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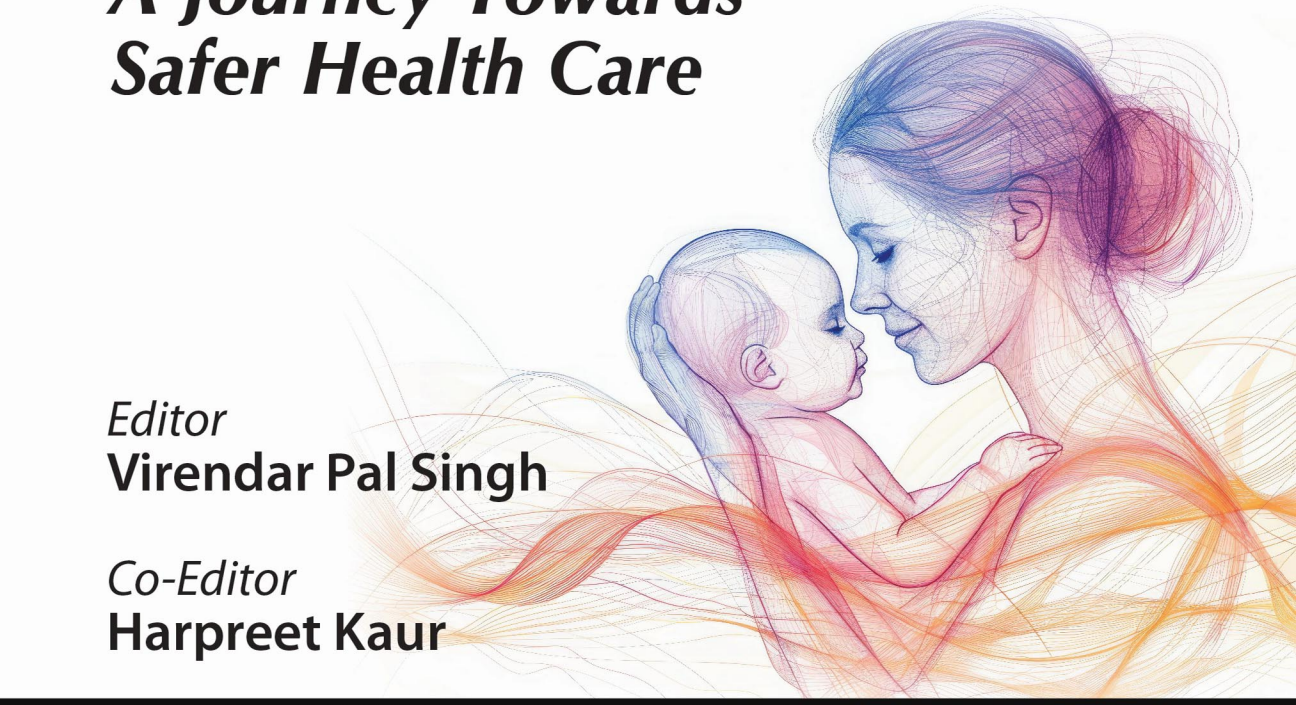
# *Medicolegal Update in*
# Obstetrics & Gynecology
## *A Journey Towards Safer Health Care*



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CHAPTER 20

# Medicolegal Aspects of Postpartum Collapse

*Panchampreet Kaur, Manpreet Kaur, Divyanee Gulati*

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## INTRODUCTION

Maternal collapse is a potentially fatal occurrence with a wide variety of etiologies affecting the cardio-respiratory and central neurological systems that results in a decreased or absent state of consciousness during pregnancy or up to 6 weeks postpartum. The result, which is critical for both mother and fetus, is contingent upon timely and successful resuscitation.[1] The maternal mortality rate (MMR) in India in 1990 was 556 per 1,00,000 live births, and the target of MDG (millennial development goal) was to reduce it to 139 per 1,00,000 live births by the year 2015. Maternal Mortality Ratio (MMR) of India for the period 2016-18, as per the latest report of the National Sample Registration System (SRS) data is 113 per 1,00,000 live births, declining by 17 points, from 130/ 1,00,000 live births in 2014-16. Despite a reduction, India remains one of the significant contributors to maternal deaths in the world.[2]

### Early Detection in the Key!

It is crucial to recognize a case of postpartum collapse as it plays a significant role in maternal morbidity and mortality. An obstetric early warning score chart (EWS) should be used consistently for all women to enable early detection of a woman who is getting dangerously sick.[3] Maternal collapse can occur without notice in certain situations, however pre-existing risk factors may make it more likely. Antenatal assessment and management of women, who are at risk of collapse, should involve collaboration with a multidisciplinary team and the establishment of a pregnancy and delivery management plan.

