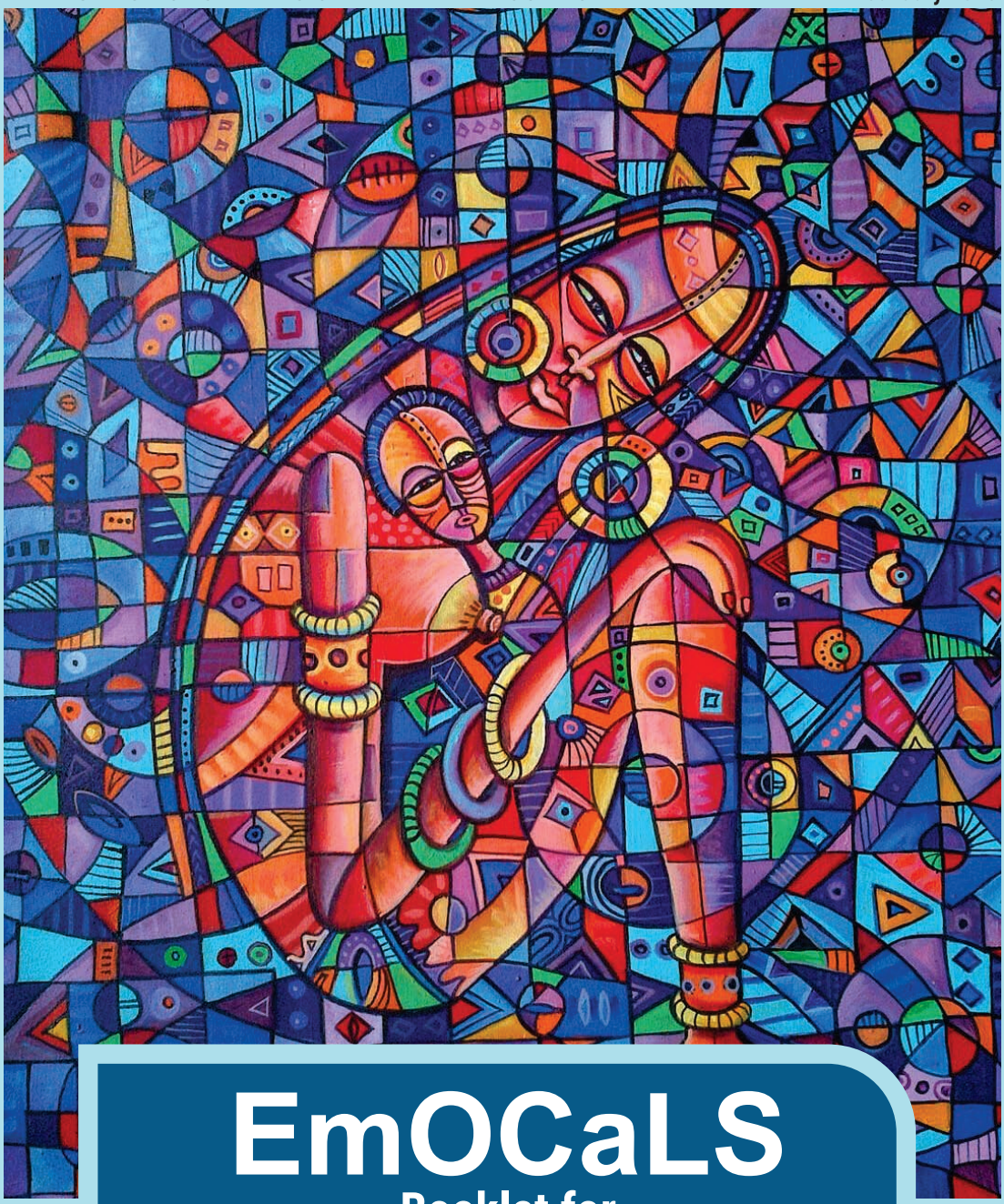
EmOCaLS

KFOG

EMERGENCY OBSTETRIC CARE AND LIFE SUPPORT

January 2023



EmOCaLS

Booklet for

Urgent Obstetric Care

A venture of

EmOCaLS committee, KFOG

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FOREWORD

The management of urgent obstetric care has now become an ever-evolving process due to the significant advances in recent years. To keep ourselves updated and keeping in mind an obstetricians time constraints, these short, miniature articles have been designed. This being an initiative of Kerala Federation of Obstetrics and Gynaecology under the Emergency Obstetric Care and Basic Life Support committee, this task has been taken up by none other than Dr Neetha George , known for her sincerity and commitment in all her responsibilities. This being the first of its kind I wish this booklet all the very best and a long life to come.

Dr Sareena Gilvaz
KFOG President

MESSAGE FROM THE **EDITOR**

Dear Senior colleagues and friends,
This small EMOCALS booklet is a small humble venture to keep ourselves abreast with the recent obstetric and intensive care .We know that when any sudden obstetric mishap occur in the labour room , we have hardly any time to call the intensivist or anaesthetist for resuscitation. From basic small procedures to the latest innovations to decrease maternal morbidity, it would be prudent for us to know the updates and to incorporate that knowledge into practice. I thank every single author who heeded to my last minute call for the booklet matter amidst their busy schedule. I also thank Dr Gopika Rajan, consultant at JMMC, Thrissur to have helped me in the editing process.

Dr Neetha George
EMOCALS Chairperson, KFOG
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PPMD
PREVENT THE PREVENTABLE MATERNAL DEATHS

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Confidential Review of Maternal Deaths (CRMD) committee members observed that many preventable maternal deaths are still happening in our state. We were concerned that this was happening in spite of many training sessions and workshops organized by the Kerala Federation of Obstetrics and Gynecology (KFOG) A critical look at the reasons for this failure revealed that even the two days training programme of Life saving skills (EMOCALS _D and EMOCALS _N) is not reaching the labour room staff (doctors and nurses) in the majority of the delivery points scattered all over the state. There are nearly five hundred delivery points, counting the centres under the Government and the private sector. We thought that a one day programme conducted in the outlying small delivery centres focusing only on the important life saving steps will attract more staff in such centres. The trainers have to go to the periphery rather than the trainees coming to the head quarters.This is the background to the launch of the Prevent the Preventable Maternal Deaths (PPMD) project of KFOG.

Almost at the same time when KFOG was thinking of PPMD, the WHO (World Health Organization) also came out with the drive to eliminate all preventable maternal deaths by 2025. It was pointed out that otherwise we will not achieve the sustainable development goals by 2030.

We realized that hemorrhage still remains the leading cause of maternal mortality in the developing world. We also noticed that at present there is a golden opportunity to address the problem because of two new inventions in the management of PPH. The first was the suction cannula promoted by Dr. Samartha Ram to achieve vacuum assisted uterine contraction to stop bleeding from an atonic uterus. The second innovation was the Trans Vaginal Uterine Artery Clamp (TVUAC) by Dr. V P Paily. The TVUAC clamps and retractors can be of particular use in cases of lower segment PPH which is on the increase after prostaglandins became popular for labour induction.

The recommendation is to consider the use of the cannula and clamps as soon as excess bleeding is noticed after Active Management of Third Stage of Labour (AMTSL). These two steps can be used as complementary and the author's hospital could avoid the need for invasive surgical procedures like laparotomy and brace stitches, uterine artery ligation for PPH management in the last five years. The cannula and clamps have to be made available in all delivery points and all staff, doctors and nurses, have to be trained in its use.

The other causes of maternal deaths like heart disease, hypertension and amniotic fluid embolism also will be addressed during the PPMD workshops.

KFOG is convinced that this is the practical and most cost effective way to prevent the preventable maternal deaths in our state. It has taken the lead to train sufficient number of trainers (nearly 180) to go to the peripheral centres in all the districts of Kerala. But without the government's active involvement and commitment the programme cannot go forward. Unfortunately, we have not seen the required initiative from the government side.

V P Paily
State Coordinator, CRMD,Kerala.
3rd Feb.2023.

CEREBRAL VENOUS THROMBOSIS (CVT)

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Cerebral Venous Thrombosis is seen as thrombus affecting the cerebral venous sinuses commonly involving superior sagittal sinus and through the transverse, seen in 1 in 10,000 pregnancies.

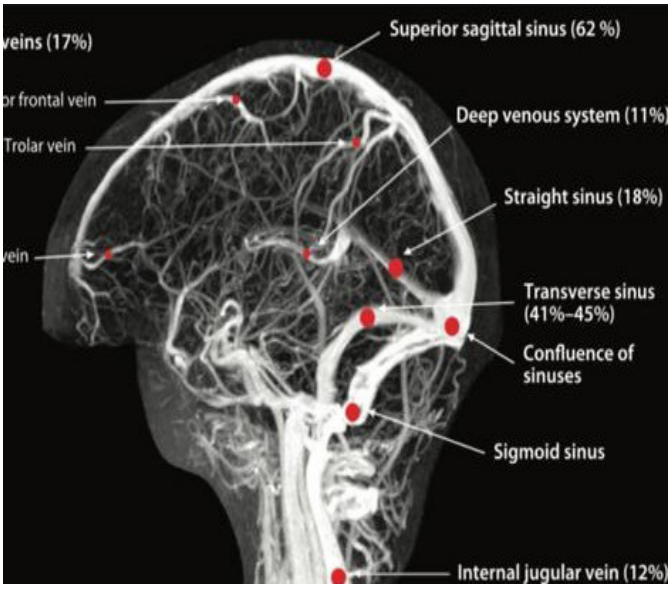


Fig 1 showing commonly affected sinuses in CVT

The underlying cause stems from transient triggers for example: pregnancy, puerperium (normally in its second and third week) , hormonal use as in oral contraceptives and infections . The outcomes after a CVT is generally quite favourable where promptly diagnosed and treated with a low risk of recurrence in a subsequent pregnancy if no underlying cause is detected.

