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Research Article

Obstetric admissions to the intensive care unit of a tertiary hospital in northern India

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Abstract

Objective: To determine the causes of the obstetric admissions to the intensive care unit (ICU) and the impact of antenatal care on ICU admission.

Methods: Obstetric ICU admissions over the two years from May 2009 to May 2011 at Maulana Azad Medical College and associated Lok Nayak Hospitals, New Delhi, were analyzed retrospectively.

Results: The 136 obstetric admissions to the ICU represented 0.8% of all the deliveries in the hospital during that period. The majority (76%) of women were transferred to the ICU postpartum. Obstetric haemorrhage (56.1%), hypertension (19.8%), and endotoxic shock (12.5%) were the major obstetric cause of the ICU admission. Together with the cardiac disease, DIC, infections, they formed 91.4% of all the admissions. Anaesthetic complications were responsible for 2.9% of them. Of all the admissions, 12% were completely unbooked and uninvestigated during the whole antenatal period, 85% were registered/ booked at other hospitals and 3% were booked in our hospital. The maternal mortality was 19.1% of all the ICU admissions in this study, and the mortality rate in unbooked patients was 58%.

Conclusion: The most common precipitants of ICU admission were obstetric haemorrhage and uncontrolled hypertension, both of which can be managed well if the patient has complete antenatal visits and investigations. This reflects the importance of ante-natal care, so that the high risk pregnant female can be identified in advance, referred at appropriate time to the higher centre and managed meticulously.

Keywords: Intensive care unit; haemorrhage

1. Introduction

Care of critically ill obstetric woman at an intensive care unit (ICU) is a unique challenge in obstetrics, both for the obstetrician and the ICU physician. Hemorrhage, toxemia, anemia and septicemia are the common causes of morbidity and mortality in these patients[1]. Not only are these patients young and usually otherwise healthy, but maternal mortality and morbidity are also important quality-assurance indicators. About 0.1-0.9% of parturient require ICU admission.[2-5]

In developed countries, obstetric patients only account for a small proportion (<2%) of ICU admissions, whereas the figure is up to 7% in India and the maternal mortality ratio is also significantly higher in developing countries.[6]

According to the World Health Organization (WHO), "There is a story behind every maternal death or life-threatening complication. Understanding the lessons to be learnt can help to avoid such outcomes".[7] A better knowledge of the spectrum, characteristics, and outcomes of the diseases involving this group of patients is the first step towards achieving prevention and hence reduction of both maternal and neonatal morbidity and mortality.[8]

The primary objective of the present study was to review the characteristics of the obstetric patients admitted to our ICU over a 2 year period, for both obstetric-related and non–obstetric-related causes, and to assess the causes of admission, the impact of antenatal care on ICU admission, treatment and interventions during the ICU stay, obstetric and perinatal outcome and the mortality rates.

2. Methods

This was a retrospective cohort study of consecutive obstetric patients admitted to the ICU of Maulana Azad Medical College and associated Lok Nayak Hospitals, New Delhi over a two year period from May 2009 to May 2011. Patients included were critically ill women admitted during pregnancy or six weeks postpartum. The admission books of our ICU were also utilized, so as not to miss any eligible patient. The patient records, after ethical committee clearance, were then screened to ensure that when admitted, they were pregnant or within 42 days of termination of pregnancy. During the study period, there were .a total of 16000 deliveries in the department of obstetrics and gynecology, Maulana Azad Medical College and Lok Nayak Hospital, New Delhi.

Each patient record was reviewed in detail. Supplementary data were accessed through the hospital's patient database. The data retrieved for analysis included demographics, adequacy of antenatal care, co morbidities, obstetric features (antepartum history, weeks of gestation, antenatal abnormalities, mode of delivery, vital signs, and Glasgow Coma Scale score) on admission to the ICU. The causes of admission to the ICU were classified as obstetric or non-obstetric. Obstetric disorders were defined as specific pregnancy-related conditions, which occurred during pregnancy or within 42 days in the postpartum period. Table 1 defines some of the obstetric disorders encountered in this study. Non-obstetric conditions were defined as all other conditions that were not specifically pregnancy-related. For each patient, data pertaining to ICU interventions (mechanical ventilation, haemodialysis, use of central or arterial lines, blood products/ transfusions, operations, radiological and echocardiographic examinations) were retrieved. In addition, ICU length of stay, hospital length of stay, and the outcomes of all the mothers and infants (including numbers of deaths) were recorded and analysed.