## ETIOLOGY

There are several etiological factors of the postpartum collapse, which may be pregnancy-related or develop from non-pregnancy related problems that may have existed prior to pregnancy. A systematic examination of reasons of the collapse in a hospital environment enables the trained rescuers to determine the cause and if reversible, improve the survival.[4]

### Causes of Postpartum Collapse

*4 H's*

- *Hypovolemic:* Bleeding may be revealed/ concealed (Obstetric/other reasons); or relative hypovolemic of dense spinal block; septic or neurogenic shock
- *Hypoxia:* Pregnant patients can become hypoxic more quickly
- *Hypo/hyperkalemia and other electrolyte disturbances*
- *Hypothermia*

*4 T's*

- *Thromboembolism*: Amniotic fluid embolus, pulmonary embolus, air embolus, and myocardial infarction

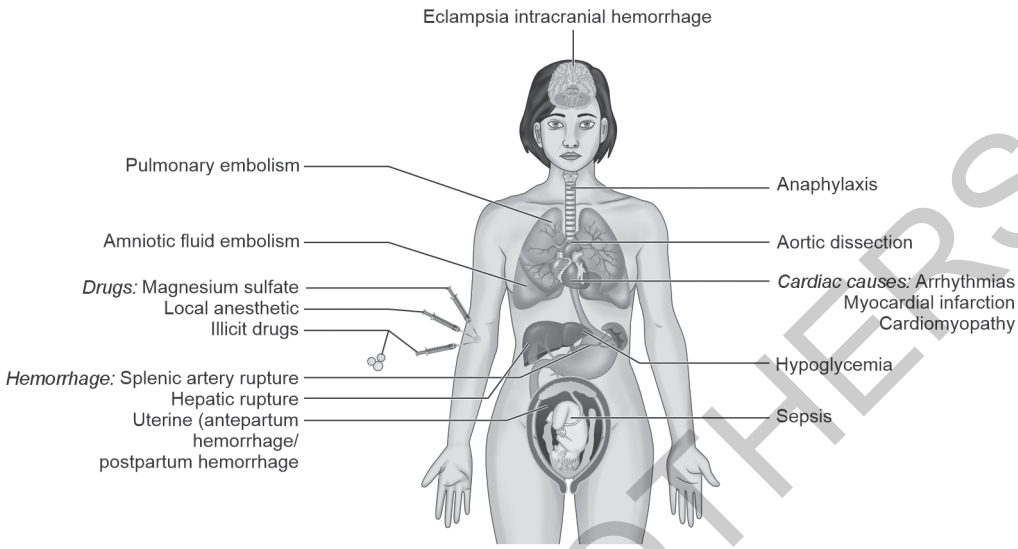


**Fig. 1:** The etiological factors of postpartum collapse.[1]

- Toxicity
- Tension pneumothorax
- Tamponade (cardiac)

*Cardiac Events:*

- Peripartum cardiomyopathy
- Myocardial infarction
- Aortic dissection
- Large-vessel aneurysms

