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Evaluation of Critically Obstetric III Patients in Intensive Care Unit Follow-Up: A Retrospective 10-Year

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ABSTRACT

Background: In recent years, although maternal and infant mortality rate has been decreased, it still remains an important health care problem. Early diagnosis, follow-up and treatment of these problems are very important. Because of these features, obstetric critical patients are a special group of patients who need attention. The aim of this study was to evaluate the factors affecting mortality in critical obstetric patients admitted to the intensive care unit.

Material and Methods: This study was performed retrospectively in the Medical Intensive Care Unit. Obstetric patients who stayed intensive care for more than 24 hours were included in the study. Demographic and clinical information of the patients were collected. Data were taken from the patient file and electronic recording system.

Results: We enrolled 62 patients. The mean age was 30 ± 7 years. The mean gestational age was 32 ± 5 weeks. The most common reasons for admission to intensive care were 22.4% HELLP syndrome, 19.4% preeclampsia and 19.4% hemorrhage. We compare survival and non-survival patients; APACHEII score, and 1st day SOFA score were higher, GKS was lower for the non-survival patients. (p=0.001, p=0.006, p <0.001, respectively). On the first day, the high SOFA score was found as an the independent risk factor for determining the mortality (OR: 3.47,95% CI: 1.131-10.696, p=0.030). The average length of ICU stay was 6 (range: 1-64) days. The intensive care mortality was 8%.

Conclusion: This study showed that, the most common critically obstetric conditions for admission to intensive care unit were pregnancy-related hypertensive diseases and hemorrhage. The most appropriate marker for predicting mortality in these patients groups were 1st day high SOFA score.

Keywords: Obstetric critically patient, intensive care units, mortality,

Introduction

Obstetric patients are usually young and have no additional problems except for the physiological changes of pregnancy. Maternal and infant mortalities that occur during or after pregnancy, which is a physiological process, lead to highly devastating effects for patients and their relatives. Comorbidities that occur during or before pregnancy, or that occur during or after pregnancy may require close follow-up of these patients and even admission to the intensive care unit. Although maternal and infant mortality rate has decreased in recent years, it still remains an important health care problem. Early diagnosis of these problems and thus follow-up and treatment of them without wasting time are very important. Because of these features, critical obstetric patients are a special group of patients who need attention.

Although maternal mortality has decreased recently, it is still an important health care problem, which is attempted to be improved, especially in developing countries. According to the 2018 report of the World Health Organization, while the maternal mortality rate is 239 per 100000 births in developing countries, it is 12 per 100000 births in developed countries (1). In our country, it is 14.7 per 100000 live births according to the health statistics yearbook published by the Ministry of Health in 2017 (2).

These patients die due to complications that occur following pregnancy or delivery. A significant proportion of these complications occur during pregnancy, and most of them are preventable or treatable problems. According to the data of the World Health Organization, the conditions that cause 75% of maternal deaths

are severe hemorrhage and infections, preeclampsia-eclampsia that occur after birth, and complications that occur during childbirth (1).

Since the vast majority of conditions that cause maternal deaths are preventable, the reasons to cause maternal mortality should be well known, it is necessary to be prepared for the complications that may occur, and when needed, follow-up and treatment of these patients should be performed properly. There is a limited number of studies on this subject in our country (3-6). The aim of this study was to determine the factors affecting mortality in critical obstetric patients admitted to the Medical Intensive Care Unit.

Material and Methods

All critical obstetric patients admitted to the Medical Intensive Care Unit between 2008 and 2018 were analyzed retrospectively. Approval was obtained for this study from the Ethics Committee of Erciyes University Faculty of Medicine (Date: 19.09.2018 no: 2018/422). Patient data were obtained from patient files and electronic medical records. These patients were analyzed in terms of maternal age, gestational age, reason for admission to the intensive care unit, specific interventions in the intensive care unit, invasive mechanical ventilation (IMV) and non-invasive mechanical ventilation (NIMV), plasmapheresis, intermittent and continuous hemodialysis.

The severity of disease was evaluated by the APACHE II score, SOFA score, and Glasgow Coma score.

Statistical analysis

The Chi-square (X^2) test was used in the analysis of categorical data of the patients enrolled in the study. During the comparison of numerical variables, the Mann-Whitney U test was used to compare two independent groups, and the Kruskal-Wallis analysis of variance was used to compare more than two independent groups. Single and multiple multivariate logistic regression analyses were performed to determine the risk factors affecting mortality. The data were recorded in the SPSS 22.0 program. $P<0.05$ was considered statistically significant.

