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Original Research Article

Study of near miss maternal morbidities at a tertiary hospital

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ABSTRACT

Background: In health care literature NEAR MISS refers to a severe life-threatening condition that did not cause death-but had the potential to do so. But in 2009, WHO came up with a comprehensive criteria for identification of near miss. Present study was undertaken to analyse maternal near miss morbidity (MNMM) cases and associated morbidity in a local setting.
Methods: Present study was single-center, prospective, observational study, conducted in maternal near miss cases which met the comprehensive criteria of WHO, admitted during study period and survived.
Results: In present study, majority of cases were 20-29 years (78%), multigravida (52%), in third trimester and postpartum (52%), had phenotype as class I MNMM (maternal near miss with healthy infant) (36%), In near miss cases, near miss on arrival were 66% while 34% were near miss after admission, 8% had disorder on admission and became near miss and 26% had no disorder on admission but became near miss (26%).
Conclusions: Hypertensive disorders and Hemorrhage and COVID-19 related complications were the leading causes of near miss situations. Previous LSCS and Anemia seem to be risk factors for developing MNMM.

Keywords: Maternal near miss morbidity, Hypertensive disorders, Postpartum hemorrhage, Mortality index

INTRODUCTION

"Women are not dying because of diseases we cannot treat. They are dying because societies are yet to make the decision that their lives are worth saving."-Mahmoud Fathalla, WHO.[1]

Maternal mortality is described as "just the tip of the iceberg", implying that there is a base -maternal morbidity- which remains largely undescribed.[2] For each woman who dies, many will survive but often suffer from lifelong morbidity. When we reduce the risk factors for maternal deaths, we can also reduce the number of women suffering from severe morbidities.

In health care literature NEAR MISS refers to a severe life-threatening condition that did not cause death-but had the potential to do so. An ill woman who would have died but for the good care received or sheer good luck is a Near Miss case. The investigation of near-miss, provides superior information about disease burden and indicates quality of care in mothers. It can also broaden understanding of factors that contribute to both maternal morbidity and mortality.[3,4]

There were several criteria to define near miss; But in 2009, WHO came up with a comprehensive criterion (which included clinical, laboratory and management-based criteria) for identification of near miss. Present study was undertaken to analyse maternal near miss cases and associated morbidity in a local setting.

METHODS

Present study was single-center, prospective, observational study, conducted in department of obstetrics

and gynecology, SS Institute of Medical Sciences and Research Centre, Davangere, India. Study duration was of 1 year (January 2020 to December 2020).

Inclusion criteria-All the maternal near miss cases which met the comprehensive criteria of WHO, admitted during study period and survived. Exclusion criteria-Those cases who did not survive.[5]

A near miss is defined as a woman who survives a severe life-threatening condition (either after receiving emergency medical or surgical intervention or otherwise) during pregnancy, abortion, childbirth or within 42 days of pregnancy termination. In this study, WHO comprehensive criteria was adopted for identification of maternal near miss morbidity (MNMM).

All women with severe life-threatening conditions who fulfilled the WHO criteria were identified and flagged. Patient characteristics including age, education level, parity, booking status, whether came directly or referred from outside, hospital where antenatal care received, whether in life threatening condition at arrival or became so later on, Gestational age at admission, h/o previous LSCS, adverse events, disorders, organ system dysfunction, surgical interventions, contributing factors, need for care in HDU setup, interventions needed in HDU, need for Blood and blood products, mode of delivery, Gestational age, birth weight, Neonatal outcome, need for other specialty intensive care ,duration of HDU stay and duration of hospital stay were studied. All emergency surgical interventions to control hemorrhage including B Lynch suturing, Bilateral uterine artery ligation, Bilateral internal iliac artery ligation, caesarean hysterectomy was documented. Their course of hospital stay was followed closely A total of 50 cases were included in the study. Each case was documented with respect to the adverse event, the disorder and organ dysfunction.

RESULTS

During study period, there were 2211 live births. we noted a low mortality index (0.14). We noted 8 Maternal Deaths and 50 near miss maternal mortality cases. In near miss maternal mortality, 42 cases pregnancy specific cause was noted while in 8 cases pre-existing disorders were aggravated during pregnancy.

