating the near miss cases is that these events are more frequent and hence, comprehensive and reliable information can be drawn and rapid audits can be conducted²⁻⁵. Near-miss cases share many characteristics with maternal death and can directly inform on obstacles that had to overcome after the onset of an acute complication. At the same time, the survivor herself can be a source of information. As surviving a near miss event mainly occurs because of the care provided, inquiring into the events of near miss would boost up the morale of the care providers. Usually, near miss morbidity precedes maternal death. Therefore, identifying and analysing the cases of maternal near miss helps in understanding the factors that determine maternal mortality.^{6,7}

There are many ways of identifying maternal near miss cases using various sets of criteria like disease specific, management specific and organ system dysfunction based. Amongst these, organ system dysfunction based criteria have been noted to be epidemiologically sound and less affected by bias in identifying maternal near miss cases.⁸ In 2009, World Health Organization (WHO) has developed new system based on organ system dysfunction which incorporates clinical, laboratory and management based criteria for identifying maternal near miss.⁴ It has been then recommended that WHO near miss approach for maternal death be uniformly used in analysing the cases of near miss maternal mortality.¹ It includes the following:

Severe maternal complications

- Severe postpartum haemorrhage
- Severe pre-eclampsia
- Eclampsia
- Sepsis or severe systemic infection
- Ruptured uterus
- Severe complications of abortion

Critical interventions or intensive care unit use

- Admission to intensive care unit
- Interventional radiology
- Laparotomy (includes hysterectomy, excludes caesarean section)
- Use of blood products

Life-threatening conditions (near-miss criteria)

- Cardiovascular dysfunction - shock, cardiac arrest (absence of pulse/ heart beat and loss of consciousness), use of continuous vasoactive drugs, cardiopulmonary resuscitation, severe hypo perfusion (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 anaesthesia, severe hypoxemia (O2 saturation <90% for ≥60 minutes or PAO2/FiO2 <200)
- Renal dysfunction - oliguria nonresponsive to fluids or diuretics, dialysis for acute renal failure, severe acute azotaemia (creatinine ≥300 µmol/ml or ≥3.5mg/dl)
- Coagulation/haematological 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.

The objective of this study was to determine the frequency of maternal near miss events, to study the sociodemographic characteristics of the near miss cases and to analyse the causes of near miss events, to know the interventions taken to treat the patients to evaluate the foeto-maternal outcome of the near miss cases in the study.

II. Methods

It is a prospective observational study conducted in the department of obstetrics and gynaecology, Rangaraya Medical College and Hospital, Kakinada, Andhra Pradesh, India. Ours is a tertiary care institute, it is a referral hospital for both public and private hospitals. In addition to providing twenty-four-hour emergency obstetric services, the hospital also provides antenatal care and delivery services for both low and high risk pregnant women. Hospital has 24-hour facility for blood component therapy with labour room complex and ICU with 24-hour facility for multidisciplinary specialty.

Any patient who met the WHO inclusion criteria for maternal near-miss mortality, mentioned above, during the period January 2018 to June 2018 was included in study. Data have been collected from the patients having Near Miss Mortality event during the hospital stay on a predesigned a proforma prepared for the study. Patient characteristics including age, parity, gestational age at admission, type of admission, booking status and interventions taken to save the life of the patient were also noted. Investigations were done for anaemia, septicaemia, eclampsia and for organ system dysfunction/ failure.

Data was collected for determining the nature of obstetric complication, presence of organ system dysfunction and timing of near miss events with respect to admission. Mode of delivery and the foetal outcome was also noted.

III. Results

There were 5105 deliveries during the study period. Total number of near miss cases was 77. Maternal near miss incidence ratio obtained in the present study is 15.4 per 1000 live births.

