Original Article

Severe obstetric morbidity and its outcome in patients presenting in a tertiary care hospital of Karachi

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Abstract

Objective: To determine the frequency, types (disease states) and outcome of severe obstetric morbidity in patients presenting at a public-sector tertiary care hospital.

Methods: The cross-sectional study was conducted at the Obstetrics and Gynaecology Unit II, Civil Hospital, Karachi, from April to September 2010. Consecutive cases of severe obstetric morbidity (near-miss), as defined by specific criteria, presenting in emergency were included. They were categorised into six groups: haemorrhage, hypertensive disorders in pregnancy, sepsis, ruptured uterus, anaemia, and a miscellaneous group encompassing morbidities not falling in the aforementioned groups. Obstetric near-miss (ONM) cases were described by disease-specific criteria. Primary outcome measures were frequency of near-miss in each disease specific group, type (disease state) of near miss in a group, maternal outcome measures i.e. hospital stay>7 days, hysterectomy, urinary/faecal fistula, morbidity due to management intervention and maternal death. Maternal near-miss ratio and mortality to near-miss ratio were calculated. Secondary outcome measures were ventilator support for >24 hours, and intensive care admission for >48 hours.

Results: There were 1508 deliveries during the study period from which 130 patients met the inclusion criteria. Among the 130 enrolled patients, obstetric near-miss (survivors) were 111. Among the total of 1442 livebirths, the maternal near-miss ratio was calculated to be 76.97/1000 livebirths. Nineteen maternal deaths resulted in the near-miss to mortality ratio of 5.8:1. Haemorrhage (34.2%) was the most frequent group, followed by hypertensive disorders (29.1%) and ruptured uterus (11.53%). Case fatality rates of sepsis (35%) and miscellaneous (30%) groups were the highest. Hysterectomy rates were 3.60% and hospital stay > 7 days stood at 31.33%. The intensive care admission rate was 42.34%.

Conclusion: Haemorrhage, hypertensive disorders and ruptured uterus were the leading causes of obstetric near-miss, whereas sepsis, acute fatty liver of pregnancy and peripartum cardiomyopathy resulted in the highest case fatalities.

Keywords: Postpartum haemorrhage, Sepsis, Uterine rupture, Maternal mortality, Hysterectomy (JPMA 62: 226; 2012).

Introduction

Severe obstetric morbidity or obstetric near-miss (ONM) is gaining interest internationally as a new indicator of the quality of obstetric care following maternal mortality statistics.[1] 'Near-miss' describes a patient with an acute organ system dysfunction, which, if not treated appropriately, could result in death.[2] ONM has also been described as a situation of lethal complication during pregnancy, labour or puerperium in which the woman survives either because of medical care or just by chance.[3] The death to severe morbidity ratio may reflect the standard of maternal care.[4] International studies have reported ONM to maternal death ratios ranging from 5:1,[2] 30:1[5] upto 118:1.[6] They are a better source of information than mortality statistics as women themselves may be the source of such information.[7] Worldwide, some studies have described ONM according to common obstetric disease states, e.g. haemorrhage, pre-eclampsia,[1,8] whereas others used either criteria related to the response to the disease (e.g hysterectomy or admission to intensive care Unit) or specific organ system dysfunction, i.e specific criteria of dysfuction or failure of specific organ system.[9,10] Data on maternal morbidity is important in health planning and policy-making as the planners need to know how many women require essential obstetric care. The incidence of ONM in developed countries like the Netherlands have been reported as 7.1/1000 deliveries.[1] A systematic review from the United States reported ONM in 1% of women as compared to 3.01%-9.05% in some developing countries.[11] In a population-based cohort survey in six West African countries, it was found to be 6.7/100 livebirths.[5] Prevalence was reported as 17% in public-sector hospitals and 4.2% in private facilities in a study from Indonesia.[12] To our knowledge, there is only one published study to date conducted in Pakistan at a private hospital of Karachi which reported 44 near-miss cases out of 868

deliveries (5.06%).[7] Pakistan, being a developing country, faces the challenges of poverty, illiteracy and low resources. Pakistan is signatory to the Millenium declaration and is commited to achieving the target of millenium development goal 5 (MDG-5) by reducing maternal mortality ratio (MMR) to 140. Supplementing maternal mortality reviews with information on near-miss cases will help in establishing requirements for intensive care , diagnosing inadequacies in the health system and will also manifest success of intensive obstetric care. Public-sector tertiary-care hospitals cater to an increasing number of patients from lower socioeconomic classes with the majority of them being unbooked and received in a critical state. Our study aimed at enhancing knowledge about the frequency and nature of near-miss and extent of obstetric success in these cases at a public-sector tertiary hospital.

