

Maternal and Perinatal Outcome of Perimortem Caesarean Section

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ABSTRACT

Aim: To describe characteristics, etiological factors, maternal and perinatal outcome of perimortem Caesarean section.

Design: Prospective study

Setting: Emergency Room of Department of Obstetrics & Gynecology Unit I.Dr.Ruth KM Pfau Civil Hospital & Dow Medical College, Karachi.

Methodology: This study was carried out in the Department of Obstetrics and Gynaecology, Civil Hospital Karachi from November 2020 to March 2021. All women who were presented in emergency in a collapsed state were included in the study and those women who were brought dead were excluded. Clinical details including age, gestational age, reason for perimortem Caesarean section, perinatal and maternal outcome were recorded on a predesigned proforma.

Results: A total of 27 women underwent perimortem Caesarean section. The mean age of women who underwent PMCS was 26±6.5 years, and mean gestational age was 35±4 weeks. Sixteen (59%) women were referred from either primary care or small clinics. Majority 15(55%), underwent PMCS within 5 minutes of maternal collapse and 12(44%) underwent PMCS, after 5 minutes of collapse. Septic shock 21(77%) was the main etiological factor for PMCS, followed by hypertension and cardiomyopathy 2(7%) each. Twenty three (85%) women survived, following PMCS, whereas 4(14%) died. Reasons for maternal death included hepatic encephalopathy(1), peripartum cardiomyopathy(2), eclampsia(1). The perinatal mortality was high, with only 14(51%) live birth and mean APGAR score at 1 and 5 minutes was 3. The mean stay in intensive care was 37±35 hours, whereas mean stay in ward was 57±39 hours.

Practical implications: This study suggests that if perimortem caesarean section accomplished in a timely manner, it can improve fetomaternal outcome.

Conclusion: Perimortem Caesarean section can improve upon maternal survival. Greater awareness among doctors, multidisciplinary approach, proper documentation and information for family members are cornerstone of this emergency procedure.

Keywords: Perimortem Caesarean section, septic shock, eclampsia, postpartum haemorrhage, maternal mortality.

INTRODUCTION

WHO define maternal near miss "a woman who nearly died but survived a complication during pregnancy, child birth or within 42 days after delivery"¹. Cardiac arrest is a very rare event in pregnancy. The estimated incidence of cardiac arrest in out of hospital is 1.71/100,000 and 2.78/100,000 during hospitalisation². The etiological factors for cardiac arrest during pregnancy can be haemorrhagic and non-haemorrhagic. The latter include amniotic fluid embolism, pulmonary embolism, uterine inversion and sepsis. The non-haemorrhagic causes have been found to be increased in developed world whereas haemorrhage, anaemia, eclampsia and sepsis are common in the developing world³.

The principle management of cardiac arrest for pregnant and non-pregnant women are same, it is very challenging in pregnancy due to anatomical and physiological changes in pregnancy. The presence of a gravid uterus after 20 weeks of pregnancy makes maternal resuscitation difficult. The chest compressions delivered during the procedure of cardiopulmonary resuscitation are less effective due to presence of gravid uterus⁴. American Heart Association suggests that perimortem caesarean section (PMCS) is the most effective way to resuscitate pregnant women in cardiac arrest.⁵ It makes resuscitation (CPR) more effective with improved chances of maternal survival. Guidelines on maternal collapse identifies four minute interval as the golden time period for maternal salvage. This is based upon the fact that brain anoxia occurs within four minutes of maternal collapse⁶.

The incidence of perimortem Caesarean section (PMCS) is not well documented, and case series and case reports have been used to provide an over view of the situation. The commonest reasons identified from pooled case series are amniotic fluid embolism, eclampsia, cardiac causes and sepsis⁷ It has also been

performed for trauma, burn injuries and other conditions. The main aim of performing the procedure is to improve the chances of maternal survival^{6,7}.