Table 1: Demographic Characteristics of Near miss cases in the study

| Characteristics | | Number of Cases (N=77) | Percentage |
|-------------------|-----------------|------------------------|------------|
| Age | <20yrs | 27 | 35% |
| | 20-35yrs | 45 | 58.4% |
| | >35yrs | 5 | 6.6% |
| Parity | Primi | 41 | 53.2% |
| | Multi | 36 | 46.8% |
| ANC | Yes | 24 | 31.1% |
| | No | 53 | 68.9% |
| Gestational Age | <13 weeks | 6 | 7.7% |
| | 13-28 weeks | 24 | 31.2% |
| | >28 weeks | 43 | 55.8% |
| | Postpartum | 4 | 5.2% |
| Type of Admission | Self | 29 | 37.6% |
| | Referred | 48 | 62.4% |
| Near Miss | On Admission | 69 | 89.6% |
| | After Admission | 8 | 10.4% |

Table 2: Causes of Near miss events in the study

| Causes | Number of Cases (N=77) | Percentage |
|-------------------------------|------------------------|------------|
| Hypertensive disorders | | |
| Severe Pre-eclampsia | 18 | 23.3% |
| Eclampsia | 26 | 33.7% |
| Severe Haemorrhage | | |

| | | |
|----------------------------|----|-------|
| Early Pregnancy(Ectopic) | 6 | 7.7% |
| Late Pregnancy | | |
| APH | 4 | 5.1% |
| PPH | 10 | 12.9% |
| Sepsis` | 5 | 6.4% |
| Dystocia | | |
| Uterine rupture | 2 | 2.6% |
| Impending rupture | 3 | 3.8% |
| Severe Anaemia | 3 | 3.8% |

Table 1 shows the demographic characteristics of the near miss cases in the present study. The most common age group affected in the near miss cases in the present study was 20 to 35 years (58.4%). While 41 cases (53.2%) were primipara; 36 (46.8%) cases were multipara. Maximum cases had not received any ANC care (68.8%). Majority of the cases, i.e. 43 cases out of which 77 were in the third trimester and 4 in the postpartum period indicating that late pregnancy and delivery is the worst affected period. There were 62.4% referred cases; on the other hand 37.6% were self-admissions. While 89.6% cases were near miss at the time of admission itself, only 10.4% became near miss cases after admission in our hospital.

The most common cause of near miss events in the present study (Table 2) was hypertension- 44 cases (57%), followed by haemorrhage - 20 cases (32.1%) and dystocia- 5 cases (6.4%). Other causes were sepsis- 5 cases (6.4%) and severe anaemia (non-haemorrhagic)-3 cases (3.8%).

Table 3: Organ system dysfunction in near miss cases in the study

| Organ Dysfunction | Number of Cases (N=77) | Percentage |
|----------------------------|------------------------|------------|
| Neurological | 26 | 33.7% |
| Respiratory | 7 | 9.09% |
| Cardiac | 3 | 3.8% |
| Haematological/Coagulation | 25 | 32.4% |
| Hepatic | 2 | 2.5% |
| Renal | 11 | 14.2% |
| Uterine | 3 | 3.8% |

Amongst the near miss cases in the present study the most common organ system dysfunction (Table 3) was neurological dysfunction (33.7%), most of them were in cases of eclampsia. Other organ dysfunctions were haematological / Coagulation (32.4%),renal dysfunction (14.2%), uterine dysfunction leading to hysterectomy in 3 cases (3.8%), hepatic (2.5%) and respiratory dysfunction (9.09%) and cardiac dysfunction (3.8%).

Table 4: Intervention in the management of near miss cases in the study

| Intervention | Number of Cases (N=77) | Percentage |
|--|------------------------|------------|
| Laparotomy | 12 | 15.5% |
| Massive blood and blood products transfusion | 27 | 35.01% |
| Higher Antibiotics | 32 | 41.5% |
| Hysterectomy | 4 | 5.1% |
| Inotropic Support | 32 | 41.5% |
| Mechanical Ventilation | 7 | 9.09% |
| Magnesium sulphate therapy | 29 | 37.6% |

Table 4 shows the properly timed interventions that were secured to the near miss patients which saved their lives. Blood and blood products transfusions were needed in 35.01%. Magnesium sulphate therapy was given in 37.6% cases; they were all cases of eclampsia or severe pre-eclampsia. Laparotomy for either rupture uterus or ruptured ectopic were done in 15.5%. Another 9.09% needed ventilator support. Inotropic support was needed in 41.5%. Hysterectomy was done in 5.1% cases. Many near miss patients needed more than one intervention during their management.