Methods

The cross-sectional observational study was conducted at the Obstetric Unit-II of Civil Hospital, Karachi, from April to September 2010 after approval from the Institutional Review Board of the Dow University of Health Sciences. Consecutive cases of ONM were included by non-probability purposive sampling of patients admitted in emergency at the Unit. Informed consent from husband/relative of all the patients was obtained. Disease-specific criteria, as described by Waterstone et al,[6] was adapted with some modifications. For instance, in the fourth group, we also included cases of ruptured uterus which were diagnosed per operatively when emergency Caesarean was done for foetal distress, with loss of contractions or haemorrhage as explained in the original inclusion criteria of group 4. Besides, we also added group 5, i.e. severe anaemia, and group 6, i.e. miscellaneous conditions of severe morbidity as explained below in the inclusion criteria.

Six specific disease groups were: 1) Severe Haemorrhage including early pregnancy complications i.e. ruptured ectopic pregnancy and miscarriage, antepartum haemorrhage due to placenta previa, abruptio placentae and postpartum haemorrhage leading to shock, acute blood transfusion ≥ 4 units, hysterectomy or coagulation failure; 2) Eclampsia/Severe pre-eclampsia with or without HELLP (Haemolysis, elevated liver enzymes low platelets) syndrome groups as defined by Waterstone.[6] Severe pre-clampsia was defined as blood pressure (BP) ≥ 170/110mmHg once plus proteinuria ≥ 0.3g/24hour or >++ on dipstick or diastolic BP >90 mm Hg plus proteinuria as above plus one of the following: oliguria <30ml for 2 hours, visual disturbance i.e. flashing of lights/ blurred vision, epigastric/right upper quadrant pain or tenderness, thrombocytopenia/pulmonary oedema. HELLP syndrome was defined as Bilirubin >20.5µmol/l (>1.2g/dl), alanine aminotranferase (ALT) >70IU/L, platelets <100,000/L. Eclampsia was defined as convulsions in pregnancy or within the first 10 days postpartum along with two of the following, BP ≥ 170/100mm Hg, Proteinuria ≥ + on dipstick, or ≥ 0.3g/24 hours, Thrombocytopenia <100,000/L, ALT >42IU/L; 3) Sepsis was defined by the Waterstone criteria[6] as temperature >100.4° or <96.8°F with leukocyte count >17000 or <4000 in the presence of positive blood or swab culture. Severe sepsis was defined as above features plus with one of the organ dysfunction e.g. altered mental state, hypotension i.e systolic BP<90 mmHg, or renal failure; 4) Ruptured uterus included peripartum hysterectomy or laparotomy for ruptured uterus or clinical symptoms of severe pain, foetal distress, loss of uterine contractions and haemorrhage which led to emergency Caesarean section and a diagnosis of rupture or impending rupture (in cases of previous Caesarean) was confirmed; 5) Severe anaemia Hb <6gm/dl in the absence of haemorrhage, with symptoms of severe breathlessness or cardiac failure; 6) Miscellaneous group comprised of uncommon conditions of severe morbidity e.g. cardiac disease in pregnancy requiring intensive care admission or pregnancy termination, renal disease with creatinine >400mmol/L (4.5mg/dl), severe respiratory disease or neurological disease in pregnancy requiring intensive care admission or mechanical ventilation. Liver disorders in pregnancy, including acute fatty liver of pregnancy (AFLP), hepatitis E and obstetric cholestasis requiring pregnancy termination and Non-obstetric sepsis (sepsis in pregnancy not due to an obstetrical cause).

