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Original Research Article

Maternal collapse in tertiary care center over a year

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ABSTRACT

Background: Maternal collapse is defined as an acute event involving the cardiorespiratory systems and/or central nervous system resulting in a reduced or absent conscious level (and potentially cardiac arrest and death). Causes can be hypovolemia, hypoxia, electrolytes imbalance, thromboembolism, toxicity, etc. Since the maternal physiology is different from the general adult, modifications are necessary during the cardiorespiratory resuscitation process. This study aimed to find out the prevalence and causes of maternal collapse.
Methods: It was a hospital based cross-sectional study conducted in the department of obstetrics and gynecology, RIMS for a duration of one year.
Results: The total number of maternal collapse during the study period was 43, with a mortality of 8 among them. Uterine rupture and placenta accreta spectrum were the topmost causes for maternal collapse.
Conclusions: The study of the factors involved in maternal collapse will help in better understanding of the causes and management of the same.

Keywords: Maternal collapse, Maternal physiology, Resuscitation

INTRODUCTION

Maternal collapse is defined as an acute event involving the cardiorespiratory systems and/or central nervous system resulting in a reduced or absent conscious level (and potentially cardiac arrest and death), at any stage in pregnancy and up to 6 weeks after birth.[1] The true incidence in India is difficult to be estimated since there is no national or regional statistics reported on regular basis. In the guidelines published by RCOG on maternal collapse in pregnancy and puerperium in 2011, the rate of maternal collapse was reported to range from 14 to 600 among 1 lac births.[2]

The causes for maternal collapse may or may not be pregnancy related. Some common causes are mentioned below.

Haemorrhage

It is the most common cause of maternal collapse. Obstetric haemorrhage accounts for 47% of the maternal deaths in India.[3] In our part of the country, it is the cause of 52.5% of maternal mortality.[4] The important causes of obstetric haemorrhage are postpartum haemorrhage, major antepartum haemorrhage, uterine rupture, ruptured ectopic pregnancy, incomplete abortions.

Thromboembolism

It is another important cause of maternal collapse. Pulmonary embolism, cerebral vein thrombosis is the common thromboembolic phenomenon encountered. The prevalence is approximately 1 in 1000 pregnancies, with a 9% contribution to maternal mortality in India.[5,6]

Amniotic fluid embolism

Amniotic fluid embolism presents as collapse during labour or delivery or within 30 minutes of delivery in the form of acute hypotension, respiratory distress and acute hypoxia. The incidence is approximately 1 in 40,000 deliveries, and the mortality ranges from 20-60%.[7]

Cardiac disease

Cardiac events like peri-partum cardiomyopathy, myocardial infarction, aortic dissection, etc. also can cause maternal collapse. The other causes are eclampsia, sepsis, drug toxicity and overdose, intracranial haemorrhage, anaphylaxis, electrolyte imbalance, hypoglycemia.

Management of maternal collapse

The management for the collapse is according to the resuscitation guidelines of adults with the standard ABCDE approach, with the ongoing treatment for the specific cause.[8] But, certain modifications are necessary for pregnant women of 20 weeks or more gestation because of the changes in physiology during pregnancy.[2] To relieve the pressure on the vena cava and aorta, there should be a lateral tilt of 15^0 on the surface. It allows effective chest compressions. The airway should be protected as soon as possible by intubation, since there are more chances of regurgitation during pregnancy. There also is an increased requirement of oxygen.

The concept of peri-mortem cesarean section was introduced for an effective cardiorespiratory resuscitation. It should be achieved within 5 minutes of the collapse. It is recommended when there is no response to correctly performed CPR within 4 minutes of maternal collapse or when resuscitation is continued beyond this in women over 20 weeks of pregnancy.[2]

In an effort to identify the seriously ill and deteriorating women, the Modified Early Obstetric Warning Score (MEOWS) had been established. It uses a colour coded chart to identify the condition of pregnant women under observation. It is particularly useful in peripheral health centers.[9] This study aimed to find out the prevalence and causes of maternal collapse in our setting.