Table 1: Obstetrical conditions included in the study

Severe pre-eclampsia	Hypertension >140/90 mm Hg or blood pressure increases of 30 mm Hg systolic or 15 mm Hg diastolic, and proteinuria >0.3 g complicated by one or more of the following: Hypertension >160/110 mm Hg Proteinuria >2 g/24 h or +++ on dipstick Oliguria <60 mL for 2 successive hours or <500 mL/24 h Epigastric or liver pain Headache and blurred vision Pulmonary oedema
Eclampsia	Any fitting in pregnancy that is unrelated to epilepsy
HELLP (haemolysis, elevated liver enzymes and low platelet count)	Haemolytic anaemia, hepatic cytolysis and thrombocytopenia: Bilirubin ≥17.1 µmol/L (haptoglobin ≤0.5 g/L or schistocytes + if available) and elevated AST ≥70 U/L or elevated GGT ≥70 U/L and platelet count <100 x 109 /L
Peripartum cardiomyopathy	Development of cardiac failure in the last month of pregnancy or within 5 months of delivery Absence of an identifiable cause for the cardiac failure Absence of recognisable heart disease before the last month of pregnancy Left ventricular dysfunction with LVEF <45% by echocardiography
Antepartum hemorrhage	Bleeding from or into the genital tract after the gestational age of viability but before the delivery of the baby.
Postpartum hemorrhage	A loss of more than 500 ml of blood from the genital tract at vaginal delivery, 1000 ml at caesarean section and 1500 ml at caesarean hysterectomy, or A ten percent drop in haematocrit following delivery, or A need for blood transfusion in the first 24 hours of delivery.

3. Results

During the study period, a total of 136 obstetric patients were transferred to the Intensive Care Unit (ICU). This constituted 0.8% of all the deliveries in our hospital. The mean maternal age was 25±4.7 (SD), with age distribution as shown in table 2.

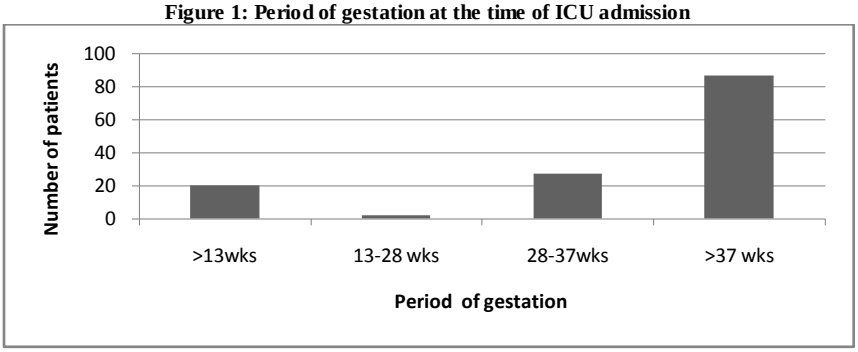
Table 2: Age distribution of the patients transferred to the ICU

Age distribution (in years)	Number of patients (%)
<20	10 (7.4)
21-25	58 (42.6)
26-30	38 (27.9)
31-35	17 (12.5)
36-40	3 (2.2)

Most of the patients were multigravida (n =82, 60.2%) while 54(39.7%) patients were primigravida. Antenatal care played significant role in the obstetric outcome. 97% of the patients transferred to the ICU during the study period had inadequate or no antenatal care, while 3% were booked in their pregnancy and had adequate antenatal care (p<0.001).

The mean gestational age of patients admitted to ICU was 37.04±3.89 weeks; the distribution of gestational age is depicted in figure 1.

Figure 1: Period of gestation at the time of ICU admission



Causes of ICU admission are shown in table 3. Postpartum admissions were significantly higher (76% n=103, *P*<0.005) with more patients presenting with obstetric complications (94.85%, n=129, *P*<0.001) as compared to medical complications (5.14%, n= 7)

Table 3: Causes of ICU admission

Underlying causes	Number of patients
Obstetric hemorrhage	76(56.16%)
Hypertensive disorders	27(19.8%)
Endotoxic shock	17(12.3%)
Cardiac disorders	5(3.6%)
DIC	4(3.1%)
Anaesthetic complications	4(2.9%)
H1N1 influenza	1(0.7%)
Dengue shock syndrome	1(0.7%)
Cerebral malaria	1(0.7%)