*Others:* Eclampsia, pre-eclampsia, and anaphylaxis

- *Hemorrhage:* This is the most common cause of maternal collapse. The causes of major obstetric hemorrhage include postpartum hemorrhage, antepartum hemorrhage from placenta previa, placenta accreta spectrum, placental abruption, uterine rupture and ectopic pregnancy.
- *Hypoxia:* Hypoxia is common in pregnant females and may occur due to cardiac as well as respiratory factors. Common causes include peripartum cardiomyopathy, myocardial infarction, aortic dissection, and large-vessel aneurysms.
- *Electrolyte imbalance:* Hypokalemia and hyperkalemia can be seen due to several factors such as hyperemesis gravidarum, renal disorders, diabetic ketoacidosis, burns, and trauma resulting in postpartum collapse.
- *Hypothermia:* Commonly due to excessive cold exposure
- *Thromboembolism:* Pregnancy is associated with several physiological changes including hypercoagulability, increased venous stasis, and decreased venous outflow, which increases the risk of thromboembolism. Venous thromboembolism includes deep venous thrombosis (DVT) and pulmonary embolism. Half of these events occur during pregnancy while the other half is seen in the postpartum period[5] and it is an important cause of postpartum collapse.
- *Amniotic fluid embolism:* Amniotic fluid embolism manifests as collapse during labor or delivery or within 30 minutes of delivery, characterized by severe hypotension, respiratory distress, and

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hypoxia. Seizures and cardiac arrest are possible complications.

- *Cardiac disease:* Myocardial infarction, aortic dissection and cardiomyopathy are the three leading cardiac causes of mortality.[6] Primary cardiac arrest in pregnancy is extremely rare, occurring in around 1/30,000 maternities. The majority of cardiac events are preceded by signs and symptoms. These patients should be addressed by a multidisciplinary team that is adequately qualified and experienced. Additional cardiac reasons include coronary artery dissection, abrupt left ventricular failure, infectious endocarditis, and pulmonary edema.
- *Sepsis:* Sepsis is a leading cause of maternal morbidity and mortality. Inadequate treatment can be fatal.[6] Bacteremia, which can occur in the absence of pyrexia, or an elevated white cell count can rapidly progress to severe sepsis and septic shock, which can result in death. The most frequently implicated organisms in obstetrics are streptococcal groups A, B, and D, *Pneumococcus*, and *Escherichia coli*.
- *Drug toxicity/overdose:* Magnesium sulphate toxicity is prevalent in the context of renal impairment. Accidental administration of anesthetic drugs can also lead to disastrous consequences. Substance abuse or illegal drug consumption can also result in maternal morbidity and death.
- *Eclampsia:* Eclampsia, as a consequence of pre-eclampsia, is also a significant cause of maternal collapse.
- *Intracranial hemorrhage:* Intracranial hemorrhage is a common consequence of uncontrolled hypertension, particularly systolic hypertension. It can also occur as a result of burst aneurysms or arteriovenous malformations. Although maternal collapse is frequently the primary manifestation, severe headache frequently precedes this.
- *Anaphylaxis:* Anaphylaxis is a severe, potentially fatal systemic hypersensitivity reaction that manifests as respiratory, cutaneous, and circulatory abnormalities, as well as gastrointestinal disruption and collapse. There is substantial shift of intravascular volume, which might result in reduced cardiac output. Acute ventricular failure and myocardial ischemia are also possible complications. Occlusion of the upper airways due to angioedema, bronchospasm and mucus clogging of smaller airways all lead to severe hypoxia.

*Anaphylaxis is likely when all of the following three criteria are met:*

1. Sudden onset and rapid progression of symptoms.
2. Life-threatening airway and/or breathing and/or circulation problems.
3. Skin and/or mucosal changes (flushing, urticaria, angioedema).

## RISK FACTORS

Postpartum collapse is a catastrophic condition which can occur without any significant risk factor, but some of the predisposing factors are:[7]

*Predisposing factors:* Maternal malnutrition, anemia, hypertensive disorders, coagulation disorders, sepsis, prolonged labor, previous cesarean section, antepartum hemorrhage, and morbidly adherent placenta

*Pre-existing conditions:* Poor socioeconomic condition, chronic hypertension, diabetes mellitus, cardiac diseases, epilepsy, chronic liver disease, and chronic renal disease

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## MANAGEMENT

The woman who is critically ill and in shock requires special expert management due to various physiological changes that occur in pregnancy.