Clinical presentation

- Headache 90%
  Headache is the most common symptom , seen in almost all patients with CVT. This headache is often constant and worse on lying and relieved on standing unlike a post spinal or epidural headache.
- Seizures 40%
- Focal deficits 20% (eg : hemiparesis, aphasia)
  CVT may be complicated by a venous infarctions with or without bleeding which often lead to a focal neurological deficit and seizures.
- Papilledema may be also be there in some cases.
  Even with the above symptoms , the outcome is

good. But when the patient goes into reccurrent seizures, coma or rapidly deteriorating neurological function it denotes involvement of the deep venous system and a bad prognosis.

Diagnosis and Management

Timely diagnosis of CVT requires a high index of suspicion because of its myriad presentations.

- MRI and MR Venogram is the preferred brain imaging by both the American Heart Association and European Federation of Neurologists. IV contrast is not needed to make the diagnosis.
- A CT or CT venogram is an acceptable alternative when MRI is not available. During late pregnancy the initial evaluation can begin with a CT without contrast.

The classic CT or MRI signs of CVT are as follows :

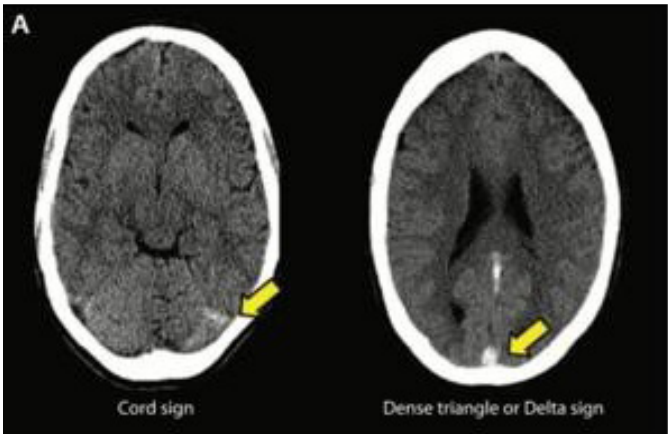


Fig 2 plain CT showing cord sign and delta sign. On the left is a thrombosed cortical vein or sinus seen in a non-contrast CT. On the right is the delta sign which represents the thrombosis of the posterior portion of the superior sagittal sinus, again seen on a non-contrast CT.

•D- dimer , a product of fibrin degradation has been studied in CVT . Those with an acute and extensive CVT shows a raised d- dimer > 500 mcg / L. However a low d-dimer does not rule out a CVT as it declines with time . Therefore your clinical suspicion should draw you more for further evaluation.

Management

•A cochrane review performed a meta-analysis, It showed that the initial anticoagulant treatment was the mainstay of treatment in reducing both the mortality and morbidity of the patient and the

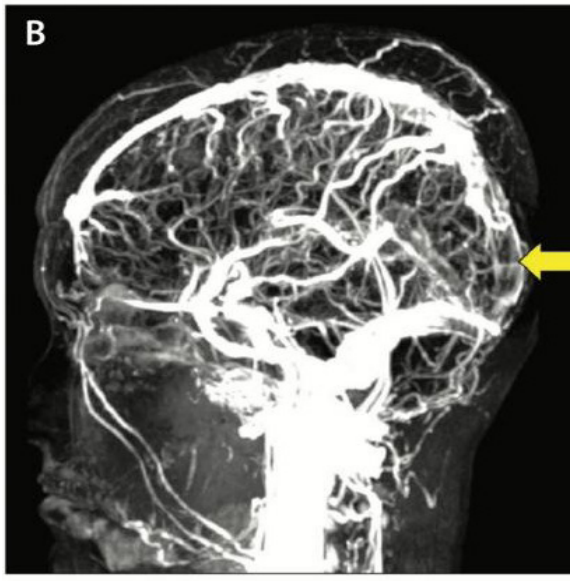


Fig 3 MR venogram and delta sign
This sign disappears as a contrast CT which on venogram is then called empty delta sign

preferred anticoagulant is low molecular weight heparin (LMWH). This can be followed up later with warfarin which is typically given for 3 -6 months postpartum targetting an INR 2-3.

•Seizures whether single or multiple can be treated with antiepileptic drugs (AED) though it cannot be given for prophylaxis that is in the absence of seizures. The duration of AED is also based on the discretion of the treating doctor.

•There is only limited evidence for an endovascular therapy- thrombolysis or mechanical thrombectomy which are alternatives to improve recanalisation.

•Decompression hemi-craniectomy is done only on those with progressive neurological deterioration inspite of intense medical management.

•Intra- cranial hypertension seen in 15-40% of cases can be treated with diuretics and in extreme cases which are refractory to treatment will require a lumboperitoneal shunt.

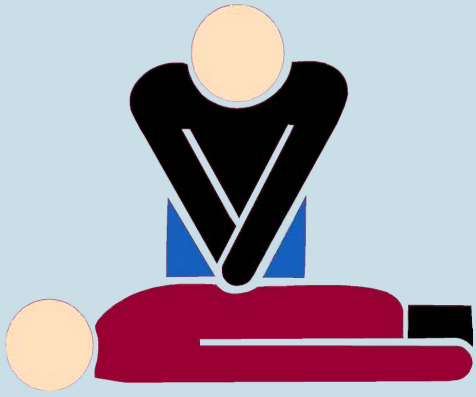
•Check for thrombophilias only to decide on duration of treatment and to assess the risk of recurrence.

Prognosis

Outcome after a CVT is generally favourable. Some have reported other issues of pre -eclampsia and ischaemic stroke. This happens only in those that have not been anti-coagulated.

MATERNAL COLLAPSE IN LABOR ROOM

Latest guidelines on
cardiac arrest resuscitation



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The primary role of an obstetric anesthesiologist in the labour unit is to provide analgesia and anaesthesia to women in labour and to those requiring caesarean section. Anesthesiologists are also essential members of a multidisciplinary team crucial for successful management of various obstetric emergencies.

Obstetric emergencies pose unique challenges. The patient is typically young, healthy. This along with the physiological changes of pregnancy means they usually compensate well initially for pathological insults, masking the early signs of trouble, delaying detection. The result being decompensation when it occurs, happens rapidly. These life-threatening situations are also fortunately rare, the downside of this being that even experienced clinicians may only have limited experience. This is the rationale for the recommendation of regular resuscitation drills. Finally, the geographically remote, unfamiliar environs of the labour room can hamper response.

Maternal collapse is defined as "an acute event involving the cardiorespiratory systems and/or brain resulting in a reduced or absent conscious level and potentially death at any stage of pregnancy and up to 6 weeks post-delivery".

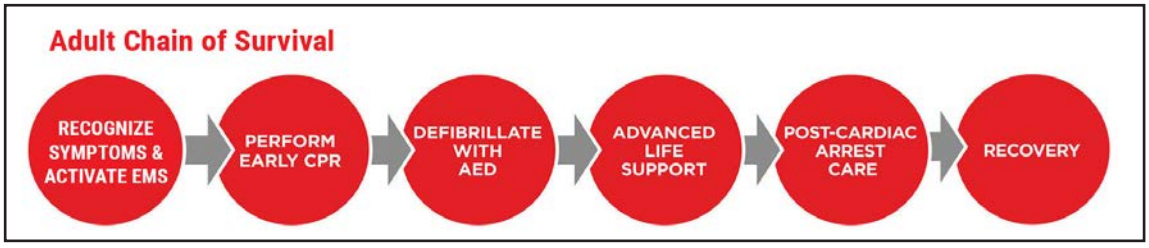
Obstetric emergencies may be broadly classified according to etiology as anaesthetic, obstetric or those following medical comorbidities. Anaesthetic causes range from failed intubation, high spinal, local anaesthetic toxicity, anaphylaxis and drug errors. Obstetric causes include category 1 caesarean section, hemorrhage, thromboembolism, sepsis, ecclampsia, uterine rupture. Medical emergencies maybe consequent to hypoglycemia, cardiac disease, arrhythmia, stroke, myocardial ischemia. Irrespective of the cause of our first priority in a maternal collapse is to rule out an arrest.