Results

Sixty-two critical obstetric patients admitted to the intensive care unit during the study were enrolled in the study. All critical obstetric patients aged 16-50 years were included in the study. The mean maternal age of the patients was 30±7 years. The patients' most common reason for admission to the intensive care unit was HELLP [14 patients (22.6%)]. Apart from HELLP, 12 patients (19.4%) were admitted to the intensive care unit with the diagnosis of preeclampsia, and 12 patients (19.4%) were admitted to the intensive care unit with the diagnosis of vaginal or post-op hemorrhage. While 2 of 7 patients (11.3%) admitted to the intensive care unit for medical reasons had mitral stenosis, 2 of them had postoperative respiratory failure, 1 of them had hypertension, HBV and cirrhosis, 1 of them had portal vein thrombosis, and 1 of them had diabetic ketoacidosis. Two (3.2%) of these patients were followed up in the intensive care unit for neurological reasons (press syndrome, myasthenia gravis).

Cesarean section was the most common delivery method with 55 patients (88.7%). Detailed demographic and clinical characteristics of the patients are presented in Table 1.

While 23 patients (37%) admitted to the intensive care unit underwent IMV due to acute respiratory failure for 7.6 (range: 1-51) days, 12 (19.3%) patients underwent NIMV for 4.9 (range: 1-24) days.

IMV and NIMV were administered together in 7 (11.3%) patients. Plasmapheresis was performed in 12 patients (19.3%). The indications of the patients undergoing plasmapheresis were as follows: HELLP in 4 patients, hemorrhage in 3 patients, DIC in 2 patients, and medical reasons in 2 patients. Continuous renal replacement therapy (CRRT) was performed in 4 hemodynamically unstable patients, while intermittent hemodialysis (IHD) was performed in 2 hemodynamically stable patients. Nosocomial infection occurred during the stay in the intensive care unit in a total of 10 patients (16.1%). These infections were lower respiratory tract infection in 9 patients (ventilator-associated pneumonia in 7 patients), soft tissue infection in 1 patient, and encephalitis in 1 patient. Three of the patients with infection died. During intensive care follow-up, 25 patients (40.3%) were given erythrocyte suspension (ES), 12 patients (19.3%) were given platelet (PLT) suspension, 8 patients (12.9%) were given fresh frozen plasma (FFP), 6 patients (9.6%) were given cryoprecipitate, and 1 patient (1.6%) underwent fibrinogen transfusion. Other interventions performed in the intensive care unit are presented in detail in Table 2.

The average length of ICU stay was 6 (range: 1-64) days, and the mean duration of hospitalization was 10 (range: 1-83) days.

Intensive care mortality of all patients was found to be 8% (5 patients). Three patients (60%) died due to postoperative cardiac arrest,

Table 1. Demographic and clinical characteristics of the patients

Variable	Patients N=62
Maternal Age, ±SD, years	30±7
Gestational Age, n, ±SD, weeks	32±5
Body weight, ±SD, kilogram	75±10
Type of Delivery, n(%)	
Cesarean section	55 (88.7)
NSVR	7 (11.3)
Reasons for admission to the intensive care unit, n(%)	
HELLP	14 (22.6)
Hemorrhage	12 (19.4)
Preeclampsia	12 (19.4)
Eclampsia	8 (12.4)
Medical Reasons	7 (11.3)
Post-op Cardiac Arrest	3 (4.8)
DIC	2 (3.2)
Neurological Reasons	2 (3.2)
Pulmonary Edema	1 (1.6)
Post-op Sepsis	1 (1.6)
Total	62 (100)

NSVR: Normal spontaneous vaginal route, **DIC:** disseminated intravascular coagulopathy