The study had a four-point exclusion criteria: 1) Haemodynamically stable patients with haemorrhage not requiring resuscitation or acute blood transfusion; 2) Patients with stable cardiac, or 3) respiratory disease, not requiring intensive care admission or pre-term pregnancy termination; 4) and patients with jaundice due to hepatitis A.

Patient characteristics such as age, parity, antenatal booking status and details of disease-specific condition and their management were recorded in a semi-structured proforma from case records. Outcome measures were disease-specific conditions, their outcome in terms of hospital stay > 7 days, hysterectomy, multi-organ dysfunction i.e. evidence of abnormality in at least 2 components of coagulation, liver function, renal function, neurological or vascular function. Urinary/faecal fistula, any secondary complications resulting from management intervention or death. Secondary outcome measures were intensive care admission for >48 hours, ventilatory support for >24hours. Data was entered into computer through SPSS version 17 and was analysed by descriptive statistics.

Results

A total of 130 patients met the inclusion criteria on

Table-1: Patient characteristics of the subjects and proportionate contribution to severe acute maternal morbidity (groups & their disease states).

Patient Characteristics	Enrolled Subjects Frequency (%) n=130	Obstetric nearmiss(Survivors) Frequency(%) n=111	Maternal deaths Frequency(%) n=19	Case fatality rate$^{\lambda}$
Age distribution				
Upto 19 years	8(6.2%)	8(7.2%)	-	
20-24	34(26.2%)	29(26.1%)	5(26.3%)	
25-29	35(26.2%)	31(27.9%)	4(21.1%)	
30-34	33(25.4%)	24(21.6%)	9(47.4%)	
35-39	15(11.5%)	14(12.6%)	1(5.3%)	
40 & above	5(3.8%)	5(4.5%)	-	
Parity distribution				
Primipara	42(32.3%)	34(30.6%)	8(42.1%)	
Para 2-4	55(42.3%)	46(41.4%)	9(47.4%)	
Para 5 & above	33(25.4%)	31(27.9%)	2(10.5%)	
Booking Status				
Unbooked	105(80.76%)	94(84.7%)	11(57.9%)	
Referred	21(16.2%)	16(14.4%)	7(36.8%)	
Booked	2(1.5%)	1***(0.90%)	1**(5.3%)	
Near-Miss Groups and Their Types (Disease States)				
1) Haemorrhage	43(33.07)	39(35.1)	4(21.05)	9.30%
Late Pregnancy Complications	32(24.61%)	28(25.22)		
Postpartum haemorrhage	21(16.15)	17(15.31)	4	
Abruptio placentae	8(6.15)	8(7.20)	-	
Placenta previa	3(2.30)	3(2.70)	-	
Broad ligament haematoma	1(0.76)	1(0.90)	-	
Early pregnancy complications	11(8.46%)	11(9.90)	-	
Ruptured ectopic	6(4.61)	6(5.4)	-	
Miscarriage	4(3.07)	4(3.60)	-	
2) Hypertensive Disorders$^{\delta}$	31(23.84)	29(26.1)	2(10.52)	6.45%
Eclampsia	20(15.38)	19(17.11)	1	
Severe preeclampsia**	11(8.46)	10(9.009)	1**	
3) Sepsis	14(10.76)	9(8.1)	5(26.31)	35.71%
Sepsis	4(3.07)	4(3.60)	-	
Severe Sepsis	10(7.69)	5(4.50)	5	
4) Ruptured Uterus	15(11.53)	13(11.71)	2(10.52)	13.33%
Impending rupture	2(1.53)	2(1.80)	-	
Rupture	13(10.00)	11(9.90)	2	
5) Anaemia	8(6.15)	8(7.20)	-	-
6) Miscellaneous	20(15.38)	14(12.61)	6(31.57)	30%
Cardiac	12(9.23)	9(8.10)	3	25%
Renal	2(1.53)	2(1.80)	-	
Liver disorders (AFLP*/Hepatitis E)	4(3.07)	1(0.90)	3	75%
Tuberculous menningitis	1(0.76)	1(0.90)	-	
Respiratory Disease	-	-	-	
Non-obstetric sepsis***	1(0.76%)	1***(0.90%)	-	

λ Case fatality rate= Percentage of Maternal death from specified severe morbidity out of total cases in that group

δ Included 2 cases each of HELLP (haemolysis, elevated liver enzymes, low platelets) syndrome in eclampsia and pre-eclampsia.