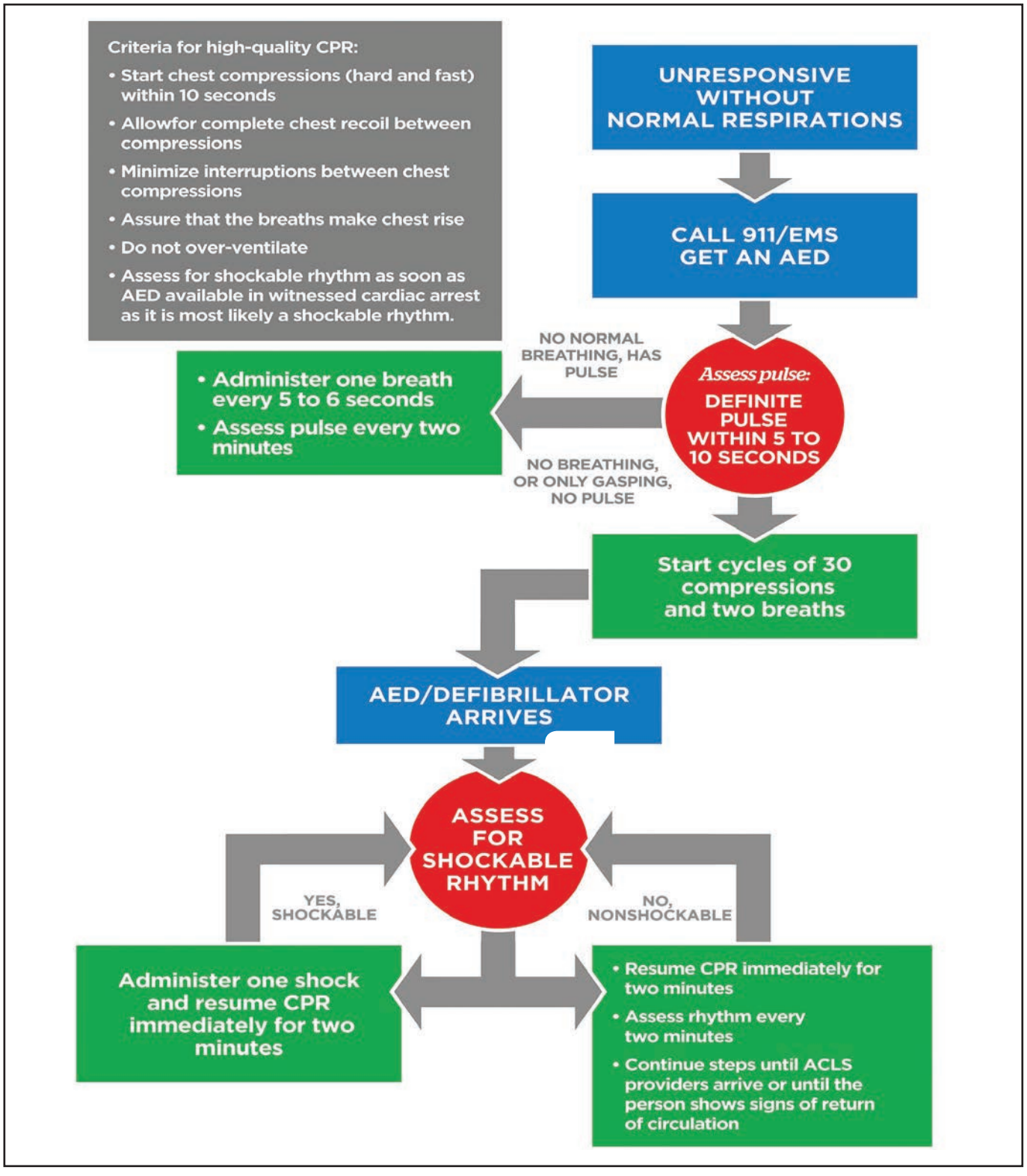
According to the clinical presentation the mother maybe in an impending arrest or an established cardiac arrest.

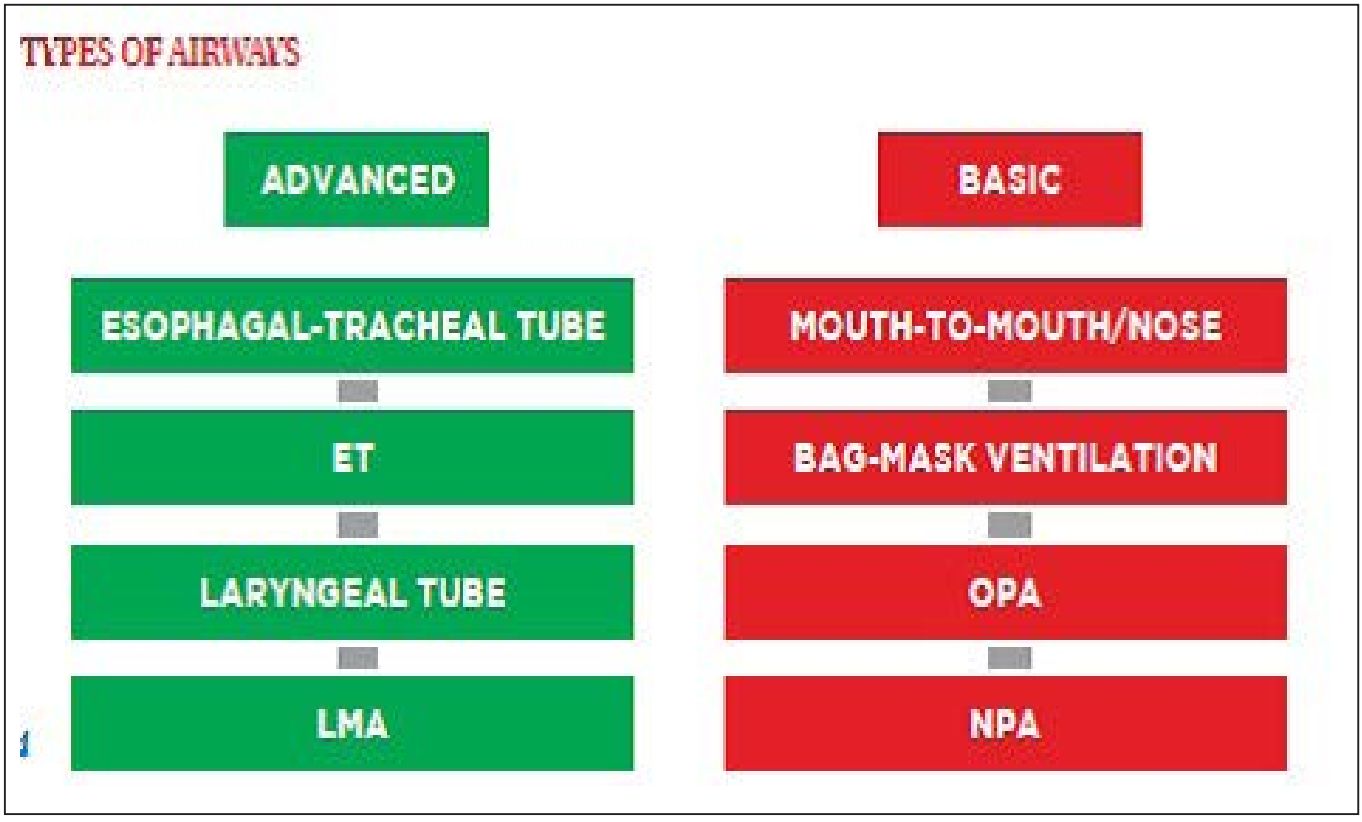
Maternal Cardiac Arrest

As in any adult found to be in cardiac arrest, the mother will be unresponsive, without a pulse, and will not be breathing. While treating a patient in cardiac arrest, little to no blood testing or imaging is necessary. If one can obtain point-of-care testing, a potassium and glucose level may be beneficial. Point-of-care ultrasound to look for cardiac activity may also be beneficial if it does not interfere with resuscitation efforts.

Identification of a cardiac arrest victim includes assuring a patient is unresponsive, without central pulses and not breathing normally and spontaneously. Once a victim is identified, immediate CPR and activation of the emergency response system should be of priority.


Adult Chain of Survival
RECOGNIZE SYMPTOMS & ACTIVATE EMS
PERFORM EARLY CPR
DEFIBRILLATE WITH AED
ADVANCED LIFE SUPPORT
POST-CARDIAC ARREST CARE
RECOVERY


Criteria for high-quality CPR:
• Start chest compressions (hard and fast) within 10 seconds
• Allowfor complete chest recoil between compressions
• Minimize interruptions between chest compressions
• Assure that the breaths make chest rise
• Do not over-ventilate
• Assess for shockable rhythm as soon as AED available in witnessed cardiac arrest as it is most likely a shockable rhythm.
UNRESPONSIVE WITHOUT NORMAL RESPIRATIONS
CALL 911/EMS GET AN AED
Assess pulse:
DEFINITE PULSE WITHIN 5 TO 10 SECONDS
NO NORMAL BREATHING, HAS PULSE
• Administer one breath every 5 to 6 seconds
• Assess pulse every two minutes
NO BREATHING, OR ONLY GASPING, NO PULSE
Start cycles of 30 compressions and two breaths
AED/DEFIBRILLATOR ARRIVES
ASSESS FOR SHOCKABLE RHYTHM
YES, SHOCKABLE
NO, NONSHOCKABLE
Administer one shock and resume CPR immediately for two minutes
• Resume CPR immediately for two minutes
• Assess rhythm every two minutes
• Continue steps until ACLS providers arrive or until the person shows signs of return of circulation