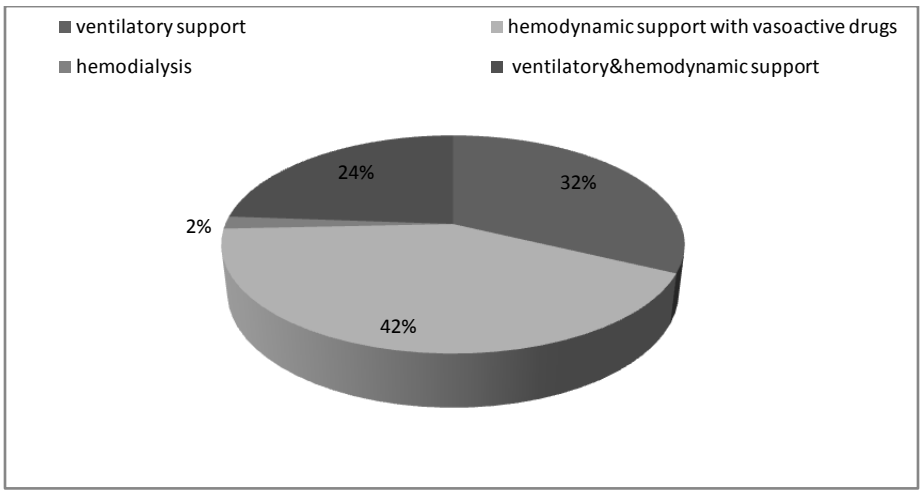
Obstetric hemorrhage was the commonest cause (56%) for admission to the ICU in this study. Antepartum hemorrhage (APH) was the cause in 27% patients, while postpartum hemorrhage (PPH) was the cause in 73% of the total patients admitted in the ICU due to obstetric hemorrhage. The causes of APH were further classified into placenta previa (n=41), abruption placenta (n=18) and rupture uterus (n=4).

The main causes of PPH were atonic uterus (n=6), traumatic (n=5), and disseminated intrauterine coagulation (n=2). Hypertensive disorders in pregnancy were the second most common cause of ICU admission. The major causes in this category were severe preeclampsia (67%), eclampsia (26%) and essential hypertension (7%).

52(50.4%) patients had caesarean section, 43 (41.7%) had vaginal delivery while 8 (7.9%) had abortion as pregnancy outcome. The caesarean section rate was significantly higher in the study group (50.4% vs 19.8%, p<0.001) as compared to rest of the women delivering at this hospital.

Perinatal outcomes was 9 stillbirths (8.7%) and 86 livebirths (83.5%); the stillbirth rate was significantly higher (p<0.05) than the overall rate of the hospital. Operative interventions were taken in 15 patients. Caesarean Hysterectomy [n=6 (4.4%)], explorative Laparotomy [n=5 (3.7%)], repair of cervicovaginal trauma [n=3 (2.2%)] and manual removal of placenta [n=1 (0.7%)]. Of the total 136 patients, 95(69.85%) had a total stay in ICU for less than 5 days. 28 (20.59%) were admitted in ICU for 6-10 days while 13 (9.56%) had a total stay more than 10 days. Ventilatory and hemodynamic support was required in the majority of patients, as shown in figure 2

Figure 2: Components of ICU care received by the patients included in the study



Blood and blood products transfusion was one of the major component of ICU care, and 94 (64.12%) patients needed between five to ten units. There were total 29 mortalities during the study period (table 4), making the maternal mortality rate to be 19.1% of the total ICU admissions, which was significantly high (p<0.05) when compared to 2.3% in the Canadian study done by Mahutte et al.[9]Final cause of maternal were mortality-multi-organ failure including heart failure, shock lung and acute renal failure in most of the patients.

Table 4: Causes of Maternal mortality in ICU

Causes	Number
Direct	**22(84.6%)**
Hemorrhage(APH, PPH)	12(46.1%)
Hypertensive disorders	4 (15.3%)
Septicemia(septic abortion, pyoperitoneum)	5 (19.2%)
Obstructed labour	1 (3.8%)
Indirect	**1 (3.8%)**
Diabetec Ketoacidosis	1(3.8%)
Unrelated	**3 (11.5%)**
Dengue shock syndrome	1 (3.8%)
H1N1 influenza	1 (3.8%)
Cerebral malaria	1 (3.8%)

4. Discussion

Despite the drastic decrease in maternal morbidity over the last few decades because of improvements in obstetric care, maternal mortality remains to be a challenge in the developing world. Although patients receiving obstetric care are young and healthy in general, there is an indisputable potential for catastrophic complications related to the pregnancy and the delivery. An indicator of pronounced maternal morbidity is intensive care unit (ICU) admissions of obstetric patients.[10] Critically ill obstetric patient who required ICU admission constituted 0.8% of all the deliveries in our hospital, compared to 0.3% in the study by Mahutte et al[9] and 0.14% by Gupta et al.[11] The rate is comparable with other studies (0.1-0.9%).[2-5]The high rate of ICU admission in our institution was explained by it being a tertiary referral centre. Of all the admissions, 12% were completely unbooked and uninvestigated during the whole antenatal period, 85% were registered/ booked at other hospitals and 3% were booked in our hospital. Majority of them were referred from a health centre, but the referral was delayed in the majority of the cases (mean = 4 ±0.56 hours). The lack of antenatal care has not been associated as a risk factor for ICU admissions in previous studies.[2,12] In contrast, in this study inadequate or no antenatal care was found in significantly higher (p<0.05) number patients. This association with lack of antenatal care emphasizes the fact that proper care during antenatal period plays a major role in averting, and if present, then early detection of antenatal complications. Timely referral to a tertiary medical facility is an important predictor for the morbidity and mortality of patients admitted in ICU for further management and stabilization.