Table 2. Clinical outcomes of the patients

Intensive-care interventions, n(%)	
IMV	23(37)
NIMV	12(19.3)
Plasmapheresis	12(19.3)
IMV+NIMV	7(11.3)
CRRT	4(6.4)
Tracheotomy	3(4.8)
IHD	2(3.2)
Tube Thoracoscopy	1(1.6)
Bronchoscopy	1(1.6)
Transfusion	
ES	25(40.3)
PLT suspension	12(19.3)
FFP	8(12.9)
Cryoprecipitate	6(9.6)
Fibrinogen	1(1.6)
Use of Vasopressors, n(%)	9(14.5)
Emerging Infection, n(%)	
Lung	9(14.5)
Soft Tissue	1(1.6)
Encephalitis	1(1.6)
IMV duration, (range) (days)	7.6(1-51)
NIMV duration, (range) (days)	4.9(1-24)
APACHE II score, (mean ±SD)	17.8±7
GCS, (mean ±SD)	12.7±3.7
SOFA score, (mean ±SD)	4.1±2.9
ICU duration, (range) (days)	6 (1-64)
Hospitalization duration, (range) (days)	10(1-83)
Mortality, n (%)	5(8.1)

APACHE II: acute physiology and chronic health evaluation **SOFA:** the sequential organ failure assessment score **IMV:** invasive mechanical ventilation, **NIMV:** non-invasive mechanical ventilation, **CRRT:** continuous renal replacement therapy, **IHD:** intermittent hemodialysis, **ES:** erythrocyte suspension, **PLT:** platelet, **FFP:** fresh frozen plasma, **GCS:** Glasgow Coma score, **ICU:** intensive care unit

1 patient (1.6%) died due to postoperative sepsis, and 1 patient (1.6%) died due to hemorrhage.

The mean APACHE II score (27±2.9) was significantly higher in non-survival patients compared to survival patients (16.9±6.6) (p=0.001). The mean SOFA score was 10±3.7 in non-survival patients. However, it was significantly higher with 3.6±2.1 in survival patients (p<0.001). The mean Glasgow Coma score (GCS) was significantly lower with 7±5.6 in non-survival patients compared to survival patients (13.2±3.1) (p=0.006). These results are presented in Table 3.

Multivariate logistic regression analysis was performed to evaluate mortality in patients. On the first day, the SOFA value was found to be an independent risk factor (OR: 3.47, 95% CI: 1.131- 10.696, p:0.030). It was observed that mortality increased by 3.47 times for each increase in the SOFA value. These results are presented in Table 4.

Discussion

In this study, obstetric patients hospitalized in the Medical Intensive Care Unit were evaluated. The most common reasons for admission were pregnancy-related hypertensive conditions

Table 3. Comparison of demographic and clinical parameters of survival patients and non-survival patients

Variable	Survival	Non-survival	p
Age, ±SD, years	33.2±8.6	29.8±7.8	0.361
Weight, ±SD, kilogram	86±19.5	74.1±8.5	0.244
Maternal age, ±SD, years	33.2±8.6	29.8±7.8	0.361
Gestational age, ±SD, weeks	32.7±4.9	32±5.5	0.803
APACHE II, (mean±SD)	27.6±2.9	16.9±6.6	0.001
GCS, (mean ±SD)	7±5.6	13.2±3.1	0.006
SOFA 1st Day,(mean±SD)	10.2±3.7	3.6±2.1	<0.001

APACHE II: acute physiology and chronic health evaluation **SOFA:** the sequential organ failure assessment score **GCS:** Glasgow Coma score

Table 4. Multivariate logistic regression analysis for mortality evaluation

Variable	OR	95%CI	p
APACHE II	1.15	0.735-1.822	0.527
GCS	1.29	0.779-2.160	0.318
SOFA 1st Day	3.47	1.131-10.696	0.030

APACHE II: acute physiology and chronic health evaluation **SOFA:** the sequential organ failure assessment score **GCS:** Glasgow Coma score

and hemorrhage. It was determined that the most important risk factor determining mortality in these patients was the high 1st day SOFA score. The intensive care mortality was 8%.

The mean gestational age of the 62 patients enrolled in this study was 32±5 weeks. In comparison with the study carried out by Demirkıran et al., the mean gestational and maternal ages of survival and non-survival patients in our study were higher. In their study, Demirkıran et al. found that the mean maternal age was 28 ± 7 years in non-survival patients and 28 ± 6 years in survival patients. However, it was found in our study that the mean maternal age was 33.2 ± 8.6 years in non-survival patients and 29.8 ± 7.8 years in survival patients. In their study, Demirkıran et al. found that the mean gestational age was 33 ± 6 weeks in non-survival patients and 33 ± 4 weeks in survival patients. However, it was found in our study that the mean gestational age was 32.7 ± 4.9 weeks in non-survival patients and 32.5 ± 5.5 weeks in survival patients (Table 3) (5).

In our study, there was no statistically significant difference between the groups in terms of mortality, as in the study of Demirkıran et al.