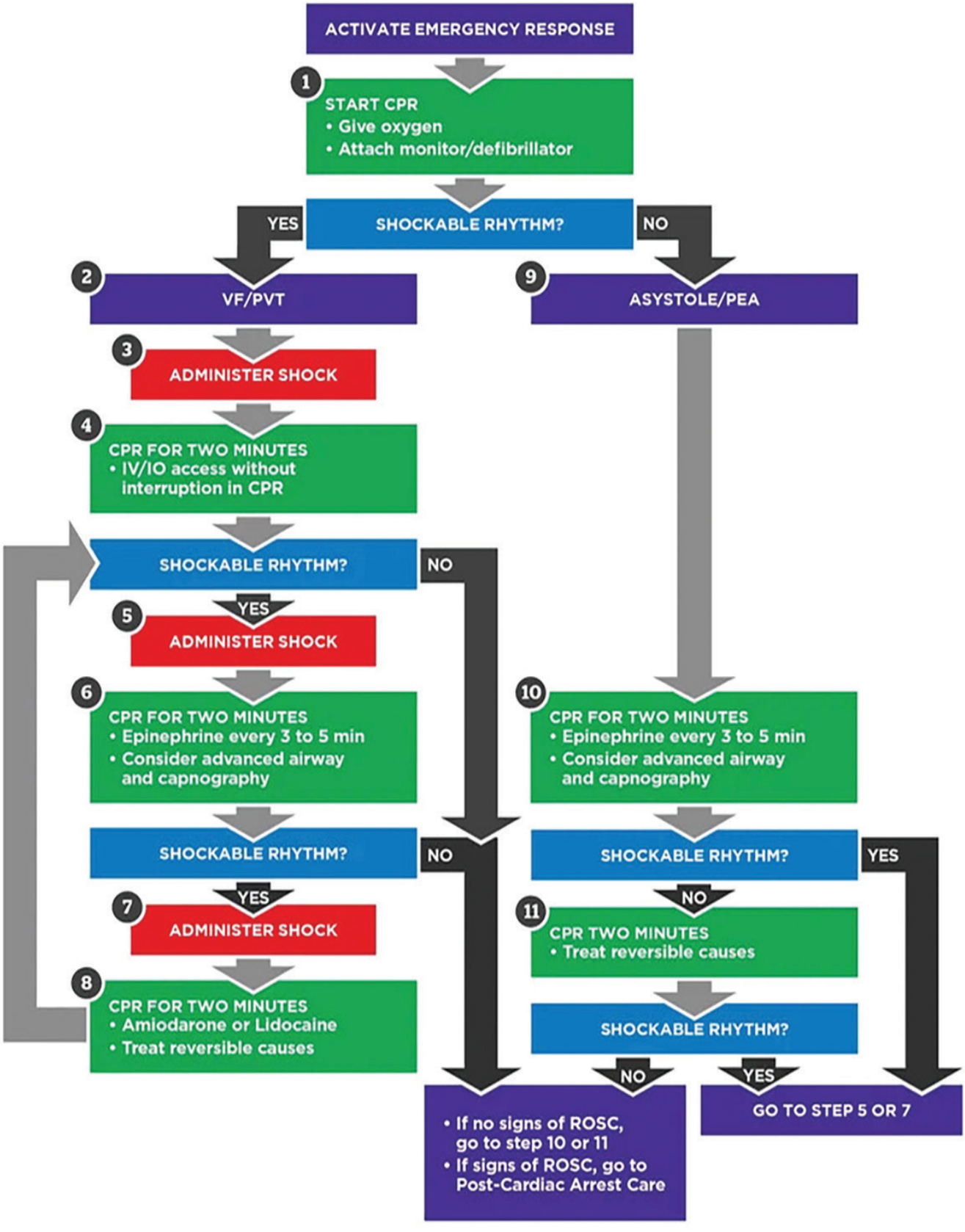


ADULT CARDIAC ARREST

CPR Quality

- Push hard (2-2.4" (5-6 cm)) and fast (100-120 bpm) and allow chest recoil
- Minimize interruptions
- Do not over ventilate
- If no advanced airway, 30:2 compression to ventilation ratio
- Quantitative waveform capnography

Adult Cardiac Arrest Algorithm



- If ETCO2 <10 mmHg, attempt to improve CPR quality

Shock Energy

• Biphasic: Biphasic delivery of energy during d fibrillation has been shown to be more effective than older monophasic waveforms. Follow man facturer recommendation (e.g., initial dose of 120 to 200 J); if unknown, use the maximum dose available. Second and subsequent doses should be equivalent and higher doses should be considered.
• Monophasic: 360 J

Return of Spontaneous Circulation

• Return of pulse and blood pressure
=
• Sudden sustained increase in PETCO2 (typically 40 mmHg)
• Spontaneous arterial pressure waves with intra-arterial monitoring

Advanced Airway

• Supraglottic advanced airway or ET intubation
• Absolute placement confirmation:
1. Negative Epigastric Auscultation
2. Positive Bilateral Chest Auscultation
3. Vocal Cord Visualization
4. Quantitative ETCO2
• 10 breaths per minute with continuous chest compressions

Drug Therapy

• Epinephrine IV/IO Dose: 1 mg, administer as soon as possible then every 3 to 5 minutes after
• Amiodarone IV/IO Dose: first dose is 300 mg bolus, second dose is 150 mg
• Lidocaine: 1st dose: 1-1.5 mg/kg, second dose: 0.5-0.75 mg/kg

The standard AHA adult BLS algorithm shown above is used. Chest compressions are performed by pressing hard (2inches) and fast (100-120/mt) in the center of the chest. Current guidelines recommend 2 breaths for every 30 compressions (30:2). Providers can also manipulate the airway to aid in airway patency, thus, allowing proper ventilation. These maneouvers include the head-tilt, chin-lift, and the jaw thrust. Additional considerations in obviously pregnant women (>20 wks.) include manual displacement of the uterus to the left if more than 2 rescuers are present, documenting the time of arrest if a perimortem section may need to initiated. If a Mg drip is on flow in a collapsed parturient, consider Mg toxicity early. Stop the infusion, administer IV Calcium in addition to above measures.

The AHA algorithm for Maternal cardiac arrest

Providers can use BLS treatment with the addition of medications and advanced airways, including supraglottic airway devices (King LT, I gel) and endotracheal intubation. Medications used in cardiac arrest include Epinephrine and Amiodarone. Advanced life support (ALS) providers have the additional benefit of cardiac rhythm interpretation, allowing for quicker defibrillation if indicated. Team planning should be done in collaboration with the obstetric, neonatal, emergency, anesthesiology, intensive care, and cardiac arrest services. Relief of aortocaval compression with left uterine displacement (LUD) by 15 degrees should be instituted. If the uterus is difficult to assess (e.g., in the morbidly obese), attempts should be made to perform manual LUD if technically feasible.

Perimortem Cesarean delivery (Resuscitative Hysterectomy)above 24 weeks period of gestation to improve maternal and fetal outcomes should be done at the site of arrest if attainment of Return of Spontaneous Circulation (ROSC) is delayed more than 4 mts. The goal is to deliver the fetus in 5 mts. The most experienced provider should take charge of airway management. Early endotracheal intubation is advised in this patient population. Tube position should be confirmed by waveform capnography. This will also facilitate monitoring quality of CPR and early identification of ROSC.Once an advanced airway is in place, 1 breath is given every 6 seconds (10 breaths/min) with continuous chest compressions. As with all patients, the aide memoire four Hs and four Ts (Hypoxia, Hypovolemia, Hypothermia, Hypo- or hyper-kalaemia/-magnesaemia/calcaemia, Thromboembolism, Toxins, Tamponade, Tension pneumothorax) can be used to classify common causes of collapse in pregnancy, with the addition of anesthetic complications, eclampsia and intracranial hemorrhage. Other important causes that may be particularly relevant in the obstetric population include pulmonary or amniotic fluid embolism.

The AHA scientific statement on maternal cardiac arrest also recommends that code team members with responsibility for pregnant women should be familiar with the physiological changes of pregnancy that affect resuscitation technique and potential complications. The same currently recommended defibrillation protocol should be used in the pregnant

patient as in the nonpregnant patient. There is no modification of the recommended application of electric shock during pregnancy. The 2021 updates also recommend targeted temperature management for the mother after ROSC.

Impending Arrest:

- Hospital units with a pregnant woman in their care should ensure that proper pre-event planning has been instituted, including preparation for maternal cardiac arrest and neonatal resuscitation
- A quick head-to-toe assessment will help guide treatment and identify the cause. The response to any urgent call to labor ward must adopt an 'ABC' approach with early recognition of problems specific to the parturient.
- Pregnant women who become ill should be risk stratified by the use of a validated obstetric early warning score
- The patient should be placed in a full left lateral decubitus position to relieve aortocaval compression
- Administration of 100% oxygen by face mask to treat or prevent hypoxemia is recommended
- Intravenous access should be established above the diaphragm to ensure that the intravenously administered therapy is not obstructed by the gravid uterus
- Precipitating factors should be investigated and treated

Increasingly, Point of care ultrasound (POCUS) is being used the assessment of critically ill obstetric patients. It can help detect hypovolemia, (occult intraperitoneal collection),peripartum cardiomyopathy ,pulmonary oedema, indirect features of right ventricular overload in amniotic fluid embolism, pulmonary embolism and deep vein thrombosis.

Successful outcomes in maternal resuscitation requires multidisciplinary team work.It also needs regular audits, frequent training and practice drills to identify and address gaps.