In present study, majority of cases were 20-29 years (78%), multigravida (52 %), in third trimester and postpartum (52 %), had phenotype as class I MNMM (maternal near miss with healthy infant) (36 %), with high risk factors as unbooked and unimmunized (4 %), With h/o previous 1LSCS (24 %), With h/o previous 2 LSCS (8%) and inter pregnancy interval less than 18 months (22%). In near miss cases, near miss on arrival were 66 % while 34% were near miss after admission, 8% had disorder on admission and became near miss and 26% had no disorder on admission but became near miss (26%).

postpartum hemorrhage (28 %), eclampsia (20 %) and COVID-19 related complications (14 %) were major causes of NMMM.

40% cases required surgical intervention to control hemorrhage (B lynch-4%, Bilateral uterine artery ligation-12%, bilateral internal iliac artery ligation-8 % and emergency hysterectomy-16%). Other contributing disorders were anemia (14%), diabetes mellitus (4%), GDM (2%) and hypothyroidism (2%). Major indications for transfer to HDU care were neurological dysfunction (26%), circulatory collapse (42%), Need for intravenous antihypertensives (6%) and fall in oxygen saturation (12%). Most common interventions in HDU were ventilatory support (14%), Transfusion of blood and blood products to correct circulatory collapse (40%) and Ventilatory support + Transfusion (8%).

Cerebral dysfunction (40%), Hypovolemia necessitating >5 units of transfusion (28%) and Emergency hysterectomy (16%) were major reasons for MNMM cases being classified as MNMM.

DISCUSSION

The majority of cases 66% in present study were near miss on arrival. This same pattern- 74% near miss on arrival-was observed in the Bolivian study.[3] This may be attributed to failure of recognition of the seriousness of the condition or delayed decision to seek medical assistance.

Table 1: Annual statistics.

Category	No. of patients
Live births	2211
Near miss (MNMM)	50
Maternal deaths (MD)	8
Women with life threatening conditions (MNMM+MD)	58
Maternal near miss incidence ratio (MNM/LB)	0.02
Severe maternal outcome ratio (MNM+MD/LB)	0.03
Maternal near miss: mortality ratio (MNM:1MD)	6.25
Mortality index {MD/(MNMM+MD)}	0.14
Pregnancy specific causes	42
Pre-existing disorders aggravated during pregnancy	8

Addressing this ‘first delay’ needs research to understand the health seeking behaviour of the women and regular updating of knowledge and skills among the medical fraternity. However, MNMM on arrival also reflects the effectiveness of emergency referrals.

The MNMM incidence ratio ranged from 3.8 to 12 per 1000 livebirths in developed countries6; In the Manipal

study in INDIA4 it was 17.8 /1000 live births. In present study, it was 20/1000 live births. This is comparable to the incidence in high income countries where it is between 0.5 and 1%.[6,7] THE MNM: mortality ratio in Western Europe was 117-223:1. It was 5.6:1 in the Manipal study and 6.25:1 in the present study.

Table 2: General characteristics.

Characteristic	No. of cases (n=50)	Percentages
Maternal age (years)		
<19	2	4%
20-29	39	78%
30-40	9	18%
Obstetric status		
Primigravida	20	40%
Multigravida	26	52%
Post-natal mothers	4	8%
High risk factors		
Unbooked and unimmunized	2	4%
With h/o previous 1LSCS	12	24%
With h/o previous 2 LSCS	4	8%
Inter pregnancy interval less than 18 months	11	22%
Duration of pregnancy		
First trimester	4	8%
Second trimester	8	16%
Third trimester and postpartum	38	76%
Phenotype		
Class I MNMM : maternal near miss with healthy infant	18	36%
Class II MNMM: infant requiring NICU admission in MNMM cases	16	32%
Class III MNMM: maternal near miss with stillbirth or infant death.	12	24%
Neonatal outcome		
Live babies	21	42%
No. Of babies requiring NICU care and survived	16	32%
Neonatal mortality	12	24%
Received NICU care and died	1	2%
Stillbirths	11	22%
Average duration of hospital stay		
Average duration of hospital stay	14.95 days	
Average duration of HDU stay	94.18 hours	
Near miss cases		
Near miss on arrival	33	66%
Near miss after admission	17	34%
Had disorder on admission and became near miss	4	8%
Had no disorder on admission but became near miss	13	26%