Table 5: Mode of Delivery in Near miss cases in the study

| Mode of Delivery | Number of Cases (N=77) | Percentage |
|--------------------------------|------------------------|------------|
| Caesarean | 28 | 36.3% |
| Vaginal | 41 | 53.2% |
| Laparotomy for Uterine rupture | 2 | 2.5% |
| Laparotomy for Ectopic | 6 | 8% |

Table 6: Neonatal outcome of the near miss cases in the study

| Neonatal outcome | Number of Cases (N=77) | Percentage |
|------------------|------------------------|------------|
| Live births | 54 | 70% |
| Healthy | 33 | 42.8% |

| | | |
|---------------------------------------|----|--------|
| Birth Asphyxia | 21 | 27.2% |
| Still Births | 17 | 22.07% |
| First trimester termination (Ectopic) | 6 | 7.79% |

The result of the mode of delivery is depicted in Table 5, 36.3% delivered by LCSC, while 53.2% were delivered normally. Regarding neonatal outcome 70% had live births, out of which 42.8% were healthy babies, 27.2% had birth asphyxia, while 22.07% cases had still births.

IV. Discussion

Maternal near miss incidence ratio in the present study is 15.4 per 1000 live births, which is similar to the study conducted by Singh et al from Raipur (15.1/1000 live births) ⁹ and 17.8/1000 in a study by Roopa PS et al from Karnataka. ¹²

Most of the cases of maternal near miss in this study were in the age group of 20- 35 years (58.4%) which is similar to the other studies conducted in Ethiopia and Nepal. ^{10,15}

In our study majority of the women becoming near miss was primipara (39%) which is supported by other studies ⁹. Third trimester was the worst time for the pregnant women to land up in life threatening situations as in the present study and other studies. ^{9, 15}

Near miss events are mainly due to not availing any antenatal care, which indirectly is due to lack of knowledge amongst the pregnant women about it. This fact is supported by the present study in which 68.8% had not taken any antenatal care, and by other studies conducted in various parts of the world. ^{9, 11, 18-20}

Majority of the cases were referred to our hospital from other public or private hospitals (62.3%) as was the case in other studies. ^{15,19,20} And these were near- miss events on admission (89.6%) itself rather than becoming near-miss after admission to our hospital, which is consistent with other studies. ^{9,13,15,19,20}

The most common cause for maternal near - miss in the present study was found to be hypertension (57.1%) followed by haemorrhage disorders 25.9 % followed by dystocia (6.4%), sepsis (6.4%) and anaemia (3.8%) ^{9,13,19}. In a study conducted in Syria showed HDP (52%) to be the most common cause followed by haemorrhage. ^{13, 15}

Regarding organ dysfunction neurological dysfunction (33.7%) was the most common, seen especially in patients with eclampsia followed by haematological dysfunction (32.4%). Other organ involvements were renal dysfunction (14.2%) and respiratory dysfunction (9.09%). In contrast to our study, various studies from Nepal, Karachi and Syria concluded haematological dysfunction to be the most predominant followed by neurological involvement. ^{10, 11, and 13}

Massive blood transfusion was needed in 35.01% of patients which were similar to few studies ⁹. Laparotomy was needed to save the life of the patients in 15.5%, whereas another study showed its need only in 5%. ¹⁰ Hysterectomy was done only in 5.1% cases in our study, whereas it was done in 4 and 43 cases respectively in other studies. ^{10, 13}

Nearly 31.1% near miss admissions were delivered by LSCS and 53.3% delivered by vaginal route in the present study. Similar results were obtained in other studies while in an Ethiopian study most of them delivered by vaginal route (61%) and only 13% delivered by LSCS. ^{10, 13, 15}

Around 70.1% of the babies were live births and 22.07% were still births in our study which is similar to a study ⁹ while in other studies still births were much lower (6-9.4%) and live births were more (82-90%). ^{13,15}

V. Conclusion

In the present study there were 77 cases of maternal near miss and maternal near miss ratio was 15.4/1000 live births. This study concludes hypertensive disorders and haemorrhage to be the leading causes for the same. Hence, evaluation of the circumstances surrounding near miss can give us an idea to know the exact etiology, treat it in its early stage and prevent death. It can be done by proper and efficient management of hypertensive disorders, haemorrhage and anaemia

Proper training of the health care personnel, even at primary level, to handle these life threatening events and timely referral to a higher centre whenever necessary is very important in preventing maternal death. Also creating awareness among the women regarding the importance of routine antenatal check-up is quintessential.

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