Changes in the AHA 2021 guidelines are

1. Amiodarone and lidocaineare now considered equivalent as antiarrhythmic in cardiac arrest scenarios.
2. For adult symptomatic bradycardia, atropine dose changed to 1 mg from 0.5 mg.Dopamine dose for this changed from 2-20 mcg/kg/minute to 5-20 mcg/kg/minute.
3. Emphasis on prevention of hyperoxia, hypoxemia and hypotension
4. Initial stabilisation split in to manage airway, manage respiratory parameters and manage hemodynamic parameters.
5. For adult tachycardia IV access and ECG moved earlier in the algorithm.
6. Updated ACS algorithm contact to balloon inflation goal less than or equal to 90 minutes
7. Target SpO2 >94% for stroke and general care; 92-98% for post cardiac arrest care
8. During CPR, 15 seconds before pausing compressions, high performance team should check for pulse, prechargedefibrillator, and prepare to deliver shock in 10 seconds or less to increase CCF>80% as 10% rise in CCF leads to 11% rise in survival
9. Feedback devices or metronomes(can be downloaded on mobiles too)
10. IV preferred over IO
11. New diagram to guide neuroprognostication

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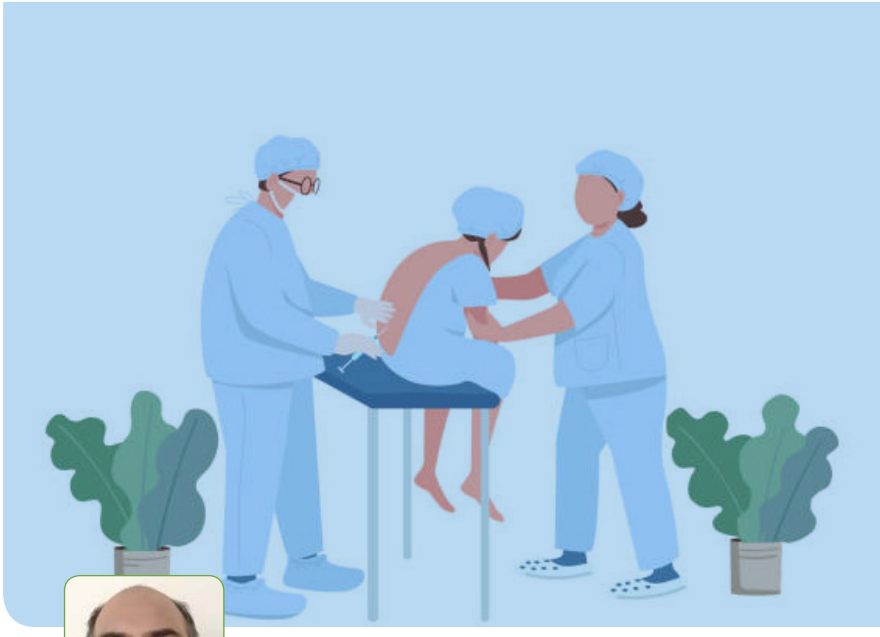
CHALLENGES IN ANASTHESIA DURING A C SECTION



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Cesarean section is one of the most widely performed surgical procedures. It presents specific set of challenges to the anaesthesologist and calls for the utmost care on the part of the care givers. That it is a unique situation in the sense of caring for two lives instead of one cannot be stressed enough.

This article attempts to list the major anaesthetic concerns involved in elective and emergency cesarean section surgeries. The topic is considered under the following headlines

1. Pre-Operative assessment
2. Fasting, antacid prophylaxis and antiemetic therapy
3. Anaesthetic technique:
   single shot spinal, epidural, combined spinal epidural, general anaesthetic
4. Preparation for and Management of specific concerns
   Difficult Airway
   High Spinal
   Massive hemorrhage
   Contraindications to regional anaesthesia
   Awareness under GA
5. Post operative care
   Vital signs monitoring
   Analgesia
   Hydration
   Nausea and vomiting
   Feeding
   Thromboprophylaxis
   Mobilisation

1. Pre operative assessment

It is imperative that all women for Cesarean section should be seen pre operatively. Suitable patients may be considered for placement on enhanced recovery after obstetric surgery (EROS) program. ASA 1or 2 mothers who have had no anaesthesia related issues in the past are seen only on the morning of surgery. Patients with specific concerns or other medical conditions which need to be optimised can be scheduled for an earlier visit. Mothers for emergency cesarean section will need to be pre operatively assessed at the time of decision for surgery. The assessment should include a complete review of the history and lab reports with special focus on the Airway and back.

2. Fasting, antacid prophylaxis/ antiemetic

All patients should have antacid prophylaxis within 6 hours of surgery

- Ranitidine 150 mg oral or 50 mg slow IV/ IM
- Metoclopramide 10 mg oral// IV /IM
- Sodium citrate in the theatre at discretion of the anaesthetist.

For elective cases, this is prescribed at the antenatal clinic. For emergency cases if not already given during labour it may be given parenterally at that time of decision for surgery.

The minimum periods of fasting as per AAGBI and ASA guidelines are
- 6 hours for solid food

- 2 hours for clear non particulate and non carbonated fluids

Pregnant patients should not be left for long periods without hydration. They may require IV fluids. Those on enhanced recovery program can be given a carbohydrate drink up to 2 hours prior to surgery. Chewing gum is treated as clear fluid and prohibited for 2 hours pre operatively.

3. Anaesthetic technique

For patients of BMI more than 40, consider involving a colleague.

The patient is positioned with a left down tilt to minimise Aorto-caval compression. ECG/ BP/ spo2 are monitored at a minimum. IV cannula of at least 18 G is a must. Consider two IV lines if risk of hemorrhage.

For emergency LSCS fetal heart rate monitoring should be preferably undertaken during induction for as long as feasible. Within 60 minutes prior to incision a single dose of prophylactic antibiotics-1.5 gram cefuroxime (if allergic to penicillin use clindamycin) to reduce the risk of post operative infection.

At delivery five units syntocinon in 5 ml NS given slowly ,10 U im AND 20 U in a drip at 10 units per hour.

Single shot spinal

The preferred technique. Pencil point needles of 24/ 25 G are preferred to reduce PDPH, Ephedrine/ phenylephrine are used to treat hypotension. Heart rate is preferably kept above 80 BPM to reduce nausea/ vomiting. Anaesthesia up to T4 spinal level is ideal.

Epidural anaesthesia

This is generally the case when an epidural analgesia for labour has been sited and decision to convert CS is taken later. Topping up up is done with approximately 1.5 to 2 ml per segment. An epidural maybe inserted De-novo for CS in rare situations like a heart disease patient where spinal anaesthetic is not preferred.

Combined spinal epidural

Can be used if there is potential for prolonged surgery.

General anaesthetic

This is generally necessary when fetal heart abnormality and fetal status necessitates very rapid delivery. General Anaesthetic may also be necessary if spinal/epidural is contraindicated or in cases where massive hemorrhage is expected so that the sympathectomy caused by a spinal is better avoided. An intact and compensating sympathetic system in the face of bleeding is preserved with a general anaesthetic.

4.Preparation and management of specific concerns

General anaesthesia throws up two major challenges;

1. Difficult Airway and inability to intubate(1:224 vs 1:2500 in general) leading to CICO [can't intubate can't oxygenate] situations. Regular practice of failed intubation drills/ use of adjuncts like video laryngoscope and difficult Airway cart are of much significance in these settings.

2. Aspiration of gastric contents/ pneumonitis

The physical/ hormonal changes of pregnancy coupled with the labour pain, use of opioids etc delay gastric emptying predisposing to aspiration. Antacid/ antiemetic prophylaxis, avoidance of solid food during labour, allowing only clear fluids etc are of paramount importance. A rapid sequence induction is always done.

7P RULE OF RAPID SEQUENCE INDUCTION

Rapid sequence intubation seven Ps timing

Action	Time
Preparation	10 minutes before intubation
Preoxygenation	5 minutes before intubation
Pretreatment	3 minutes before intubation
Paralysis with induction	Induction
Protection	30 seconds after induction
Placement (Intubation)	45 seconds after induction
Post-intubation management	60 seconds after induction

Preoxygenation for 3 minutes is a must. Nasal cannulae giving supplemental oxygen at 5 to 10 litres per minute under the face mask have been shown to delay the onset of desaturation. Gentle positive pressure ventilation (pmax<20 cm H2O) can also be done while the succinyl choline is taking effect.

Management of hypotension with regional anaesthesia

Preloading may be useful only if the patient is hypovolemic. Left lateral tilt of 15 degrees of the operating table reduces Aorto-caval compression. Heart rate is better maintained above 80 BPM. Phenylephrine/ Ephedrine boluses or infusion as necessary.

High Spinal

Is defined as local anaesthetic block extending about T4 level. Cause is rarely spinal anaesthetic and is more likely due to wrongly placed or migrated epidural catheter, causing injection of high volumes of local anaesthetic inadvertently into the spinal space.

Management is by ABCD of resuscitation and may necessitate induction of general anaesthesia.

Contraindications to regional anaesthesia

Patient refusal Bleeding diathesis Hypovolemia Sepsis near insertion site

Generalized sepsis Stenotic heart disease Platelet count less than a lakh

Massive haemorrhage

Can be primary or secondary (associated with coagulation failure)

Large bore IV cannulae, blood product management, Rapid transfusion devices, body/ fluid warmers, invasive hemodynamic monitoring etc remain the cornerstones of Management

Accidental awareness under general anaesthesia

Explicit recall of intraoperative events after completion of anesthesia, with or without pain is considered awareness. Risk of awareness is high in emergency CS(1:1200) as compared to(1:15,000) in general for all anaesthetics.

5. Post operative care

Vital signs monitoring including respiratory rate, heart rate, blood pressure, pain and sedation. They should be monitored every 15 minutes for the first hour and half hourly for the next hour, and hourly for the next 12 hours or until stable.

A MOEWS (Modified obstetric early warning System) should be calculated with each set of observations

Monitoring of regional block using modified Bromage score and sensory level is desirable.

Post operative analgesia

Analgesics used may include Paracetamol, Ibuprofen, Diclofenac. Opioids may be given as PCA.