METHODS

The study was a hospital based prevalence study conducted in the department of Obstetrics and Gynecology, Regional Institute of Medical Sciences, Imphal, Manipur, from October, 2022 to September, 2023.

All the women admitted in the department and who experienced maternal collapse during the study period were included in the study. The required data were collected retrospectively from the near-miss and mortality registers maintained in the department. The socio-demographic characteristics of the patients such as age, religion, socio-economic status, parity were recorded. Patients' period of gestation at the time of collapse, mode of delivery, relation with the labour events, the causes of the events leading to collapse, the outcome of the women were noted down. The data were entered in excel sheet, and analyzed with SPSS version 21.

Ethical approval was obtained from the institutional ethics committee.

RESULTS

The total number of deliveries during the time period was 8311. There were 43 cases of maternal collapse and 8 cases of maternal mortality during the same period.

Table 1: Distribution of the cases according to age.

Age of the cases (years)	No. of cases (%)
Up to 20	4 (9.4)
21-30	13 (30.3)
31-40	23 (53.4)
>40	3 (6.9)
Total	43 (100)

The prevalence of maternal collapse was 5.1 in 1000 childbirths.

Most of the cases (53.4%) belonged to the age group of 31-40 years of age (Table 1).

Table 2: Distribution of the cases according to the period of gestation.

Period of gestation of women (weeks)	No. of cases (%)
<24 weeks	12 (27.9)
24-37 weeks	12 (27.9)
>37 weeks	19 (44.2)
Total	43 (100)

As shown in Table 2, nineteen of the cases (44.2%) were pregnant for more than or equal to 37 weeks of gestation, 12 cases (27.9%) were pregnant between 24 to 37 weeks gestation, and 12 other cases (27.9%) were related to the early pregnancy complications. So, in total, there were 31 women (72.1%) who were pregnant for at least 24 weeks.

As shown in Table 3, out of those 31 women who had a viable pregnancy, 4 women (12.9%) collapsed in antenatal period, 19 (61.3%) collapsed in the intra-partum period, and 8 (25.8%) in the post-partum period.

In this study, uterine rupture was the most common cause of maternal collapse accounting for 18.6% (8 cases) of all the cases. Its prevalence was 0.1% (8 in 8311 deliveries). Out of them, 4 cases (50%) occurred in the 2nd stage of labour of which 3 were detected before delivery, and remaining one was detected in the immediate puerperal

period. Two cases (25%) were cases of scar rupture detected incidentally during cesarean section, and the remaining two (25%) were iatrogenic uterine rupture during attempted 2nd trimester illegal surgical abortions.

Placenta accreta spectrum accounted for 16.2% (7 cases) of the maternal collapse. Three of them were diagnosed by MRI antenatally, two were discovered during planned cesarean section, and the other two were cases referred from other centers with intractable bleeding associated with 2nd trimester abortions.

There were yet 4 cases (9.4%) of suspected amniotic fluid embolism, the diagnosis of which was made by exclusion of other possible causes. Two of them occurred in the latent stage of labour following induction of labour, one in the 1st stage of labour, and the remaining one in the intra-partum period.

The percentage of maternal mortality among the maternal collapse was 18.6% (8 cases). The causes of maternal mortality are shown in table 4. Pre-eclampsia was responsible for 25% (2 cases) of the maternal deaths among all the cases of maternal collapse in our study.

Table 3: Distribution of the maternal collapse cases in relation to childbirth.

Time of collapse in relation to childbirth	No. of cases (%)
Ante-partum	4 (12.9)
Intra-partum	19 (61.3)
Post-partum	8 (25.8)
Total	31 (100)

Table 4: The causes of maternal collapse and the mortalities among them.

