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RESEARCH ARTICLE

SPECTRUM AND OUTCOMES IN OBSTETRIC PATIENTS ADMITTED TO INTENSIVE CARE UNIT IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Obstetric patients are a special group as both maternal and fetal wellbeing needs to be taken care of. There is increasing evidence that admission of high-risk patients in Intensive Care Unit (ICU) is associated with reduction in maternal mortality.The present study aims to analyze the demographics, indications, clinical profile, management, and outcomes of obstetric patients requiring admission to the intensive care unit of a tertiary level hospital.
Methods: This is a prospective observational study of all obstetric patients admitted to a multidisciplinary ICU of a tertiary care hospital (King George Hospital) over a period of 2 years (January2020 – December 2021). Data was analyzed using the SSP software, a statistical analysis tool widely used for managing and interpreting clinical data.
Results: A total of 100 patients admitted to ICU during the study period were included in the study. Majority of the patients were under 30 years of age, primiparous, and unbooked. The common obstetric indications for ICU admission were pre eclampsia & eclampsia, obstetric hemorrhage, septicemia, rupture uterus, and obstructed labor; medical indications were anemia & epilepsy. The maternal and perinatal mortality was 34% and 30.5%, respectively. Maternal unbooked status was significantly associated with maternal mortality ($P < 0.05$).
Conclusions: Ensuring that all antenatal cases are booked, early detection of risk factors, referral to tertiary care centers at the appropriate time go a long way in reducing the maternal mortality and morbidity. Further prospective studies will help in formulating evidence based guidelines for the management of critically ill obstetric patients.

Introduction:-

Obstetric patients are a special group of patients as both maternal and fetal wellbeing are of paramount importance. Although pregnancy and labor are physiological processes, complications may be critical and potentially lethal. In spite of the fact that the maternal mortality rate, globally, has declined by 44% over the last 25 years (1990-2015), it still remains alarmingly high in developing countries [1]

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"There is a story behind every maternal death or life threatening complication and understanding the lessons to be learned can help to avoid such outcomes" [2] says the World Health Organization. Most of the maternal deaths are preventable as timely intervention can make the difference between life and death for the mother as well as for the baby. [3]

Although obstetric patients form a significant proportion of ICU admission, there are only a few studies reporting on critical illness during pregnancy in developing countries. [4]

The present study aims to analyze the incidence clinical profile, management, and outcomes of obstetric patients requiring admission to the intensive care unit of a tertiary level hospital.

Materials and Methods:-

This is a prospective observational hospital-based study conducted in the ICU of, King George Hospital, Visakhapatnam. A total of 100 patients admitted to ICU during pregnancy, or within 42 days postpartum, from January2020 – December 2021 were included in the study.

Inclusion Criteria:

All antenatal and postnatal women (within 42 days of delivery) requiring ICU admission for obstetric as well as non-obstetric reasons irrespective of the period of gestation, age, parity, mode of delivery, and co-morbid conditions.

Exclusion criteria:

Patients requiring admission to ICU after 42 days of delivery and Covid infected antenatal and postnatal women were excluded.

Methodology:

All women, who fulfilled the inclusion criteria, were included in this study. Written and informed consent was taken from all patients.

After admission, a detailed obstetric history, along with data regarding basic demographics, preexisting medical conditions, significant family and drug history, indication for ICU admissions, interventions if any, parturient status on ICU admission, maternal and foetal outcome were noted.

Subjects were followed further by thorough general physical, systemic and obstetric examinations according to the proforma prepared for the study. Patients were monitored thoroughly during their entire period of ICU stay and were followed up till discharge or death.

Data analysis:

Case report forms were used for data collection.

Ethical considerations:

Prior permission was taken from Institutional Ethics Committee (IEC), Andhra Medical College, Visakhapatnam. A written & informed consent was taken from all the study participants.

Results:-

A total number of 100 obstetric patients were admitted to ICU during the study period of 2 years. This constituted 0.87% of total deliveries and 1.23% of total ICU admissions during study period. Most of the patients (80 %) were under 30 years of age and primiparous(45%). Survival rate was better in young mothers, (<30 years of age); probably due to the lesser incidence of medical conditions complicating pregnancy in these women.