Maternal survival after cardiac arrest depends upon early recognition of the condition, place of occurrence, time interval between cardiac arrest and perimortem caesarean section performed, along with other confounding factors⁸. Initial resuscitation measures should start at the place of event. If these measures fail to improve upon maternal condition, perimortem caesarean section should be performed, if gestational age is more than 20 weeks^{9,9}. It is not necessary to shift the woman to the operating room the procedure can be performed in the emergency room (ER) by the attending professional. The procedure is termed as resuscitation hysterotomy, if it is done by the ER personnel⁴. Immediate decision of performing the procedure may help in decreasing the maternal mortality as well, by improving upon the chances of maternal resuscitation¹⁰.

The aim of PMCS should always be maternal and not fetal salvage. Though a vertical incision is recommended for easy access to abdominal cavity, a usual transverse incision can be given depending upon the experience of doctor⁸⁻¹⁰.

The aim of this study is to find the etiological factors for maternal collapse, maternal and perinatal outcome of women who underwent perimortem caesarean section, at a tertiary care centre.

MATERIAL & METHODS

This prospective study was carried out at the Department of Obstetrics & Gynaecology, Ruth Pfau KM Civil Hospital and Dow Medical College, Karachi from November 2020 to March 2021. The Emergency Room (ER), delivery suite, operating theatres are situated in adjacent blocks on the same floor. There is presence of anaesthesia personnel round the clock on the floor. The hospital is a tertiary care and receives referrals from primary and secondary care of two major provinces. All women who were presented in

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emergency in collapsed state were included in the study and those women who were brought dead in ER were excluded from the study.

Maternal collapse was defined according to RCOG guidelines, as an acute event involving cardiopulmonary systems and/ or brain with reduced or absent level of consciousness and potentially cardiac arrest or death, at any stage in pregnancy and up to 6 weeks after birth. These women were resuscitated by the ER team including obstetrician and anaesthetist. If initial basic life-saving efforts failed, PMCS was performed in the ER by the Obstetrician, along with continued resuscitative measures by the anaesthetist. The variables which were recorded for study group included age, gestational age, place of referral, aetiology, maternal and perinatal outcome of perimortem Caesarean section.

Statistical analysis was carried out using Stata 11. Descriptive statistics were reported as frequency (percentage) for categorical variables and mean (standard deviation) for numerical variables. This study was carried out after taking an ethical approval from University's Institutional Review Board.

RESULTS

During the study period, 10674 women were admitted in the department for delivery. A total of 61 women were received in the ER, who fulfilled the criteria of maternal collapse out of them 27 women underwent perimortem caesarean section. Mean age of women who underwent PMCS was 26 ± 6.5 years, and mean gestational age was 35 ± 4 weeks. Sixteen (59%) women were referred from either primary care or small clinics. Majority 15(55%), underwent PMCS within 5 minutes of maternal collapse and 12(44%), underwent PMCS, after 5 minutes of collapse. Septic shock 21(77%) was the main etiological factor for PMCS, followed by hypertension and cardiomyopathy 2(7%) each as shown in Table 1.

Table I: Demographic details and Causes of Perimortem Caesarean Section

Age	26±6.5
Gestational age	35±4
LSCS < 5 minutes	15 (55 %)
LSCS after 5 minutes	12 (44%)
Sepsis	21 (77%)
Hypertension	2 (7%)
Cardiomyopathy	2 (7%)
Hepatic Encephalopathy	1 (3.7%)
Postpartum Haemorrhage	1 (3.7%)

Twenty three (85%) women survived, following PMCS, whereas 4(14%) died. Reasons for maternal death included hepatic encephalopathy (1), peripartum cardiomyopathy(2), eclampsia(1). The perinatal mortality was high, with only 14(51%) live birth as shown in (Table 2). Mean Apgar score at 1 and 5 minutes was 3. The mean stay in intensive care was 37 ± 35 hours, whereas mean stay in ward was 57 ± 39 hours.