Causes of collapse	Number (%)	Mortalities (among the maternal collapse cases)
Uterine rupture	8 (18.6)	Nil
Placenta accreta spectrum	7 (16.2)	1
Incomplete abortion	4 (9.4)	Nil
Ruptured tubal ectopic	4 (9.4)	Nil
Suspected amniotic fluid embolism	4 (9.4)	1
Post-partum haemorrhage	3 (6.9)	1
Placental abruption	3 (6.9)	1
Eclampsia/severe pre-eclampsia/HELLP syndrome	3 (6.9)	2
Ruptured scar ectopic pregnancy	2 (4.7)	Nil
Septic shock	2 (4.7)	1
Spinal shock	1 (2.3)	Nil
Retained placenta	1 (2.3)	Nil
Hypoglycemic coma in the post-partum period	1 (2.3)	1
Total	43	8

There were 31 viable births; 28 (90.3%) were delivered alive, while the other 3 (9.7%) were stillborn. Two of the stillbirths were in uterine rupture, and the third one was seen in amniotic fluid embolism.

Table 5: Indications of caesarean section.

Indications of cesarean section	Numbers (%)
Placenta accreta	5 (31.25)
Uterine rupture	5 (31.25)
Amniotic fluid embolism	3 (18.75)
Eclampsia	1 (6.25)
Abruptio placentae	1 (6.25)
Cephalopelvic disproportion	1 (6.25)
Total	16 (100)

Cesarean section was the mode of delivery in 16 out of those 31 deliveries (51.6%). The indications for cesarean section are mentioned in table 5.

The most common intervention required was blood transfusion. Out of the 43 women, 29 women (67.4%) required blood transfusion. Maximum blood transfusion required was for a patient of abruptio placentae resulting to disseminated intravascular coagulation at term pregnancy, with the requirement of 21 blood units. The most common surgical procedure necessary was peri-partum hysterectomy, which was undertaken in 16 women (37.2%), out of which 7 (43.7%) each were from uterine rupture and placenta accreta. The other surgical procedures required were suction evacuation for incomplete abortion, salpingectomy for ruptured tubal ectopic pregnancy, repair of scar site rupture in scar ectopic pregnancy, manual removal of placenta in retained placenta.

DISCUSSION

The prevalence of maternal collapse was found to be 5.1 in 1000 childbirths in our study. It was comparable to the estimated incidence of 0.14 to 6 per 1000 births, as was given in a literature review by Long et al.[10]

In this study, uterine rupture was the most common cause of maternal collapse. Its prevalence was 0.1%, which is comparable with 0.43% as found in a study done at Fakhruddin Ali Ahmed Medical College, Barpeta, Assam by Sarma et al.[11] Perinatal mortality was as high as 92.30%, as compared to only 33.3% in our study (2 in 6 cases of uterine rupture with viable fetus).

The incidence of placenta accreta spectrum is on rise since the last few decades on a concerning level. 16.2% of the maternal collapse in our study was contributed by the same, and hysterectomy was necessary in all of the cases to save the life of the women. In a study done by Birendra et al to find out the maternal and neonatal outcome in placenta accreta spectrum in a tertiary care centre in Varanasi, India, it was found that 28 out of 32 cases of placenta accreta (87.5%) required hysterectomy.[12]

We also had encountered quite a good number (9.4%) of suspected amniotic fluid embolism in our study. The diagnosis was made based on the clinical presentation, after exclusion of all the possible causes. Although definitive diagnosis can be made only by identification of lanugo fetal hair, and fetal squamous cells (squames) in blood aspirated from the right ventricle, unfortunately, in our study, autopsy wasn't undertaken for the one maternal death arising from suspected amniotic fluid embolism.[13]

Maternal collapse carries a high risk of mortality. The current maternal mortality ratio in India is 97.[14] Not so many studies have been published in literature regarding maternal collapse.[15,16] Most of the cases of maternal collapse were reported in relation to the peri-partum period. But, it is not always related to the peri-partum events. So, the actual prevalence is not known since the prevalence of maternal collapse is made based only on the number of deliveries. There often are under-reporting of cases, and there is no proper statistical data available on regional or national basis, so comparison is difficult. Particularly in the peripheries, the health workers should be taught on the correct usage of MEOWS for early recognition of critically sick patients.

CONCLUSION

All the health providers should be trained in the basic as well as advanced life support skills. Anyone involved in the resuscitation of pregnant women should be aware of the physiological changes during pregnancy. The outcome of maternal collapse depends on the early identification, effective resuscitation and treatment of the underlying cause.

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