### Managing a Patient with Postpartum Collapse: Important Points

- Changes in lung function, diaphragmatic splinting and increased oxygen consumption make the pregnant woman become hypoxic more readily and make ventilation more difficult.
- Weight gain in pregnancy, large breasts inhibiting the working space and laryngeal edema can all contribute to make intubation more difficult.
- The pregnant woman is at a significantly higher risk of regurgitation and aspiration secondary to the progesterone effect relaxing the lower esophageal sphincter and delayed gastric emptying, along with the raised intra-abdominal pressure secondary to the gravid uterus.
- Gestational aortocaval compression significantly reduces venous return hence reducing the efficacy of CPR.
- A left lateral tilt of 15 on a firm surface relieves the aortocaval compression in the majority of pregnant women and allows effective chest compressions to be performed.

## MANAGEMENT OF SPECIFIC CONDITIONS

### Hemorrhage

The most common cause of maternal death in India is hemorrhage. Four main causes are *Tone, Tissue, Trauma, and Thrombin*. Early diagnosis and prompt management are the mainstay of the treatment. Hemorrhage is the most common cause of maternal collapse and a consequence of other causes of collapse. Awareness of the limitations of clinical signs must be kept in mind and caution must be exercised in the presence of severe pre-eclampsia and eclampsia, where fluid overload can contribute to poor outcome.

#### *HAEMOSTASIAS*

**Table 1** provides "HAEMOSTASIS" algorithm for management of massive postpartum hemorrhage.[8]

### Placenta Accreta Spectrum

Placenta accreta spectrum (PAS) or morbidly adherent placenta is a term that refers to a variety of diseases in which the placenta or a portion of it is adhered to the uterine wall. It is a leading cause of postpartum hemorrhage (PPH) and obstetric hysterectomy, which is linked with considerable morbidity and death.

**TABLE 1:** HAEMOSTASIS algorithm for management of massive postpartum hemorrhage.

| | |
|---|---|
| H | Ask for help |
| A | Asses vital parameters and blood loss |
| E | • Establish etiology (4Ts: Trauma, Tissue, Tone, and Thrombin)<br>• Ensure availability of blood |
| M | Massage uterus |
| O | Oxytocin infusion |
| S | • Specific surgical management<br>• Shift to OT (bimanual compression) |
| T | Tamponade (balloon and uterine packing) |
| A | Apply compression sutures |
| S | Systematic pelvic devascularization (uterine, ovarian, and internal iliac) |
| I | Intervention radiology—UAE |
| S | Subtotal and total abdominal hysterectomy |

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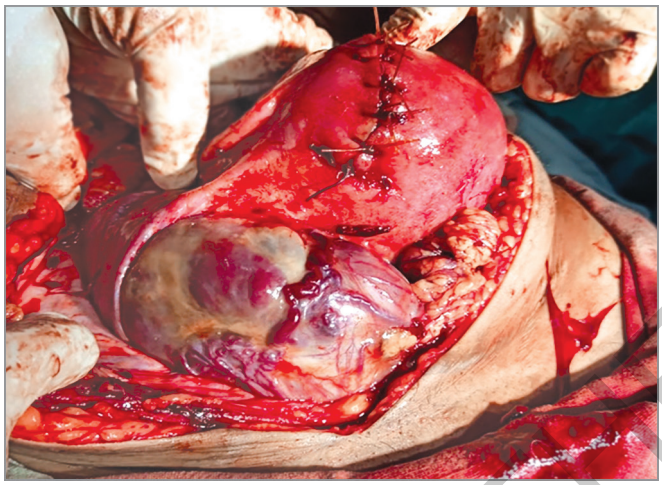
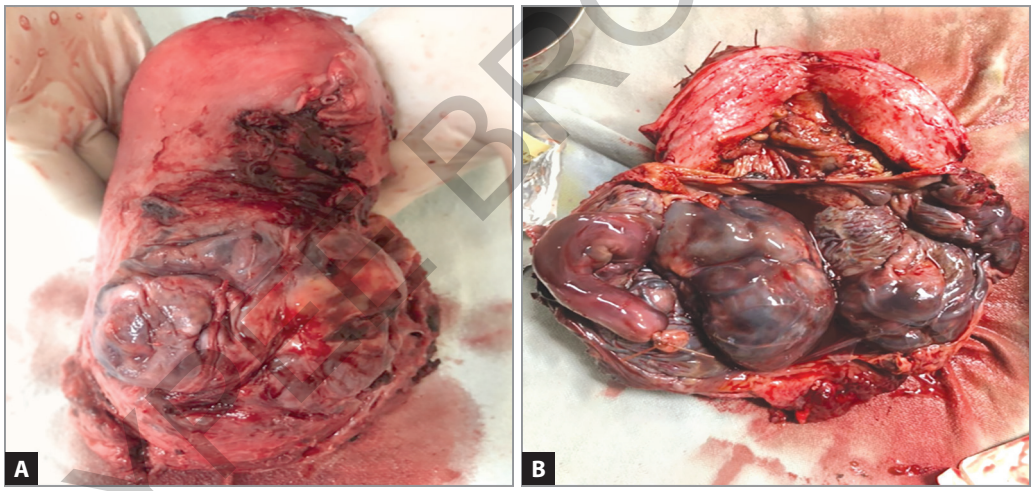