Most of the women admitted to the ICU were young (mean= 25±4.7 years), multiparous, term and postpartum. A minority had preexisting medical problems that contributed to their admission. These results were similar to the study by Mahutte et al (1999)[9], Gilbert et al (2003)[1] and Gupta et al (2011)[11] and Ramachandra Bhat et al (2013).[13]. Postpartum admissions (n=103, 76%) were significantly more than the antepartum admissions (n=33, 24%, p value<0.01), as found in the previously done studies.[10,13] Obstetric causes were significant cause of morbidity and ICU transfer (91.4%), as compared to non obstetric causes, such as existing medical disorder(5.7%) and anesthetic complication (2.9%).

The major obstetric causes were obstetric hemorrhage (56.16%), hypertensive disorders (severe preeclampsia and eclampsia) (19.8%) and endotoxic shock (12.3%). Obstetric hemorrhage was the most common cause in the previous studies also (table 5).

Table 5: Obstetric hemorrhage was found to be the most common cause of ICU admission in various earlier studies

Study	Year of publication	Obstetric hemorrhage(%) as cause of ICU admission
Mahutte et al[9]	1999	26
Gilbert et al[1]	2003	24
Leung et al[8]	2010	38
Gupta et al[11]	2011	62.5
Ramachandra Bhat et al[13]	2013	27.7

Associated medical disorders included cardiac disease (n=5, 5.2%), which mainly included the decompensated valvular heart disease (severe Mitral stenosis with atrial fibrillation=3). Other medical disorders included infections like cerebral malaria, H1N1 infuenza with acute respiratory distress syndrome (ARDS) and dengue shock syndrome. All the three patients admitted to the ICU with these infections died, as they were in the decompensated phase of the disease.

When primary indications for ICU admissions were analysed, hemodynamic instability (n=114, 84%) was the most common and significant cause of ICU admission, as compared to respiratory insufficiency (n=48, 65%). Other causes were neurological instability and electrolyte disturbances. These two causes were found to be primary indications in other studies also.[9,11,13]

As shown in previous studies[1,8,11,13] ventilatory and hemodynamic support was required in the majority of patients. Most of the patients (n=122, 89.7%) were stabilized after artificial ventilation, along with other ICU interventions like inotropic support and hemodialysis. Duration of stay in ICU was less than 5 days in majority of patients (n=95, 69.8%) and increased duration was associated increased morbidity and mortality. More than five units of blood and blood products transfusion were required in 64.12% of patients; indicating that blood loss and hemodynamic instability due to obstetric hemorrhage was the major cause of admission to ICU. Incidence of maternal mortality has significantly decreased in the developed countries (0%[15], 2.3%[9], 11%[12], 27.78%[16]) as compared to the developing countries (50%[18], 41.67%[10], 33.81%[1]). Increased maternal mortality rates in developing countries have been attributed to treatment by quacks, low socio-economic status, non-existent antenatal care, low hematocrit and under-nourishment in obstetric patients.[11] The maternal mortality in our study was 19.1%. Multi-organ failure including heart failure, shock lung and acute renal failure to be the leading cause of maternal mortality (85.1%) as reported earlier.[11,12] The mortality was higher (n=22,84.6%) among patients admitted for obstetric as opposed to non-obstetric indications (n=4,15.4%), as found in a previous study.[13] Late referral from peripheral centres, lack of awareness about the disease severity by the community, delay in transportation, and delay in initiation of the treatment also lead to higher mortality rate in these critically ill obstetric patients.

5. Conclusion

Obstetric hemorrhage leading to hemodynamic instability is the leading cause of ICU admission, secondary to the complications of hypertensive disorders of pregnancy, in the developing countries. Awareness should be created among the population regarding the importance of adequate antenatal care, detection of the danger signs of various obstetric complications and need for contacting medical facility at the earliest in case of emergency situations. Early detection and prompt referral to tertiary centre with intensive care facilities should be promoted among the medical fraternity to reduce the incidence of ICU admissions and maternal mortality. Optimum care of circulation, blood pressure and ventilation could minimize the prevalence of multiple organ failure and mortality in critically ill obstetric patients admitted in ICU.

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