Mode of delivery in the index pregnancy in MNMM by caesarean section was 43.6% in the Dutch survey, and 13% in the Netherlands study6; 63% in the Bolivian study3; it was 88% in the present study.[6,8]

During the study period, the caesarean section rate in present study was 52.52% of all hospital deliveries. The caesarean section rate among NEAR MISS women delivering in present study was 88%. In the Bolivian study, the caesarean section rate among hospital deliveries was 28%; in MNMM cases it was 63%. In the Canadian study, about 50% of MNMM patients required caesarean section.[3,5,7]

Mode of delivery was instrumental delivery in 12.7% in the Dutch study, and 8.6% in the Netherlands study; it was 4% in the present study.[3,6] Home delivery complicated by MNMM was 6.3% in the Dutch study6 and 31.6% in the Netherlands study, and 9.5% in the Bolivian study; it was 4% in the present study. Probably this reflects the

institutional deliveries in India which favours the early identification and management of peripartum complications.[3,6]

Table 3: Diagnosis.

Diagnosis	No. of cases	Percentages
Postpartum hemorrhage	14	28%
Eclampsia	10	20%
COVID-19 related complications	7	14%
Ruptured ectopic pregnancy	4	8%
Disseminated intravascular coagulation	3	6%
Peripartum cardiomyopathy	2	4%
Septic abortion	2	4%
Morbidly adherent placenta	2	4%
HELLP syndrome	2	4%
Acute renal failure	2	4%
Puerperal sepsis	2	4%

Being older than 35 years, not having a partner, being a primipara or para >3, and having had a Caesarean section in the previous pregnancy were factors independently associated with the occurrence of severe maternal morbidity.[9] AGE >35 was a significant risk factor in both the Dutch (29.3%) and the Netherlands study (24.7%).[6] It was not significant in the present study (6%), probably because of the early age of marriage and social pressure not to postpone childbirth in India. In the Dutch study, 19.3% of MNMM had a h/o previous Cesarean section. In the Dutch study, primiparity, diabetes, hypertension and prior caesarean section were identified as risk factors for developing MNMM. In the present study, multiparity, anemia, diabetes and previous caesarean section seem to be risk factors for developing MNMM. In the Abbottabad study, anemia 37% and diabetes 10% were identified as risk factors.[10]

In the present study, the majority of cases 64% came directly to the hospital 32% had one referral between health facilities; and 4% had two referrals between health facilities. This pattern of health seeking behavior is comparable to the pattern in the BOLIVIAN study3 where the majority58% of cases came directly to the hospital, 36% had one referral between health facilities and 6%had two referrals between health facilities.

In the Bolivian study, 26% of MNMM presented in early pregnancy.[3] Most of them were related to pregnancy termination-which is a sensitive, legally restricted issue in Bolivia. In the present study only 16% of MNMM presented in early pregnancy (<28 weeks). They were due to hypertensive disorders of pregnancy (in 2nd trimester) and ruptured ectopic pregnancy (in Ist trimester). Probably because of the MTP act and legalization of abortion in India, there were no MNMM attributable to pregnancy termination in the present study.

In present study, majority 76% of MNMM were in late pregnancy (>28 weeks). This pattern is similar to the Manipal study where 57.2% of MNMM presented in late pregnancy. The proportion of MNMM who presented in the postnatal period was higher (27.3%) in the Manipal study, than in present study where it was only 8%.[4] The most common cause of MNMM in the postnatal period in present study was PPH; the other cause was Postpartum eclampsia following a preterm homedelivery. In the Bolivian study, sepsis(1.4/1000) and obstructed (0.4/1000) labour were uncommon causes of MNMM.[3] These causes are not to be found in present study, probably due to the widespread use of partographs in monitoring labour.