66% of the patients were literates and the remaining (34%) were illiterates. This had no significant relation with survival rates. (p-value: 0.914, statistically insignificant)

Only 24% of the cases were booked, the remaining (76%) unbooked. The survival rates were significantly better in booked cases (95.8%) as compared to unbooked cases (56.6%), p value < 0.001.

Most common mode of delivery was LSCS (48 %) followed by vaginal delivery (38%). Laparotomy was performed in 10% of the patients for rupture uterus and ectopic pregnancy. 4% were undelivered.

88% of patients were referred from peripheral hospitals. Survival rates were significantly higher in of the non-referral group (91.7%) than the referral group (62.5%).

Majority of the patients (81%) were admitted (to ICU) for obstetric indications, 19% were for non obstetric (medical) indications. The common obstetric indications included hypertensive disorders, obstetric hemorrhage HELLP syndrome, , amniotic fluid embolism, uterine rupture, ruptured ectopic, GDM, septic abortion, hyperemesis, peripartum cardiomyopathy. The most common medical indications were anemia followed by epilepsy and heart diseases.

Mothers admitted with obstetric causes had better survival rates (69.1%) as compared to those with medical causes (52.6%). (p-value 0.006, statistically significant.)

Mechanical ventilation was needed for 58% of patients. The patients on ventilators had a higher mortality rate (48.3%) as compared to those who were not (14.3%).(p-value < 0.01 statistically significant).

Ionotropic support had to be given for 4 % patients. Mortality rate (75%) was significantly higher in patients on ionotropes.

34 maternal and 29 fetal deaths occurred in our study population

Discussion:-

Despite significant improvement in obstetric care worldwide, high maternal mortality continues to be a challenge in the developing countries. [1]

Critically ill obstetric patients needing ICU admission constituted 0.87% of all the deliveries in our hospital, which was comparable to Saha R et al[5] (0.87%) and by Verma(0.8%) et al. [6]

In our study, 100 patients were admitted to the ICU during the two year study period; this number is higher when compared to other studies Mahutte et al [7]

3, Cohen et al[8] . This can be explained by the fact that ours is a tertiary care centre.

In our study, 81 % of women were admitted to ICU were for obstetric reasons, and the remaining 19 % were admitted for medical reasons. In other studies, the percentage of patients admitted to ICU due to obstetric causes has varied widely; 54%- Karnad D.R et al[9], 71%- Mahutte NG[7] study 58% - Mabie G[10] . 55.4%- Zeeman GG et al[11] . 23.9% Afessa B[12] and 20% Lapinsky SE[13]

In our study survival rates were significantly better for patients admitted with obstetric causes (65.5%) as compared to medical causes (31.5%) (p value - 0.006). Pregnancy itself is a critical condition and associated medical complications increase the risk of mortality.

In the current study, hypertensive disorders of pregnancy together account for 37% of obstetric causes. This is much lesser compared to study by Jose Olarra et al[14] in which 50.4% were due to pregnancy induced hypertensive disease. In study conducted by Afessa et al[12] , 45% ICU admissions were due to respiratory failure.

66% of the patients in our study were literate and the remaining 34 % were illiterates. The literacy rate in our study was greater than many studies (Gupta S et al[15] -45.6 %, Lapinsky SE[13] 60.2% in Mahutte NG [7] study 56.3 % Afessa B[13] 51%. Literacy is a major confounding factor, as educated females are more likely to recognize danger indicators during pregnancy and seek care sooner. In a study by Gupta S et al[15], there was a significant link between literacy and survival (p value – 0.015).

However, in our analysis, the relation between literacy and survival rates was not statistically significant.

In our study, only 24% of cases were booked and the remaining (76%) unbooked.

This was similar to the Gupta S et al [15] study where the percentage of un booked and booked cases was 79.16% and 20.84% respectively. However it varied from other studies. (Hazelgrove JF[16] . Loverro G[17] Mabie G[10] Shapiro JM[18])

In our study, booked status was strongly associated with better survival. (p value 0.001).

Registered cases come for regular antenatal checkups where they are sensitized and counseled regarding various potential obstetric and non-obstetric complications. This enables them to recognize such complications and seek help/get hospitalized early as compared to unregistered cases who often get admitted to hospital with serious complications.