The most common reasons for admission to the intensive care unit were 22.4% HELLP, 19.4% preeclampsia, and 19.4% hemorrhage. Eclampsia was the fourth most common reason for admission to the intensive care unit by 8.4%. The most common reasons for admission to the intensive care unit were the diseases caused by hypertension, and then hemorrhage. These results were compatible with previous studies (3-6).

In this study, 40.3% ES, 19.3% PLT, 12.9% FFP, 9.6% cryoprecipitate, and 1.6% fibrinogen transfusion were administered. Three patients

admitted due to post-op cardiac arrest, 2 patients admitted due to DIC, 9 of 12 hemorrhagic patients, and 5 patients admitted due to HELLP were given ES. While the study conducted by Çelik et al. had similar transfusion rates to our study (34% ES, 25% FFP, and 12% PLT transfusion) (3), higher transfusion rates were found in the study of Demirkıran et al. (36.8% whole blood, 29.6% FFP, and 21.6% PLT) and in the study of Togal et al. (66% ES, 66% FFP, and 33% PLT transfusion) (4-5).

Of the total patients, 48.3% needed intubation and mechanical ventilation. This ratio was relatively higher compared to some previous studies. It was 19.4% in the study of Selo-ojeme et al., 32% in the study of Celik et al., and 41% in the study of Cohen et al. (3, 7, 8). However, it was found to be lower compared to the studies carried out by Tripathi et al. (64%) and Togal et al. (85%) (4, 9).

The mean duration of hospitalization was 10 days, and the average length of ICU stay was 6 days. While the average length of ICU stay was 4.4 days in the study carried out by Platteau et al., it was 8 days in the study of Demirkıran et al., and 7 days in the study of Togal et al. (4, 5, 10).

Five patients (8%) who were followed up died. This mortality rate was lower compared to the results obtained from previous studies carried out in our country and the value 14.7 per 100000 live births indicated in the health statistics yearbook 2017 of the Ministry of Health (2-6).

We think that this ratio was found to be lower compared to previous studies because the fact that our clinic has a tertiary intensive care unit with adequate physical conditions and number of staff was effective on it. The fact that this ratio was high in the data of the Ministry of Health may be affected by the inclusion of other intensive care units which were insufficient in terms of the number of staff and physical conditions.

While it was argued in two previous studies that the APACHE II score could determine the severity of the disease in critical obstetric patients (11,12), Lapinsky et al. argued that pregnancy already increased the acute physiological score, and therefore mortality could not be predicted by the APACHE II-III or SAPS II scores (13). The APACHE II score and 1st day SOFA score we used to evaluate mortality in this study were found to be higher in non-survival patients compared to survival patients. The mean APACHE II score was (27±2.9) in non-survival patients and was significantly higher compared to survival patients (16.9±6.6) ($p<0.001$). The mean SOFA score was (10±3.7) in non-survival patients and was significantly higher compared to survival patients (3.6±2.1) ($p=0.001$). In the risk analysis performed, it was found that the 1st day SOFA score was an independent risk factor for mortality, and the mortality rate increased by 3.47 times for each increase in the SOFA value. Likewise, in the study carried out by Celik et al., the mean APACHE II score and SOFA score were found to be significantly higher in non-survival patients compared to survival patients (3). In the study carried out by Demirkıran et al., the mean APACHE II score was also found to be significantly higher in non-survival patients compared to survival patients (5).

This study had some limitations. The number of patients in this study was partially low. Furthermore, statistical mortality rates may not be reliable since the mortality rate was low (5 patients).

In conclusion, in this study, the most common critical obstetric reasons for admission to the intensive care unit were pregnancy-related hypertensive diseases and hemorrhage. The most appropriate method for predicting mortality in this patient group was the high 1st day SOFA score. More extensive studies should be carried out to better determine the factors affecting mortality and morbidity in this special group of patients.

AUTHOR CONTRIBUTIONS:

Concept: KG,HD; **Design:** HD,KB; **Supervision:** KG,HD; **Resources:** KG,MS,HD; **Materials:** HD,KG,MS; **Data Collection and/or Processing:** HD,KB; **Analysis and/or Interpretation**: KG,HD,KB,HS; **Literature Search:** HD,KB,HS; **Writing Manuscript**: KG,HD,KB; **Critical Review:** KG,MS

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Conflict of Interest: Authors have no conflicts of interest to declare.

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