

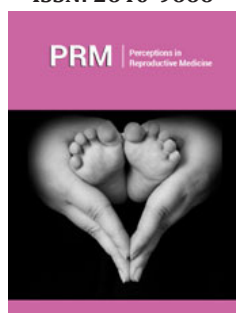
Maternal Collapse- A Catastrophic Event: Mini Review

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Abstract

Maternal collapse is a rare event and is life threatening if not managed timely. The maternal and neonatal outcome depends on the cause of collapse, the gestational age at the time of incident and the management received. Most common causes of collapse are vaso-vagal syncope or epilepsy and most common cause of maternal death is hemorrhage. The normal physiological changes in pregnancy predispose the pregnant mother to risk of collapse and difficulty in resuscitation. Sub-standard care is the predisposing factor responsible for maternal collapse in majority cases. This review is planned with the aim of providing in brief the causes of maternal collapse and its initial management.

Keywords: Maternal collapse; Cardiopulmonary resuscitation; Intensive care; Perimortem cesarean

Introduction

Maternal collapse is defined as an acute event involving the cardiorespiratory and or brain, resulting in reduced or absent consciousness while pregnant or within 6 weeks after delivery [1]. It is a rare event, which in the absence of effective resuscitation techniques can be life threatening to both the mother and the fetus. The main aim in the management of this dreadful condition is appropriate diagnosis and timely management taking into consideration the alterations required in the resuscitation process as per the physiological and physical changes in pregnancy.

Causes of maternal collapse

The causes are highlighted in Table 1. Most common causes of collapse are vasovagal syncope or epilepsy and most common cause of maternal death is hemorrhage [2].

Table 1: Causes of maternal collapse [2].

Pneumonic	Causes	
4 H's	Hypovolemia	Bleeding, dense spinal block, neurogenic or septic shock.
	Hypoxia	Peripartum cardiomyopathy, myocardial infarction, aortic root dissection.
	Hypo/hyperkalemia or metabolic disturbances	
	Hypothermia	
4 T's	Thromboembolism	Amniotic fluid embolism, pulmonary thromboembolism, air embolism.
	Toxicity	Magnesium sulphate, local anesthetic
	Tamponade	
	Tension pneumothorax	
Eclampsia and pre-eclampsia		

Physiological changes in pregnancy

Various physiological changes in pregnancy can have an impact on the effectiveness of resuscitation are as follows.

- a) Gravid uterus above 20 weeks leads to aortocaval compression causing supine hypotension [3].

- b) Increased CPR circulation demands due to increase in heart rate and cardiac output and decrease in venous return.
- c) Reduced oxygen carrying capacity due to increase in plasma volume and dilutional anemia.
- d) Increased risk of developing hypoxia due to increase in oxygen consumption.
- e) Decreased oxygen carrying capacity and more likelihood of developing acidosis due to increase in respiratory rate, decrease in residual capacity and arterial PCO₂.
- f) Difficult intubation due to laryngeal edema and large breasts [4].
- g) Increased risk of aspiration due to decreased gastric motility and relaxed lower esophageal sphincter. Aspiration pneumonitis that develops is known as Mendelsson's syndrome [5].

Risk factors that can predispose a pregnant or postpartum patient to the possibility of collapse are:

1. Maternal age more than 35 years.
2. Obesity.
3. Cardiovascular diseases.
4. Medical comorbidities like asthma, hematological disorders, autoimmune disorders, musculoskeletal disorders, infections, essential hypertension.
5. Cigarette smoking, substance abuse, alcoholism.
6. Lower socioeconomic status.

There has been development of maternity specific early warning charts, which helps in early detection of any deterioration. Modified early warning score charts (MEWS) incorporate the various vital parameters assessed are temperature, pulse rate, systolic blood pressure, respiratory rate, oxygen saturation, urine output and responsiveness to commands, which include AVPU i.e., alert, responsiveness to voice, responsiveness to pain stimuli or unresponsiveness or new CA i.e., confusion or agitation [6]. Actions of attending health care worker can be determined, depending on the score. Higher the score, earlier the need for intervention required by an expert. These charts may help identify the sick patients timely, but validation of such system does not exist.

Approach to a pregnant/postpartum patient presenting with collapse

Management of the patient presenting in a collapsed state should follow Resuscitation council UK guidelines as a protocol [7].

- a. Call for help.
- b. Inform senior obstetrician, anesthetist and critical care or cardiopulmonary resuscitation team. Inform neonatologist team if viable gestation as per hospital protocol.
- c. Ensure availability of crash trolley including availability of anti-epileptic drugs.
- d. Simultaneously, assess the patient and perform ABCDE.
- e. A left lateral tilt of 15 degrees on a firm surface or else manual displacement of gravid uterus when more than 20 weeks to relieve aortocaval compression.

The technique used for manual uterine displacement is "up, off and over" method. It is performed by placing a hand below the uterus on the maternal right and pushing the uterus upwards and to the left [8]. Tilt of the patient may hamper the resuscitation, so later technique is preferable.

- A. Airways-Ensure patency and clear the airways of any obstruction i.e., vomitus, blood, foreign body, loose teeth.
- B. Breathing-Check for spontaneous breathing by observing chest movement. Ambu bag and mask can be used to support breathing and oxygen is started at the rate of 15 liters/minute. Insertion of supraglottic airways should be undertaken till intubation can be achieved. Intubation with cuffed endotracheal tube may be required in absence of breathing. In absence of breathing, start CPR as per resuscitation council UK guidelines. Cardiac compression is done at the rate of 100-120 beats per minute. 2 breaths via ambu bag or mask or ventilator are given for every 30 compressions. Ideally, the person doing the compression should be changed every 2 minutes to avoid fatigue and effective resuscitation. After intubation has been achieved, the ventilation is done at the rate of 10 breaths per minute and chest compressions continued at the rate of 100-120 per minute.
- C. Circulation-Secure wide IV bore cannula and send blood for baseline investigations (blood group, cross match, complete blood count, coagulation profile, liver and kidney function tests, blood glucose and arterial blood gas analysis) and start fluid resuscitation as per the cause identified. One has to be careful in cases of pre-eclampsia and eclampsia.
- D. Defibrillation/Drugs- Heart rhythm is assessed during a brief pause between compressions. If it is ventricular fibrillation or pulseless ventricular tachycardia, defibrillation is started. Adhesive pads are preferred over paddles. Any monitors attached to the patient should be removed prior to shock delivery. If it is asystole or pulseless electrical activity, defibrillation is not recommended. Injection adrenaline 1mg I/V need to be given every 3-5min in this case. Documentation-I, would like to add documentation in the standard abbreviation of resuscitation process. All the events and management should be noted in patient's file and informed to the attendants. This has both significant clinical and medicolegal significance.
- E. Exposure/Environment-Correction of hypothermia if there. Etiology- I, would like to add an additional E in this standard algorithm, in an effort to identify the possible cause of collapse.

It will help the resuscitating team to start the directed treatment as per the cause.

In case of response to CPR, patient should be shifted to intensive care unit.

If there is no response to CPR, peri-mortem cesarean section should be performed within 5 minutes of the collapse at the same place where resuscitation is being performed [8].

CPR is continued until a decision is taken by a senior obstetrician and anesthetist in collaboration with cardiac arrest team.

Further treatment has to be channelized according to the cause identified.

Conclusion

All personal involved in management of cases of maternal collapse should be aware of the need for the adaptations required in the CPR of pregnant patients. Regular interactive training involving multi-disciplinary facilities will help in efficient management of such cases.

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