In our study, 88% of the cases were referred from peripheral hospitals out of which 62.5% survived. Survival rate was significantly poor in referred patients. (p value : 0.014). Most of the peripheral health centers and nursing homes are poorly equipped in terms of blood components, ventilator support and round the clock availability of specialist doctors. This may explain the poor survival rates in referred cases. Timely referral to a tertiary medical facility improves the morbidity and mortality rates of critically ill obstetric patients.

Most of the studies reported significantly higher percentage of postpartum admissions to ICU. (Osanaike B et al[19] and Okafor UV et al[20]: 100%, Lapinsky SE et al[13]· 91%, Mahutte NG et al[7]: 78%, Kilpatrick SJ et al[21]:78%, Gupta S et al[15]:83.3%). This is quite contradictory to our study where only 11% of admissions were postpartum and the remaining 88% were ante partum.

In our study, mechanical ventilation was needed for 58% of patients and iontropic support for 4% of patients. The mortality rate was significantly higher for patients requiring ventilator (48.3%) and ionotropic(75%) support. Our results were similar to other studies Gupta S et al [15] Afessa et al [12] and Olarra [14]

In the present study, 15% of patients were from tribal, 62% from rural and 23% from urban areas. This distribution is similar when compared to other studies. Mortality rate in patients from tribal areas was very high (53%) This could be due to due to lack of facilities in those areas, late referral and serious complications

Present study shows 34% and 29% of maternal and neonatal mortality respectively in patients admitted to ICU. Maternal mortality in our study is much higher than other studies (Collop and Sahn[22], Monaco et al [23]); this may be due to the fact that ours is a tertiary care hospital with percentage of patients referred with serious complications being higher and number of unregistered (unbooked) cases admission also being higher.

In our study, the percentage of patients with coagulopathies is (33%) lesser compared to other studies.(Zeeman GG et al[24]: 44.7%, Borgman MA, Spinella PC, Perkins JG[25]:39%).

The incidence of respiratory failure (4%) in our study was lesser compared to other studies. (Welsh A, McLintock C, Gatt S,et al[26] : 8.4%, Lapinsky SE[13] : 6.8%).

Conclusion and Recommendations:-

Hypertensive disorders in pregnancy and related complications were the most common indications for ICU admission of obstetric patients, followed by obstetrical hemorrhage. Sepsis was found to be linked to a bad prognosis.

Ventilators, ionotropic support, and appropriate blood and blood products transfusions have all proven to minimize the prevalence of multiple organ failure and mortality in critically ill obstetric patients.

Awareness should be created among the general population as well as medical fraternity regarding the importance of regular antenatal checkups, detection of the warning signs of various obstetric complications and the need for prompt referral to the tertiary centre (when required).A few weeks of training in critical care should be a part of the curriculum of obstetrics and gynaecology post graduation.

Multi-centric prospective studies will go a long way in formulating evidence-based guidelines for management of critically ill obstetric patients.

Table 1:- Indications for ICU admission.

Non Obstetric causes	Number of patients	Percentage
ANAEMIA	9	9%
EPILEPSY	2	2%
HEART DISEASE	2	2%
ASTHMA	1	1%
BURNS	1	1%
CONGENITAL HEART DISEASE	2	2%
TB WITH LUNG FIBROSIS	1	1%
TYPE-1 DM	1	1%
Obstetric causes		
PRE-ECLAMPSIA	12	12%
ECLAMPSIA	25	25%
POSTPARTUM HAEMORRHAGE	13	13%
PLACENTA PREVIA	5	5%
ABRUPTIO PLACENTA	5	5%
ADHERENT PLACENTA	5	5%
OBSTRUCTED LABOUR	3	3%
PERPARTUM CARDIOMYOPATHY	3	3%
ECTOPIC PREGNANCY	5	5%
RUPTURE UTERUS	5	5%

Table 2:- Comparison of commonest cause for ICU admission.