**Fig. 2:** Image showing placenta percreta. Placenta was occupying the hole in the lower uterine segment and was extending into leaves of broad ligament. Classical cesarean section was done, and placenta was left in situ (Image obtained by Authors during their clinical practice).




**Figs. 3A and B:** Image showing hysterectomy specimen which was done on later date with placenta in situ (Image obtained by authors during their clinical practice).

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Morbidly adherent placenta is mostly asymptomatic antenatally, and the diagnosis is only established by ultrasound during antenatal period or after unsuccessful attempts to remove the placenta at delivery. Postpartum hemorrhage is the most common complication, which further results in postpartum collapse.

## *Management*[9]

- Management of a woman with a morbidly adherent placenta/PAS should be multidisciplinary, with surgery conducted ideally electively under controlled settings.
- *Surgical management includes* Triple P procedure—upper border of placenta is

delineated preoperatively and delivery of fetus by transverse incision above the placental border, pelvic devascularization; and placental non-separation with myometrium excision and reconstruction of uterine wall.
- *Definitive treatment:* Peripartum hysterectomy

## Acute Uterine Inversion

Acute uterine inversion is a rare, but life-threatening complication of third stage of labor with an estimated incidence of 1:2,000–1:50,000 deliveries.

### *Types*

- *Incomplete:* Fundus of uterus inverted, but not descended through the cervix.
- *Complete:* Fundus of uterus inverted and lying in the vagina or outside introitus.

### *Risk Factors*

- Fundal placental implantation
- Uterine atony
- Cord traction applied before placental separation
- Abnormally adhered placentation such as the accreta spectrum
- Connective tissue disorder
- Abnormally Short Cord

### *Clinical Features*

1. Large boggy mass appearing at introitus
2. Shock is out of proportion to blood loss, mostly neurogenic
3. Hypogastric pain

### *Management*

- Immediate recognition of uterine inversion improves the chances of a quick resolution and good outcome.
- Once any degree of uterine inversion is recognized, several steps must be taken urgently and simultaneous resuscitation of patient must be done.
- Immediately call for help including obstetrical and anesthesia team.
- Blood (MTP) is arranged
- Large-bore intravenous infusion systems are secured to begin rapid crystalloid infusion to treat hypovolemia while awaiting arrival of blood products.
- If the recently inverted uterus has not contracted and retracted completely and if the placenta has already separated, then the uterus may often be replaced simply by pushing up on the inverted fundus with the palm of the hand and fingers in the direction of the long axis of the vagina.
- If the placenta is still attached, then attempts are made to reposition the uterus with the placenta in situ with steady pressure with the fist, palm, or fingers applied to the inverted fundus in an attempt to push it up into and through the dilated cervix.
- Once the uterus is restored to its normal configuration, oxytocin is infused.
- *O'Sullivan's technique:* Hydrostatic replacement by infusing 3–5 L of fluid into the upper vagina (only after ensuring there are no vaginal or cervical lacerations), seal the introitus by hand or vacuum cup to achieve desired result.