* Acute fatty liver of pregnancy

**Booked patient who missed her followup visits 4 weeks prior to admission in labour, with severe pulmonary oedema & hemothorax.

***One booked patient had intestinal resection for gangrenous colon in the absence of reproductive tract infection.

admission out of 1508 deliveries that resulted in 1442 livebirths. The frequency of severe obstetric complications, thus, was 86.20/1000 deliveries. Out of 130 cases, 19 maternal deaths gave a near-miss to maternal mortality ratio of 5.8:1. After subtracting maternal deaths, 111 ONM-resulted in maternal near-miss ratio (MNMR) of 76.97/1000 livebirths. Among 111 ONM (survivors), 94 (84.68%) were unbooked, while 16 (14.41%) were referred from other private and public-sector hospitals.

The mean age of patients was 27.36±6.26 years ranging between 14 and 50 years. The most frequent age group was 25-29 years (27.9%), followed by 20-24 years (26.1%), thus 20-29 years collectively contributed to 50% cases (n=60). Mean parity was 2.56 ±2.45 SD ranging from 0-11.

Data of the enrolled patients, presenting with life-threatening complications, ONMs and maternal deaths were managed throughout the study (Table-1). Group 1 i.e. haemorrhage was the leading cause in ONM, 39 (35.1%)

Table-2: Outcome morbidity measures of obstetric near-miss (n=111).

Outcome Measures	Haemorrhage n (%)	Hypertensive Disorders n (%)	Sepsis n (%)	Ruptured uterus n (%)	Anaemia n (%)	Miscellaneous n (%)	Total n (%)	Rates /1000 live births
Hysterectomy	3(2.70%)	-	-	1(0.90)	-	-	4(3.60%)	2.77
Stay >7 days	5(4.50%)	8(7.20%)	6(5.40%)	6(5.40%)	-	8(7.20%)	33(29.72%)	22.88
Multiorgan dysfunction	4(3.60%)	2(1.80%)	1(0.90%)				7(6.30)	4.85
Fistula$^{\lambda}$	-	-	-	2(1.80%)	-	-	2(1.80)	1.38
Intestinal resection	-	-		1(0.9%)	-	1*(0.9%)	2(1.80)	1.38
Secondary Morbidities		17(15.31%)	11.78					
Repeat surgeries$^{\delta}$	1(0.9%)	-	3(2.70%)	-	-	-	4(3.60)	2.77
Burst abdomen	-	-	3(2.70%)	-	-	-	3(2.70%)	2.08
Wound infection	2(1.80%)	2(1.80%)	4(3.60%)	2(1.80%)	-	-	10(9%)	6.93
Secondary Outcome ICU$^{\theta}$ admission>48 hr	17(15.31%)	15(13.51%)	4(3.60%)	3(2.70%)	1(0.9%)	7(6.30%)	47(42.34)	32.59
Assisted ventilation >24 hours	4(3.60%)	6(5.40%)	2(0.9%)	1(0.9%)	-	2(1.80%)	15(13.51%)	10.40

λ One case of ureterovaginal fistula due to hysterctomy for ruptured uterus following obstructed labour.
δ Laparotomies
θ Intensive care unit
* Non-obstetric sepsis, gangrenous colon.

followed by group 2 (hypertensive disorders) 29 (26.1%). The third rank was held by group 6 (Miscellaneous) with a 20 (12.61%) contribution, but this group combined multiple infrequent disease states implicated as indirect causes of mortality and morbidity, so comparing contribution by individual disease state in that group, ruptured uterus/impending rupture kept the third lead position as a direct obstetric cause of near-miss (11.71%). Group 6 included predominantly cardiac disease, 8.1% (n=9) cases (including 7 peripartum cardiomyopathy (PPCMP), 1 severe mitral regurgitation, 1 hypertrophic cardiomyopathy). Noticeably, a total of 4 cases (20%) of group 6 presented with liver disorders, but resulted in 3 deaths caused by AFLP.