STUDY	Commonest cause for ICU admission
Jose Olarra et al[50]	50.4% - hypertensive disorders of pregnancy
Afessa B[44]	45% - Respiratory failure
Mahutte NG[3]	43.8% - hypertensive disorders of pregnancy
Mabie G[23]	32% - hypertensive disorders of pregnancy
Present study	37% - hypertensive disorders of pregnancy

AGE	SURVIVED	DECEASED	TOTAL	P VALUE
≤ 29 YEARS	54	26	80	
> 29 YEARS	12	8	20	
TOTAL	66 (100%)	34 (100%)	100 (100%)	0.351
BOOKING STATUS	SURVIVED	DECEASED	TOTAL	
BOOKED	23 (95.8%)	1 (4.2%)	24 (100%)	<0.001
UN-BOOKED	43 (56.6%)	33 (43.4%)	76 (100%)	
REFRRAL	SURVIVED	DECEASED	TOTAL	

STATUS				
REFERRED	55(62%)	33(37.5%)	88(100%)	0.014
DIRECT	11(91.7%)	1(8.3%)	12(100%)	
TOTAL	66(66%)	34(34%)	100 (100%)	

Table 4:- Distribution of Gravidity index.

Gravidity index	Frequency	Percentage
Gravida-1	45	45%
Gravida-2	31	31%
Gravida-3	19	19%
≥4 Gravida	5	5%
Total	100	100%

Table 5:- Distribution of mode of delivery/procedures.

NVD	38	38.0
LSCS	48	48.0
Not delivered	4	4.0
LAPAROTOMY	10	10.0
Total	100	100%

Table 6:- Causes of Maternal Mortality.

S.NO	Cause of death	Number of patients	Percentage
1	PRE-ECLAMPSIA	3	8.8%
2	ECLAMPSIA	9	26.47%
3	POSTPARTUM HAEMORRHAGE	5	14.7%
4	ABRUPTIO PLACENTA	1	2.94%
5	ADHERENT PLACENTA	1	2.94%
6	PERIPARTUM CARDIOMYOPATHY	1	2.94%
7	DENGUE	2	5.88%
8	ECTOPIC PREGNANCY	1	2.94%
9	RUPTURE UTERUS	2	5.88%
10	Fulminant hepatic failure	1	2.94%
11	sepsis	2	5.88%
12	DKA	1	2.94%
13	STATUS EPILEPTICUS	1	2.94%
14	Heart disease complicating pregnancy	2	5.88%
15	STATUS ASTHAMATICUS	1	2.94%
16	CEREBRAL VENOUS THROMBOSIS	1	2.94%

Table 7:- Comparison of maternal outcome in patients admitted with obstetric and medical causes.

	SURVIVED	DECEASED	TOTAL	P-VALUE
MEDICAL CAUSES	10 (52.6%)	9(47.3%)	19 (100%)	
OBSTETRIC CAUSE	56 (69.1%)	25 (30.8%)	81 (100%)	
TOTAL	66 (66%)	34 (34%)	100 (100%)	0.006

Table 8:- Mortality rates in patients requiring mechanical ventilation.

Need for ventilation	SURVIVED	DECEASED	TOTAL	P-VALUE
YES	30 (51.7%)	28 (48.3%)	58 (100%)	
NO	36 (85.7%)	6 (14.3%)	42 (100%)	
TOTAL	66 (66%)	34 (34%)	100 (100%)	<0.001

Table 9:- Comparison of maternal an d fetal mortality.

STUDY	Maternal mortality (%)	Neonatal mortality (%)
Collop and Sahn[51]	20%	30%
Monaco et al [52]	18%	12%
Present study	34%	29%

Table 10:- Comparison of incidence of respiratory failure in study population.

STUDY	% of respiratory failure in study population
W Loverro G. Pusini V, Greco P.,et al 2001 22	8.4%
EL Solh AA. Grant BJ et al.,1996 21	2.9%
Lapinsky SE[46]	6.8%
Present study	4%

List Of Abbreviations.

ICU: Intensive care unit
WHO: World health organization
HDU: High dependency unit
DKA: diabetic ketoacidosis
ECMO: Extra-corporeal membranous oxygen
TRALI: Transfusion related acute lung injury
Gest. HTN: Gestational Hypertension
CBP: Complete blood picture LDH: Lactate dehydrogenase AST: Aspartate amino transferase ALT: Alanine aminotransferase CVA: Cerebrovascular accident ARF: Acute renal failure
DIC: Disseminated intravascular coagulation NST: Non-stress test
MgSO4: Magnesium sulfate PPH: Postpartum hemorrhage IUD: intrauterine death
AFLP: Acute fatty liver of pregnancy AFE: amniotic fluid embolism ARDS: Acute respiratory distress
APTT: Activated partial thromboplastin INR: International normalized Ratio CHD: Congenital heart disease

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