### *Surgical Intervention*

a. *Huntington's operation:* Stretch the cervical ring, gradually pull the myometrium just inside the uterine dimple and revert the inversion.
b. Hysterectomy is the last resort in management of recurrent inversion.
c. Uterotonics are to be continued for at least 8 hours.
d. Broad-spectrum antibiotics should be given.

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## Sepsis

Puerperal sepsis refers to the infection of the genital tract occurring at any time between the rupture of membranes or labor and the 42nd day postpartum, of which two or more of the following are present.[10]

- Pelvic pain
- Fever 38.5°C or more
- Abnormal vaginal discharge
- Delay in reduction of size of uterus (<2 cm a day during the first 8 days).

### *Definitions Related to Sepsis*

*Systemic inflammatory response syndrome (SIRS):* SIRS with a suspected source of infection is termed sepsis. Sepsis with one or more end organ failure is called severe sepsis, and with hemodynamic instability despite intravascular volume replacement is called septic shock. SIRS is defined by presence of any two of these five criteria:

1. Temperature >38° C (100.4°F) or <36°C (96.8°F)
2. Heart rate >90 beats/min
3. Respiratory rate >20 breaths/min or
4. $PaCO_2$ <32 mm Hg
5. WBC count >12,000/cumm or <4,000/cumm.

*Sequential organ failure assessment (SOFA):* SOFA is used to assess the severity of organ system damage. SOFA has a better predictive validity for sepsis than SIRS criteria with better prognostic accuracy and ability to predict in-hospital mortality.

*Septic shock:* Sepsis with hypotension (SBP <90 mm Hg or 40 mm Hg <patient's normal BP) for at least 1 hour after adequate fluid replacement or need for vasopressors to maintain SBP >90 mm Hg or MAP >70 mm Hg. To reduce the complexity of calculating the SOFA, qSOFA was introduced which includes:

- Abnormal mental status
- RR>22 and
- SBP <100

If qSOFA score >2, then SOFA score to be calculated.

## Eclampsia

Eclampsia is a type of hypertensive disorder of pregnancy associated with convulsions, often followed by coma, and posing a threat to the life of mother and the baby. It is associated with sudden onset of seizures. Eclampsia is preceded by preeclampsia.[11]

Apart from resuscitative measures, the mainstay of treatment of eclampsia is delivery. Magnesium sulphate is administered as an anti-convulsant as per Pritchard's regimen, 4 g in a 20% solution given IV over 5 minutes and 10 g in a 50% solution intramuscular 5 g. In each buttock to a total of 14 g as a loading dose, followed by 5 g repeated every 4 hours in alternate buttocks, till 24 hours of delivery or till the signs of magnesium toxicity appear. IV labetalol, hydralazine or nifedipine can be used as anti-hypertensive.[11]

## Amniotic Fluid Embolism

The incidence of AFE is 2–3/1,00,000 deliveries. Amniotic fluid embolism (AFE) is a rare and typically catastrophic condition that occurs when amniotic fluid enters maternal circulation. The pathogenesis of AFE is not clear. It is hypothesized that entry of amniotic fluid (which contains fetal cells and other antigenic material) into the maternal systemic circulation via a breach in maternal/fetal interface leads to abnormal activation of humoral and immunological processes and release of vasoactive, and procoagulant substances, similar to the systemic inflammatory response syndrome.[12]

*Clinical features:* Sudden collapse due to profound hypotension, hypoxemia, DIC.

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*Factors that may be associated with AFE:* Advanced maternal age, multiparty, meconium-stained liquor, obstructed labor, intrauterine fetal death, polyhydramnios, uterine rupture, placenta accreta

*Investigations:* Coagulation profile, ECG, ABG (arterial blood gases), Chest X-ray

*Treatment:*

- Multidisciplinary, team-based approach involving maternal-fetal medicine, anesthesia, critical care, respiratory, and nursing is desirable to increase the chances of stabilization and avoid further deterioration[11]
- CPR is to be performed.
- Management is supportive and symptomatic.
- Maintain oxygen saturation
- Provide hemodynamic support
- Control hemorrhage
- Correction of coagulability
- Termination of pregnancy after the initial management.