The relative contribution of each group to mortality was worked out (Figure). Though it comprised infrequent

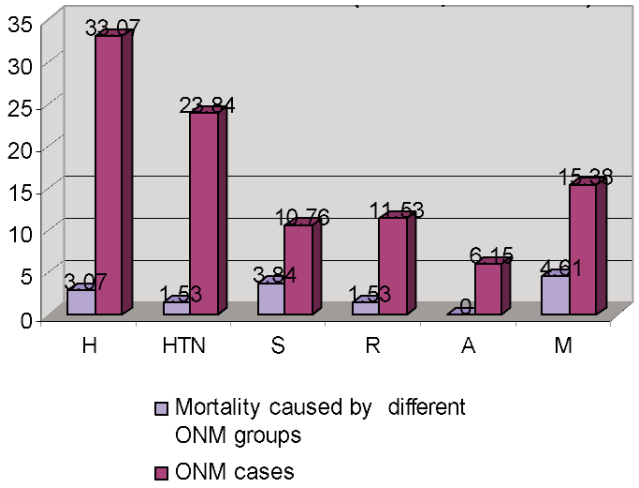

Figure: Percent Contribution of study groups and their mortality (n=130, deaths=19).

disease states, Group 6 emerged as the most frequent cause of maternal mortality, followed by sepsis which resulted in 26% deaths. The third most frequent cause of mortality was haemorrhage.

The outcome morbidity of obstetric near-miss cases was also noted (Table-2). Mean hospital stay was 6.17 ± 5.58 days; maximum stay was 50 days (Sepsis group). Among the three hysterectomies in group 1 (haemorrhage), one was performed for ruptured cervical ectopic pregnancy and two for PPH. Out of those for PPH, one was a case of morbidly adherent placenta. Group 3 (sepsis) followed by group 6 (miscellaneous) accounted for the largest proportion (66.66% and 57%) of these cases for prolonged hospital stay compared to the other groups. Sepsis led to 3 (75%) cases of repeat surgeries and all cases (n=3) of burst abdomen. Thus, 3 (33.33%) cases of sepsis resulted in either of these two secondary morbidities. Hypertensive disorders accounted for ICU admissions>48 hours in 51.72% of the cases, which was the highest among all groups, (followed by sepsis and haemorrhage (44.44% and 43.5% of these cases). Prolonged mechanical ventilation was required in 22% of sepsis and 20.68% cases of hypertensive disorders.

Discussion

ONM rates in the study of 7.69% correspond to rates of 4-8% described for low-income countries in the WHO systematic review of acute severe maternal morbidity (SAMM).[10]

According to WHO bulletin 2010, the study of secondary analysis of WHO global survey in Latin America described near-miss in 120 institutions, and recorded MNMR of 185:1.[13] A population study performed through

health information systems (HIS) and maternity information systems (MIS) record from the Brazilian capital, reported near-miss rates of 44.3/1000 livebirths.[14] The same also reported sepsis as the leading cause while pre-eclampsia and haemorrhage were second and third, conforming to the criteria for near-miss. Souza J. in a current demographic health survey reported ONM prevalence as 21.3/1000 livebirths in Brazil.[13] Compared to them, MNMR in our study is remarkably high. Our MNMR of 76.97/1000 livebirths and death to near-miss ratio of 1:5.8 indicate high maternal death rates in developing countries.[15] A cohort study from UK, conducted on ethnic variation in SAMM, found Pakistani women to be at 1.5 times higher risk of severe acute maternal morbidity.[16] Taly A. from India reported haemorrhage (60%) and hypertensive disorders (34%) to be the leading initiating causes of near-miss, with sepsis being third in rank (4%).[17] They also described maternal mortality to near-miss ratio of 1:6. According to a study from Khatmandu teaching hospital, haemorrhage accounted for 41.66% and hypertensive disorders for 21.77% cases, but near-miss prevalence rates were lower at 2.3%.[18] A pilot study from India reported pre-eclampsia/eclampsia and haemorrhage as the leading equal contributors (35%) to ONMs, followed by sepsis in 13% cases.[19]