Feeding

Irrespective of whether elective or emergency CS, sips of water, and if tolerating light diet is commenced as soon as the mother feels able and bowel sounds have appeared

Thromboprophylaxis

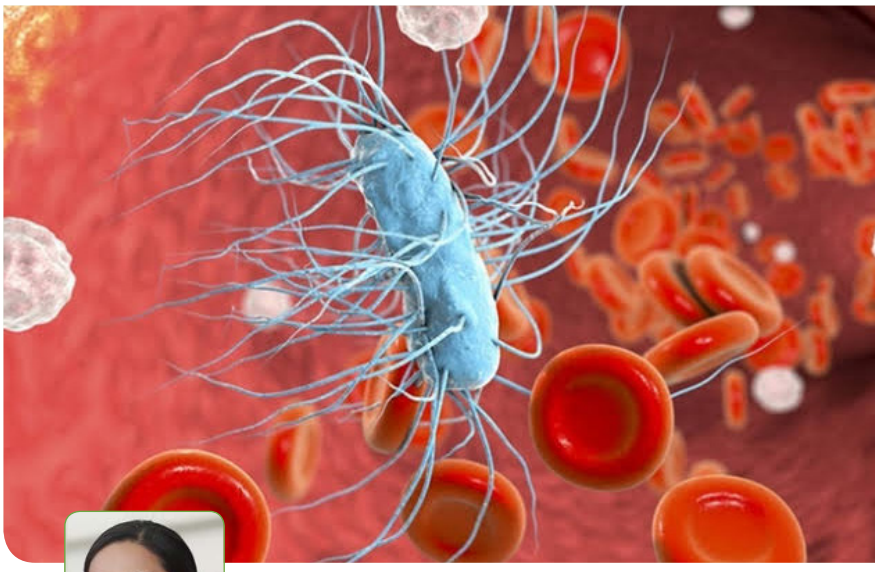
This is provided with intermittent pneumatic calf compression devices during surgery and until mobile. Anti embolic stockings are used once the patient is mobile.

Decision for LMWH is made by risk assessment scoring system.

Mobilization

Early mobilization is encouraged as soon as vitals are stable and full power and sensations have returned.

WHEN SEPSIS STRIKES

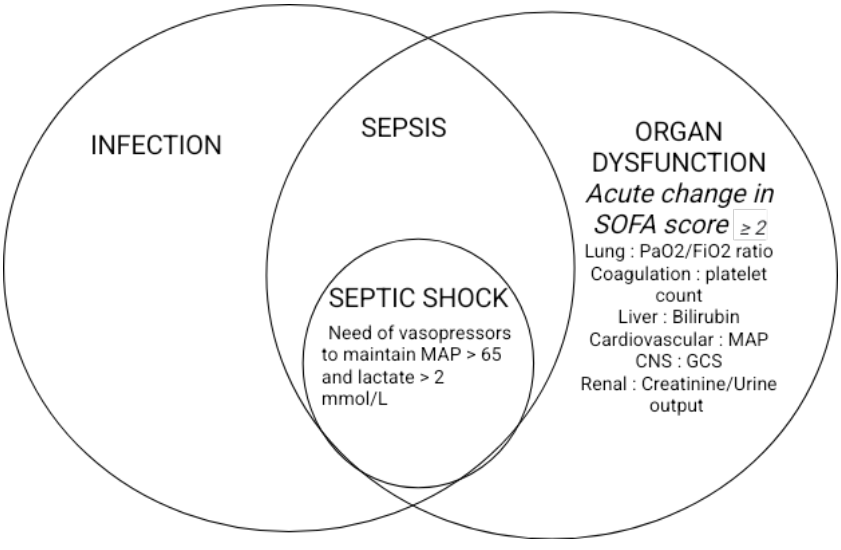


Dr.Varsha Mathews
Dept of Critical Care
Aster medicity, Kochi

- Why should you know about sepsis
- Causes one in ten maternal deaths
- Third leading cause of maternal mortality , after haemorrhage and hypertension (1)
- Observed frequency of maternal infections was around 7 % -WHO GLOSS (Global Maternal Sepsis Study) study ,May 2020(2)

- Definition of Sepsis(3)
- **Terminology**

SOFA score : Sequential Organ Failure Assessment Score



MAP = Mean Arterial Pressure = 1/3 * Systolic Blood pressure + 2/3 * Diastolic blood pressure. MAP is usually represented in brackets under NIBP or IBP measurement on monitor

GCS = Glasgow Coma Scale

PaO2 = Partial pressure of Oxygen from arterial blood gas (ABG) analysis

FiO2 = Fractional percentage of inspired oxygen , as set on the ventilator or calculated from oxygen flow rates.

NIBP = Non Invasive Blood Pressure measurement - obtained from cuff tied on patient extremity - intermittent monitoring - non invasive,intermittent pressure monitoring, may cause skin damage, inaccurate in obese,inaccurate during arrhythmias.

IBP = Invasive Blood pressure measurement - obtained from pressure waveform through an intra arterial cannula - gives continuous monitoring ,fast and convenient sampling possible,accurate in obese, less skin damage but risk of peripheral gangrene, blood stream infection

Lactate levels - easily obtained in ABG result, reflective of cellular dysfunction.

What to do : Essentials

SSC Hour-1 Bundle of Care

Elements:

- Measure lactate level
- Obtain blood cultures before administering antibiotics.
- Administer broad-spectrum antibiotics.
- Begin rapid administration of 30mL/kg crystalloid for hypotension or lactate level ≥ 4 mmol/L.
- Apply vasopressors if hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mm Hg.
- Administer oxygen andmeasure urine output

FINDING THE FOCI OF INFECTION

Lung - most often symptoms like cough, chest tightness and signs like oxygen desaturation and tachypnea suggest lung as source of infection . Imaging like chest X Ray and High Resolution CT of chest may be considered. Sample for microbiological analysis can be obtained by Mini BAL (Blind suctioning of endotracheal tube to obtain endotracheal sample in a sterile container) or Bronchoscopic wash and lavage.. Bronchoscopy for sample collection is more time consuming, requires expertise, equipment but is more accurate in identifying the causative pathogen. Advanced techniques like Biofire Film Array Pneumonia panel can be performed on a bronchoscopy sample and helps in identification of pathogen and antimicrobial resistance genes in about one hour.[5]

Blood - Ideally , 20 - 40 ml blood required for good yield of culture results. If blood for culture is drawn from an indwelling catheter that is more than 48 hours old, it should be accompanied by a paired sample from peripheries to rule out colonisation of indwelling catheter.If a BACTEC blood culture turns positive, identification of species and antimicrobial resistance can be hastened by Multiplex PCR methods like BioFire panel which provides results in around 1 hour.The ability to find targeted antibiotics quickly and thus reduce unwanted antibiotic usage and ICU stay have increased the popularity of Syndromic identification methods by PCR in spite of their added cost [6]

Body collection - Foci of infection in sepsis might be an intra abdominal or pleural collection. In such a suspicion, interventional radiology and surgical team may be involved to plan optimal imaging of the area and early aspiration of contents for source control and diagnosis of causative pathogen

Endocarditis - Identification of a gram positive bacteremia or resistant bacteremia probes us to do a transthoracic or transesophageal ECHO to identify any valvular vegetations in the heart

Gastrointestinal tract - Diarrhoea as presenting complaint must be evaluated with routine stool examination, hanging drop examination , Stool culture, and sometime, Stool Biofire panel or Clostridium Difficile Toxin and Enzyme assay in patients with prolonged hospital stay

Urinary tract - Urine routine examination and culture of midstream catch urine sample or from a freshly catheterised urinary bladder with symptoms can suggest urinary infection . Any suspicion should be evaluated with Ultrasound or Computed tomography of the abdomen to look for obstructive causes or abscess formation. Urology team should be involved to plan Double J stenting or nephrectomy for source control. Renal function tests and urine output should be closely watched for acute kidney injury or need for hemodialysis in these patients

Fungal markers - Risk factors like post surgical patient, on prolonged parenteral nutrition, prolonged ICU stay, other immunosuppressed stages etc suggest possibility of candida in the blood or sometimes, aspergillus in the lung.[7] Beta D Glucan and Galactomannan are gaining immense popularity as surrogate markers for fungal infection and saving time before initiation of life saving antifungal treatment in these patients.[8]

Vasopressors in sepsis[4]

Noradrenaline is the preferred vasopressor. Vasopressin is the agent of second choice and Adrenaline is the third choice. Dobutamine is added in the event of poor cardiac contractility , keeping in mind the hypotension that it can cause due to vasodilation. Although vasopressors may be initiated in peripheral veins above the antecubital fossa, a central line should be placed quickly and these agents should be transferred to a central line for optimal action and to prevent adverse events like limb gangrene,

Steroid in sepsis.[4]

In vasopressor refractory shock, Hydrocortisone 200 mg/day should be administered as divided doses

or continuous infusion to optimise hemodynamics and circumvent the adrenal failure.