## RESUSCITATION IN POSTPARTUM COLLAPSE[1]

Multidisciplinary team, including senior obstetrician and senior obstetric anesthetist/intensivist, should manage women with postpartum collapse.

- *Airway:* The airway should be protected as soon as possible by intubation with a cuffed endotracheal tube.
- *Breathing:* Supplemental oxygen should be administered as soon as possible. High flow oxygenation should be given.
- *Circulation:* Chest compression should be started immediately. Compressions should be performed at a ratio of 30:2 ventilations unless the woman is intubated, in which case chest compressions and ventilations should be desynchronized, with compressions being performed at a rate of 100/minute and ventilations at a rate of 10/minute.
- Urgent abdominal ultrasonography is required to rule out concealed hemorrhage.
- *Defibrillator:* Same energy level is used as in non-pregnant women.
- No alteration in algorithm of drugs or their doses.
- Identify the cause and manage accordingly.

## MEDICOLEGAL IMPLICATIONS

Obstetrics is a very litigious specialty. Patients and their families are frequently involved in legal processes related with professional and emotional stress, and because pregnancy is viewed as a natural event, any unexpected consequence is deemed to be the result of medical malpractice.[13] The majority of the time, it is connected with a breakdown in communication, both vertically (between patient and doctor) and horizontally (between various medical departments).

## CASE STUDIES

*(As per the Author's Personal Experience during Clinical Practice)*

### Case 1

*The dangerous placenta:* Placenta accreta percreta in a woman with history of previous cesarean sections has become a common presentation in today's practice and the outcome is varied. We had many such cases in recent past. A well-documented consent prior to the operative procedure is mandatory so as to avoid medicolegal implications.

An unbooked woman with previous three cesareans was admitted in the labor ward emergency at 35 weeks pregnancy with APH. After all the investigations and USG, she was

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diagnosed to be a case of placenta accreta spectrum (PAS). An elective cesarean was planned, and a classical cesarean was done so as to avoid torrential hemorrhage from the placental site and the placenta was left in situ to be removed at a later date after the vascularity decreases and blood loss minimized. At a later date, she was again taken up for surgery and total abdominal hysterectomy was done. The patient was fine and was discharged in due course of time in a healthy condition.

## Case 2

Another such emergency arose when a similar patient was taken up because of almost the same episode. She was G7P4L1A2; POG 34 weeks 1 day with gestational hypertension and placenta previa along with placental accreta with history of previous 1 LSCS, with Hb 7 gm%.

She was referred from a district hospital. The patient underwent cesarean section. Intraoperatively, there was placenta percreta; as there was no active bleeding from placental site so placenta was left in situ. But the patient had sudden about of postpartum hemorrhage on third postoperative day and emergency exploratory laparotomy and interval hysterectomy was done. She had cardiac arrest on the operation table. All resuscitative measures were taken but the patient could not be revived and she succumbed to the loss.

These two women both had placenta accreta spectrum (PAS). The management was individualized. *Case 1* was multigravida with the previous three cesareans and she tolerated both the surgeries well and without any untoward incident. However, *Case 2* was anemic grand multipara with previous one cesarean but with comorbidities. She bled in the postoperative period and though immediately taken up for intervention, could not tolerate the loss and succumbed to the condition.

## Case 3

An unbooked, 35-year-old women *G3P2L2*, 36 weeks of gestation, with previous two cesareans came with APH, and was diagnosed as a case of accidental hemorrhage. On the table, her ECG recording was showing marked tachycardia. Risk associated with surgery and her condition was documented and explained to the relatives in their own language and a written informed consent was taken. Without losing more time, she was immediately taken up for surgery under general anesthesia, in view of the concealed hemorrhage. The uterus was Couvelaire. A dead baby was extracted, and there were marked retroplacental clots which were removed. CG Balloon was kept as a preventive measure for postpartum hemorrhage and stepwise devascularization was also done by ligating both uterine and ovarian vessels. On reversal, she had ventricular fibrillation for which DC shock was given and thereafter she was shifted to ICU. Massive transfusion protocol (MTP) was also done. On third day, she had cardiac arrest but was revived. And the conservative management continued. But in spite of best measures next day again, she had cardiac arrest, and she died.