A small-scale private hospital based local study reported death to near-miss ratio as 7:1, and MNMR 50.6/1000 deliveries resulting from 44 near-miss cases out of 868 deliveries, whereas haemorrhage was most frequent near-miss contributor followed by anaemia (21.2%) and dystocia (14.2%).[7] Although this is in partial agreement with our findings of haemorrhage as the number one contributor and ruptured uterus significantly contributing to 11.7% cases, but it is a departure from our findings of hypertensive disorders as the second most common contributor. The findings resulted from the fact that 99.1% patients were unbooked or referred. Our findings conform to results of a local study from Hyderabad, demonstrating 50% of obstetric ICU admissions due to hypertension and 17% due to sepsis whereas haemorrhage was the third cause of ICU admissions. However, the study added that the reason for ICU intervention was haemodynamic instability in 40% of admissions.[20]

Ruptured uterus, being the morbidity indicator of dystocia, contributed a high proportion (11.71%) of ONM, as compared to rates of 0.62%.[14] and 3.8%[21] of near-miss cases reported from Brazil and Syria respectively. The only available local study also reported high rates of 14.8% (n=7).[7] In group 6, peripartum cardiomyopathy was predominant contributor with seven cases. Maternal deaths also comprised 15.78% PPCMP (n=3) cases. It shows its high fatality and non-recognition of disease severity in our pregnant population. According to a confidential enquiry into maternal deaths in UK, cardiac disease is the leading cause of indirect maternal death.[22] Among maternal deaths, 3 resulted from AFLP; the case fatality rate being 100%. All these patients had fulminant hepatic failure. Only one hepatitis E patient survived severe sepsis followed by obstructed labour in all ONM cases, and 4 (80%) maternal deaths resulted from sepsis. Sepsis also resulted in high case fatality rates and the need for prolonged hospital stay (66% cases).

Among the outcome indicators, hysterectomy rates were 3.60% of near-miss and overall 4.64/1000 deliveries. The WHO global survey of near-miss and maternal deaths from Latin America reported hysterectomy rates of 1.56/1000 deliveries.[13] Previously, Caesarean was a risk factor for hysteterctomy, as 4 out of total 7 (57%) hysterectomies on enrolled subjects (inclusive of maternal deaths) were performed in patients with prior CS. Furthermore two of these four cases had ruptured bladder along with ruptured uterus. Previous Caesarean validated its implication in uterine rupture as six cases had prior CS. These observations are consistent with the WHO multi-country survey in Latin America, which indicated previous CS having independent and positive association with nearmiss.[13] Hypertensive disorders were the lead ONM resulting in stay>7 days followed by sepsis.

ICU admission (>48 hours) rates in our cases were higher than those reported from Latin America and Syria.[13,21] Mijahed described ICU admission rates of 0.6% in obstetric patients.[23] Haemorrhage and hypertensive disorders were the main contributors to ICU admissions. Among these, need for assisted ventilation >24 hours was the highest in sepsis (22.22%) and hypertensive disorders (20.68%). Haemorrhage was the lead contributor in multi-organ dysfunction.

Secondary morbidities mainly related to sepsis, and led to repeat laparotomies and burst abdomen in three patients following obstructed labour. One vesicovaginal fistula followed obstructed labour and one ureterovaginal fistula after obstetrical hysterectomy following ruptured uterus and bladder.

The present study is the first from a public-sector hospital with reasonably large data on ONMs, and it also presents data on the indirect causes of ONM. In terms of limitation, patients meeting criteria for two groups were assigned the group for which surgical intervention, if applicable, or ICU admission was indicated. Thus, 3 cases of ruptured uterus also had sepsis. Besides, we collected data on patients admitted in the obstetric unit whereas some obstetric patients with severe cardiac, renal and hepatic disease might be admitted in relevant departments at the same time but were not included in the study.

Conclusion

Haemorrhage, hypertensive disorders and ruptured uterus are the main reasons for ONMs. Sepsis and indirect obstetric causes, mainly AFLP and peripartum cardiomyopathy, carry the highest case fatality rates. Sepsis also leads to high rates of secondary morbidities. There is need for increased antenatal coverage and emergency obstetrics services besides dedicated obstetric intensive care facilities at all public-sector hospitals to manage high-risk obstetric emergencies in order to limit morbidity.

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