Choosing antibiotics

Always follow principles of antibiotic stewardship while choosing antibiotics.Remember the 5 Ds, Right Drug, Right Drug route, Right dose, Right duration and timely de escalation to pathogen directed therapy. Antibiotics should be chosen based on the desired site of action, antimicrobial susceptibility reports or presence of antimicrobial resistance genes like CTX- M, OXA -48, NDM.Doses should be adjusted based on weight, renal function , hepatic function and timing of hemodialysis.Test like Procalcitonin and C- reactive peptide can help in de escalation of antibiotic by evaluating response to therapy.[9]

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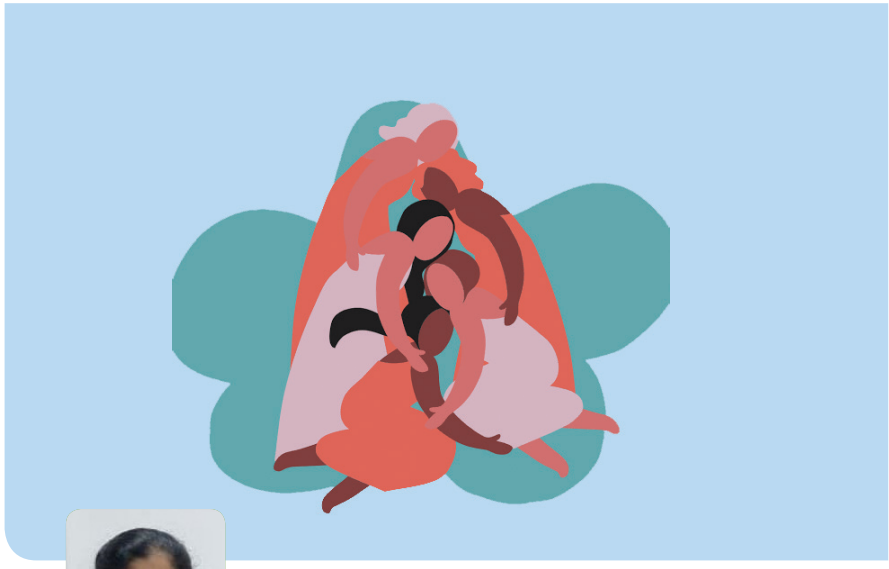
A CASE OF AMNIOTIC FLUID EMBOLISM



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State MDNMSR Chief Coordinator

The Case

29yrold G3P2L1, First FTND7yrs
Second foetus had CDH,PTVD,NND
3rd present pregnancy, Foetus having CDH
Hence referred to tertiary centre

IOL at 40+1 on 3/6/2019-Oral PGE1 50 micgm at 9.50 am MBS 4
Spontaneous leaking at 3.45 pm with mild contractions, Sudden collapse, Cardiorespiratory arrest, Resucitated and intubated, ROSC in 6minutes
BP maintained on two vasopressors, FH lost , In few mts DIC clinically evident and lab values later confirmed DIC, Massive transfusion started, Emergency cs vertical midline incision , Severe atonic PPH
Subtotal hysterectomy done, Closed with drains

Complications ECHO rt atrium and rt ventricle dilated, L heart collapsed Acute renal shut down
Severe metabolic acidosis.DIC continued
Managed in maternal HDU that night under the supervision of intensivist
DIC Correction continued with blood products cryo & FFP,platelet &PRC, Ventillator and vasopressor support continued.shifted to critical care unit on 4/6/ morning, Developed MODS , Critical care support of all target organs given in an aggressive manner, CRRT initiated continued for nearly 2weeks followed by intermittent hemodialysis.
Respiratory support was needed for a prolonged period,extubated on D12, Cardiac -vasopressors gradually tapered, Amiodarone for SVT,cardiprotective drugs
CNS -targeted temperature management, high end antibiotics, Meropenam, Metrogyl later as per culture results. Tigecyclin, Colistin, Ciprofloxacin, Antifungal etc had to be used
By D28 septic shock developed inspite of high end antibiotics.
Suspecting abdominal collection to be the source relaparatomy done under GA and peritoneal lavage given and drains reinserted. Other supportive management like stress ulcer prophylaxis,DVT prevention, adequate nutrition given. Counselling and psychological support continued.
Respiratory rehabilitation and Physiotherapy for critical illness myopathy also was going on.
Support from the spouse of the patient was encouraging to both the patient and caregivers.
Ishemic hepatitis resolved, renal function normalised,sensorium normal with no neurological deficit, Discharged on D65 without any sequel.

Diagnosis

Amniotic fluid embolism ,cardiorespiratory arrest, severe DIC, Hysterectomy,MODS
Gradual recovery to normal status

CODE 10 CRASH CS: A HELPFUL TOOL TO DECREASE DECISION-TO-DELIVERY INTERVAL

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In obstetrics, the need for Category 1 C-Section can arise anytime. The maternal and fetal outcomes will depend upon the decision to the delivery interval. RCOG and ACOG recommends a Category one CS decision to deliver interval within 30 minutes. However, the decision to delivery interval may be prolonged in many obstetrics scenarios, which can affect the feto-maternal outcome.

• Code 10 for a Crash CS is a novel code similar to code blue and purple developed in our institution (Rajagiri Hospital) for Category 1 C-Section. Whenever there is a need for category one CS, "Code 10 Crash CS Labour room" will be announced through the public address system so that all the concerned personnel for the CS rushes to the labour room complex where the Labour Room Operation Theatre is situated. The labour room staffs, i.e. Doctors and Nurses, are eligible to announce the code. In these scenarios through the hospital intercom ,after dialling; *101; the "Code 10 Crash CS Labour room" will be announced three times clearly. The labour room staff will catheterise and shift the patient to the OT. The primary surgeon will immediately scrub for the procedure. Any outstanding obstetrician will brief the patient's bystander and get consent for a C-section. The neonatologist, Anesthetist and the supporting OT staff will rush to the labour room once they hear the code 10 being announced through the public address system.

Below are the usual scenarios in which Code 10 is usually announced:

1. Prolonged Bradycardia
2. Cord Prolapse
3. Antepartum Hemorraghe
4. Uterine Rupture
5. Scar dehiscence

After auditing our Descion to Delivery Interval in Cases where Crash C-Section was announced, we found the mean Descion to Delivery Interval to be 13 minutes.

By introducing the code system, we are taking away the burden of individually informing all the concerned personnel, which will buy us time to perform a category 1 C-section without delay. Remembering the phrase; "time is life", implementing such a code system improves the neonatal outcome by reducing the Decision to Delivery Interval.

MASSIVE TRANSFUSION PROTOCOL IN OBSTETRIC HEMORRHAGE

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Obstetric haemorrhage leads to an acquired fibrinogen deficiency compounded by hyper fibrinolysis with uterine atony and accretism being the contributing factors. Early recognition and rapid treatment of initial coagulation disturbances improve survival in massively bleeding patients. Massive transfusion refers to the replacement of a large volume of blood with blood products over a short period of time to a patient with uncontrolled haemorrhage. Massive transfusion is defined when either:

- Transfusion of more than 4 units of PRBC in 1 hour with ongoing bleed or
- Transfusion of more than 10 units PRBC in 24 hours or
- Total blood volume replaced within 24 hours or
- 50 % of blood volume replaced within 3 hours or
- Bleeding in excess of 150ml/minute

Massive Transfusion Protocol refers to rapid administration of large amounts of blood products in fixed ratios (usually 1:1:1) for management of hemorrhagic shock. It sustains organ perfusion, oxygenation and maintain hemostasis. Massive Transfusion Protocol is institutional based and the procedure is as follows:

1. The decision regarding activation of Massive Transfusion Protocol is carried out by the treating physician
2. Blood center and laboratory services are notified immediately
3. Intravenous access using large bore needle(14/16 Gauge) is maintained and blood specimens sent for ABO grouping, Rh typing, Crossmatching, Complete Blood Count(CBC), Prothrombin Time(PT), INR, Activated Partial Thromboplastin Time(aPTT), Fibrinogen, Arterial Blood Gas(ABG) analysis and Electrolytes(-Na+, K+ and Ca2+)
4. In emergency, O negative units are issued. As soon as the blood group of patient is determined, switch over to type specific blood

5. The blood center issues blood products in pre-determined packs in 1:1:1 ratio (PRBC: FFP: Platelet Concentrate)keeping in view the complete blood count and coagulation profile to avoid dilutional coagulopathy
6. Administration of blood components should be done using blood warmers
7. Cryoprecipitate is issued based on fibrinogen levels
8. The protocol is terminated only when notified by the treating physician

Monitor:	Aim:	Dosage:
• Every 30 – 60 minutes • Complete blood count • Coagulation screen • Ionised calcium • Arterial blood gases	• Temperature 35 degree Celcius • pH> 7.2 • Base excess< -6 • Lactate< 4mmol/L • Ca2+> 1.1 mmol/L • Hb>8g/dl • Platelets> 50,000/cu.mm • PT/ INR <1.5 times normal • Fibrinogen> 2g/L	• Platelet count< 50,000/cu.mm- transfuse one adult therapeutic dose of random donor platelet(4-6 Units of RDP) or one unit of single donor(SDP) apheresis platelets • PT, aPTT, INR > 1.5 times normal- transfuse FFP 15ml/kg • Fibrinogen< 2 g/L- transfuse 20 units of cryoprecipitate(one adult dose is 8-10 units) • rFVIIa (60-90microgram/kg) may be considered in patients with refractory haemorrhage, but only when conventional measures including surgical hemostasis and appropriate component therapy have failed

Once the Massive Transfusion Protocol has been activated, the blood center will send the products in rounds to the operating or labor room. Each round has a specific number of PRBC, FFP, Platelet Concentrate, and Cryoprecipitate units according to the protocol established in the institution.