She was an unbooked case, belonged to lower middle socioeconomic group. She had reached hospital late, after being first managed at a private setup but left to take second opinion.

## Case 4

A woman G3P2L2, later after her demise the true formula revealed was G9P7A1 was admitted in the labor ward with multiple pregnancy in advanced labor. Immediate relevant and very necessary investigations

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were done, as there was no record of any antenatal check-up with her. And she delivered two stillborn babies. She had a bout of bleeding PV and succumbed to the loss. Herein, the concern was, grand multi, multiple pregnancy with no antenatal check-ups succumbed because could not tolerate even a small amount of blood loss. The hiding of proper history was also a concern.

### Case 5

A 22-year-old was referred from a Civil Hospital as primi gravida with 27 weeks 4 days period of gestation (POG) with pregnancy-induced hypertension (PIH) and anasarca ?allergic reaction. She was admitted and was diagnosed as severely anemic. Her USG showed F/S/O FGR with high-resistance flow in umbilical artery. The patient had sudden rise in BP with sudden fall in $O_2$ saturation associated with bilateral chest crepitations. She was shifted to ICU where she developed cardiac arrhythmias. All resuscitative measures were taken but the patient could not be revived and declared dead on the same day.

### Case 6

A 36-year-old patient P6 L5 D1 was referred to our institute from district level Civil Hospital, where she had delivered a stillborn male baby. At the time of admission, the general condition of the patient was very sick, and she was already intubated. The patient was admitted in ICU. ECHO was done in view of persistent hypertension which revealed grade 3 diastolic dysfunction and ejection fraction 30% indicating peripartum cardiomyopathy. The patient also had AKI for which dialysis was scheduled but was not possible due to very sick general condition of the patient. The patient had sudden cardiac arrest and could not be revived.

As we see today, the scenario has changed dramatically over the decades. The litigations are increasing constantly and steadily and unluckily gynecologists are the ones to rank first in these. In spite of being very particular, the scenario can change anytime, and the labor which was going smoothly may end in a catastrophe. So reasonable care along with proper documentation is a must in every case.

Antenatal/labor ward protocols should be followed with adequate supervision and monitoring of each patient. Communication, counseling and consent is a must along with documentation and record keeping.

We must foresee and anticipate the worst, with prompt diagnosis and necessary investigations. Postoperative care by operating surgeon, especially when he has operated on someone else's set-up is a must. And must always engage a qualified anesthesiologist.

Every minute a woman is dying not because of some no preventable causes but of some preventable too. A regular monthly audit of cases should be done for a better future.

Early recognition, prompt investigation and treatment are the key to prevent many obstetrical catastrophes. Multifaceted team-based strategies such as use of checklists, bundles, early warning systems and simulation trainings need to be designed and followed to decrease medical errors and improve the maternal outcomes, not just by the providers but largely by everyone.

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# *Medicolegal Update in* Obstetrics & Gynecology

## *A Journey Towards Safer Health Care*

This book is a "*Ready Reckoner*" to safely deal with the medicolegal issues related to the day-to-day practice in obstetrics and gynecology. It shall empower a busy clinician to medicolegal knowledge available at the tips for quick and safe remedy to medicolegal problems.

### *Salient Features*

- This book presents essential and updated information on various medicolegal aspects involved in day-to-day clinical practice in the field of obstetrics and gynecology
- Most of the pertinent medicolegal issues have been elaborated in the book. The book has presented "practice management strategies" for safe clinical practice
- The book is multi-authored, and the chapters on various medicolegal issues are written by specialists who are well experienced in clinical as well as medicolegal domain. The book comprises 26 chapters divided into 8 sections.
- Simple and interesting presentation of complicated medicolegal matters
- Problem-solving approach to the medicolegal problems for obstetricians and gynecologists
- Medicolegal tips are provided for effective handling of medicolegal conflicts
- References have been included with all the chapters.

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He is a strong Promoter of healthcare quality, patient safety, and medicolegal awareness amongst the medical fraternity. He has been working in the medicolegal domain for over 25 years now. He has deep-rooted understanding of medical laws and ability to provide an effective solution to the medicolegal conflicts.

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