Table 4: Other characteristics.

Characteristic	No. of cases	Percentages
Required surgical intervention to control hemorrhage	20	40%
B lynch	2	4%
Bilateral uterine artery ligation	6	12%
Bilateral internal iliac artery ligation	4	8%
Emergency hysterectomy	8	16%
Other contributing disorders		
Anemia	7	14%
Diabetes mellitus	2	4%
GDM	1	2%
Hypothyroidism	1	2%
Major indications for transfer to HDU care		
Neurological dysfunction	13	26%
Circulatory collapse	21	42%
Need for intravenous antihypertensives	3	6%

Continued.

Characteristic	No. of cases	Percentages
Fall in oxygen saturation	6	12%
Most common interventions in HDU;		
Ventilatory support	7	14%
Transfusion of blood and blood products to correct circulatory collapse	20	40%
Ventilatory support + Transfusion	4	8%
Anti-failure measures	3	6%
Intravenous antihypertensives	3	6%

Table 5: Reason for classified as near miss.

Reason	MNMM, n (%)
Cerebral dysfunction	20 (40%)
Hypovolemia necessitating >5 units of transfusion	14 (28%)
Emergency hysterectomy	8 (16%)
Heart failure	3 (6%)
Pulmonary edema	2 (4%)
Impending hypovolemia, avoided due to emergency surgical intervention	3 (6%)

In the present study, most of the MNMM cases 78% were in the age group of 20-30 yrs; there was no one younger than 19 years; 6% were aged >35years. In the Bolivian study mean age was 28±7.1 years. In the Manipal study, the mean age was 27.0±4.7. All over the world a vast majority of women in the prime of youth are exposing themselves to the risk of pregnancy and its attendant morbidities.[4]

In present study, 52% of MNMM were multigravida while 34% were primigravida. This pattern reflects the Bolivian study where 56% were multipara but differs from the Dutch study where the higher occurrence of nulliparity seems to be a risk factor for developing MNMM.[3]

In the Netherlands, the most frequent cause of MNMM, was Major Obstetric Hemorrhage (4.5 per 1000 births) while the most frequent cause of maternal deaths was preeclampsia.[5] In the Manipal study, obstetric hemorrhage 44.2%, hypertensive disorders 23.6%, sepsis 16.3%, cardiac 4.5% were the most common causes. In the Abbottabad study10, the most frequent cause was Hypertension 50%, sepsis 17% and Hemorrhage 13%. Similar findings were noted in present study.[4]

In the present study, 34% became near miss after admission to hospital. The most common adverse event in this group of patients was hemorrhage. In the present study, 66% were near miss at the time of arrival; majority of them had hypertensive disorders of pregnancy as the adverse event. This pattern is also reflected in the Bolivian study where 59% of near miss on arrival were due to Hypertensive disorders of pregnancy and 85% of near miss after admission were due to hemorrhage.

Obstetric hemorrhage, though not an important cause of maternal mortality, is still a main cause of MNMM. Preventive measures, protocols and resources for the management of APH and PPH and Skill training in management of obstetric emergencies on a regular basis is important to keep this ground won. The causes of Near Miss reflect the causes of maternal death. Near miss analysis is worth presenting in national indices as a surrogate for maternal death.

A strategy to provide access to good quality and up-to-date information to the entire team should be in place. Obstetric hemorrhage is not an important cause of maternal mortality, but is still present as a major cause of severe maternal morbidity. Preventive measures, protocols and resources for the management of ante or postpartum hemorrhage must not only be maintained, but improved, despite the fact that hemorrhage is not a major cause of mortality.

The limitation of the study is that it is done over a relatively short period; when done over a span of years it can be useful to assess the efficacy of improvement measures implemented and the long-term effects of MNMM.

CONCLUSION

In present study, MNMM incidence was 0.8 per 1000 live births. Hypertensive disorders, Hemorrhage and COVID-19 related complications were the leading causes of near miss situations. Previous LSCS and Anemia seem to be risk factors for developing MNMM. The Mortality Index was low which reflects good quality of care.

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