Table II Fetomaternal outcome of Perimortem Caesarean Section

Alive	23 (85%)
Dead	04 (14%)
Live birth	14 (51%)
Still birth	13 (48%)

DISCUSSION

Peri-mortem Caesarean section is an important tool in maternal resuscitation. It relieves the aortocaval compression, improves venous return to heart, thus improving the chances of maternal resuscitation. Peri-mortem Caesarean section has been reported for cardiac and non cardiac reasons, as well as for trauma, gunshot injuries, burns and poisoning as well.¹¹ Important points to consider is awareness among the obstetrician, anaesthetist, paramedical staff, and the time interval between arrest and the procedure¹².

The mean age of women in our study group was 26 years. This is much younger age group, than reported in other studies. A number of studies have reported age of ≥ 35 years, and have associated it with greater risk for medical complications in this age group.¹³ Though much emphasis is placed upon timing of PMCS, in our study majority 55% underwent PMCS, within recommended time duration. There were 2 maternal deaths in the group who underwent PMCS, after recommended 5 minutes period. Baghirzada et al, in their case series have suggested importance and quality of continued resuscitation, along with timing of procedure in the improved maternal survival¹⁴. In a series of 38 women who underwent PMCS, maternal survival was also seen among women who underwent procedure after the recommended time duration of 5 minutes¹⁵. More important is continued resuscitation efforts. Maternal brain hypoxia does start after 4-5 minutes period, but foetus does have better survival even after 5 minutes period, if mother had good oxygenation prior to cardiac arrest.

Our survival-discharge home rate was better than other studies. All the women who survived were discharged for home. In a review of 94 cases, 54% women went home¹⁶. Better survival in our study may be attributed to the aetiology of maternal collapse. Globally sepsis is recognized as an important cause of maternal mortality. A recent survey attributed 14% of maternal deaths due to sepsis¹⁷. Also known to have improved survival benefit is the time duration between maternal collapse and PMCS. In a study from Taiwan, the survival-discharge home rate was 13%¹³. The authors attributed the low rate to the etiological factors of hypertension and cardiovascular complications, which were main causes of cardiac arrest in their study. Both the conditions are associated with medical complications like cardiac failure. We also had 2 maternal deaths each from eclampsia and peripartum cardiomyopathy. Cardiac disease in pregnancy is emerging as an important indirect cause of maternal death.¹⁸ Intracranial haemorrhage in hypertensive disorders of pregnancy is a major cause of maternal death¹⁹. Hepatic encephalopathy due to hepatitis E virus, is an important cause of maternal death in developing world. We had earlier reported a case-fatality of 14% from hepatitis E infection²⁰. One maternal death in the study after PMCS was seen in Hepatitis E virus encephalopathy.

Though majority of our women were referred from primary care or clinics (40%), 11 women were referred from major hospitals, for a variety of reasons. Greater awareness among practicing obstetricians and anaesthetist about the procedure may help in improving maternal and perinatal survival. Similarly performing resuscitative hysterotomy/ perimortem caesarean section has been reported in pre hospital settings and guidelines also exist for better maternal outcome in such circumstances²¹. Inclusion of procedure in emergency obstetric manual for trainee obstetrician had shown a considerable increase in number of procedures performed in Dutch hospitals²².

Perimortem Caesarean section is aimed at improving maternal survival²¹. In our study we had perinatal live birth of 51%. The mean apgar score at 1 and 5 minutes was low. Fetal survival has been reported even after 30 minutes of maternal cardiac arrest¹⁵.

CONCLUSION

Perimortem Caesarean section can improve upon maternal survival. Greater awareness among doctors, multidisciplinary approach, proper documentation and information for family members are cornerstone of this emergency procedure.

Strengths and limitations: This is first study from our hospital, about Perimortem Caesarean section. Being a tertiary care centre, awareness among practicing obstetricians and anaesthetists about the procedure is necessary. The study did show good survival-discharge ratio, but we did not follow women and newborn for long term neurological sequela.

Conflicts of interest: None

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IRB permission: Institutional Ethical Review Board approved this study

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