Massive Transfusion Protocols in Obstetrics a,b - followed across the globe are

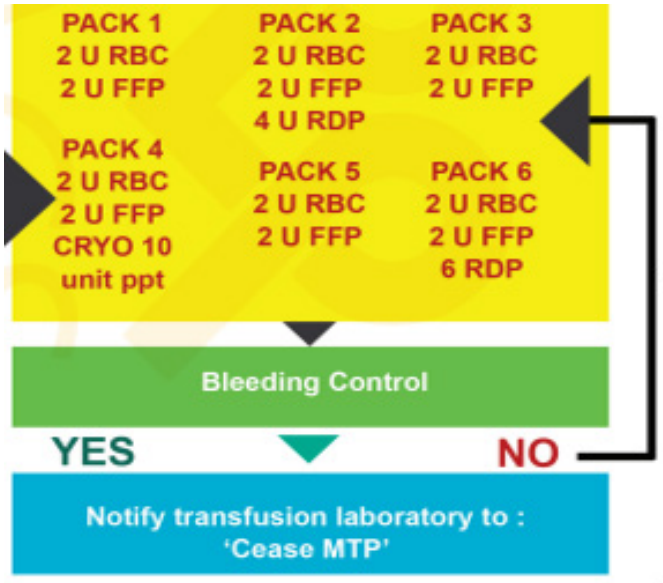
a)**Massive Transfusion Protocol by Pacheco et al**

a Source: Massive transfusion Protocol, Pacheco LD, Lozada MJ, Saade GR, Hankins GDV. Damage Control Surgery for obstetric haemorrhage. Obstet Gynecol. 2018;132: 423-42

PACK	PRBC	FFP	PLATELETS	CRYOPRECIPITATE
ROUND 1	6 UNITS	6 UNITS	6 UNITS	10 UNITS
ROUND 2	UNITS	6 UNITS	6 UNITS	10 UNITS
ROUND 3	TRANEXAMIC ACID 1g intravenously over 10 minutes			
ROUND 4	6 UNITS	6 UNITS	6 UNITS	

b) Massive Transfusion Protocol by Kerala State Blood Transfusion Council

Source b: Massive Transfusion Protocol, Kerala State Transfusion Policy & Clinical guide to transfusion guidelines 2020



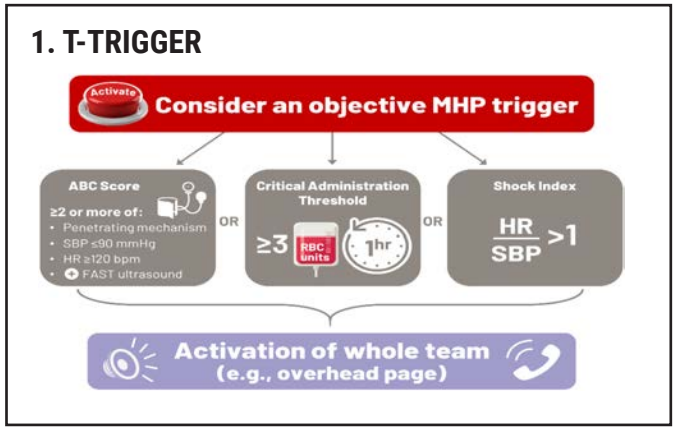
Compared to formula driven strategies(Fixed ratios of blood products),recent studies recommend use of goal directed resuscitation for diagnosis of altered hemostasis with better treatment efficacy for correcting coagulopathy.

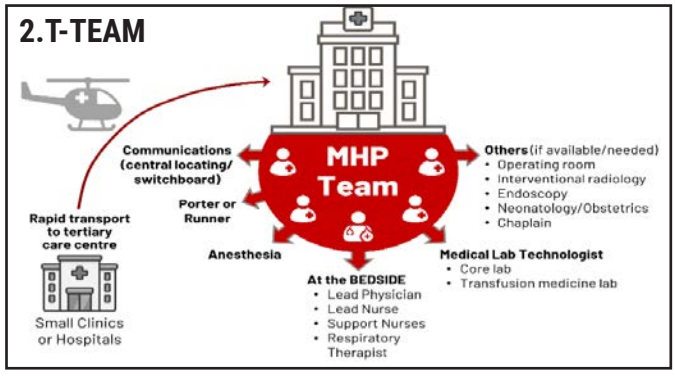
Whole blood viscoelastic point of care testing devices for assessing coagulopathy-Thromboelastography (TEG) and Rotational Thromboelastometry (ROTEM) evaluate real time coagulation functions and offers results in graphical representation within short turnaround time(10 minutes). Obstetric haemorrhage often has a significant component of enhanced fibrinolysis. Conventional clotting tests fail to identify such anomaly, whereas TEG/ROTEM may easily detect it.

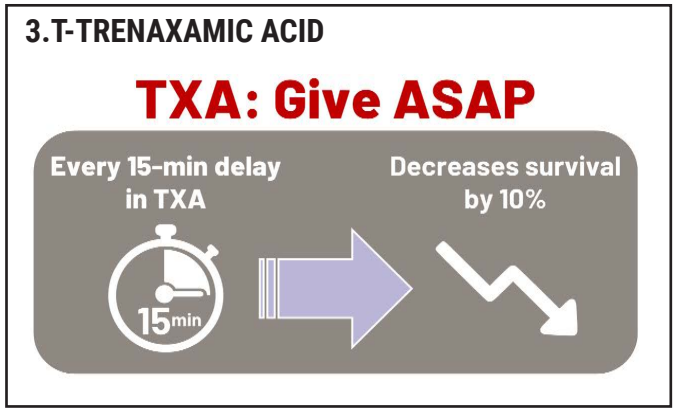
Complications of massive transfusion

Massive transfusion is associated with a large number of complications other than adverse transfusion reactions associated with the components used. The most common cause of mortality in such setting is attributed to the lethal triad of acidosis, hypothermia and coagulopathy. In addition to that a wide range of other metabolic complications includes hypocalcemia, hypomagnesemia, hypokalemia, hyperkalemia and metabolic alkalosis. Sepsis, Systemic Inflammatory Response Syndrome, thrombotic tendencies are among the several late complications observed after massive transfusions.

STEPS OF MASSIVE TRANSFUSION PROTOCOL-7 Ts

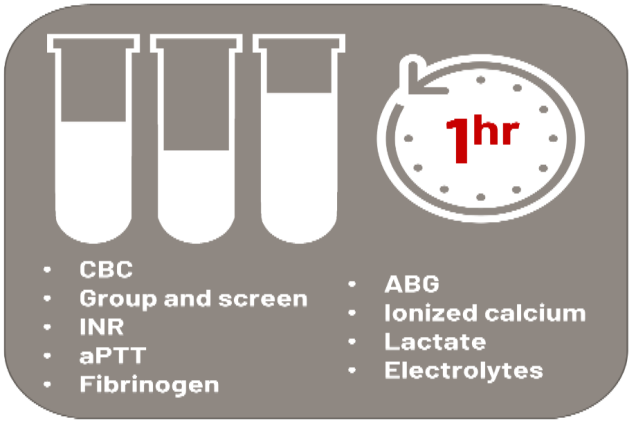


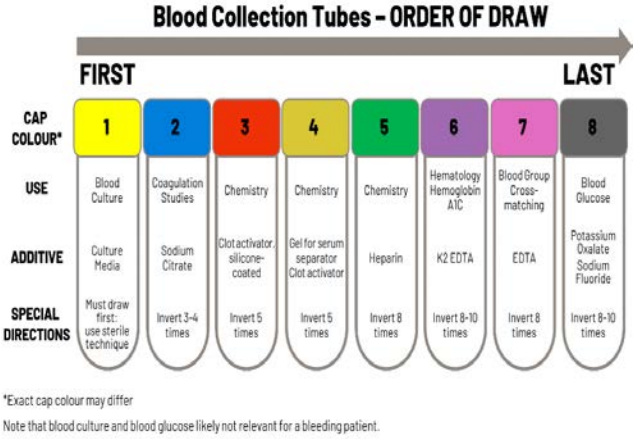




4.T-TEST -HOURLY

Test blood work at least hourly

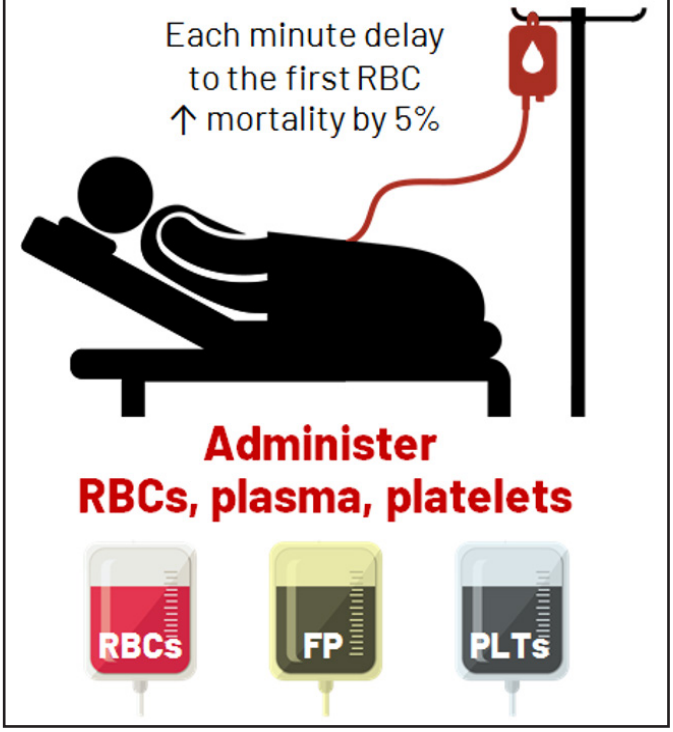




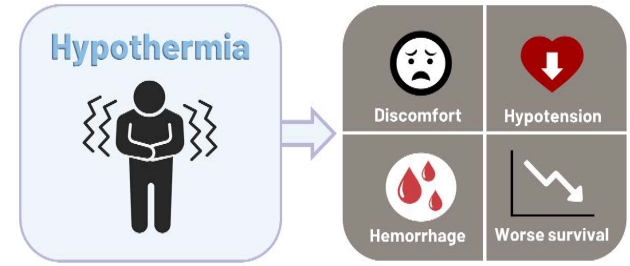
*Exact cap colour may differ

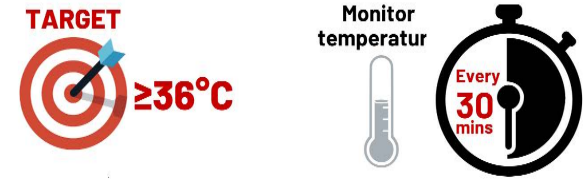
Note that blood culture and blood glucose likely not relevant for a bleeding patient.

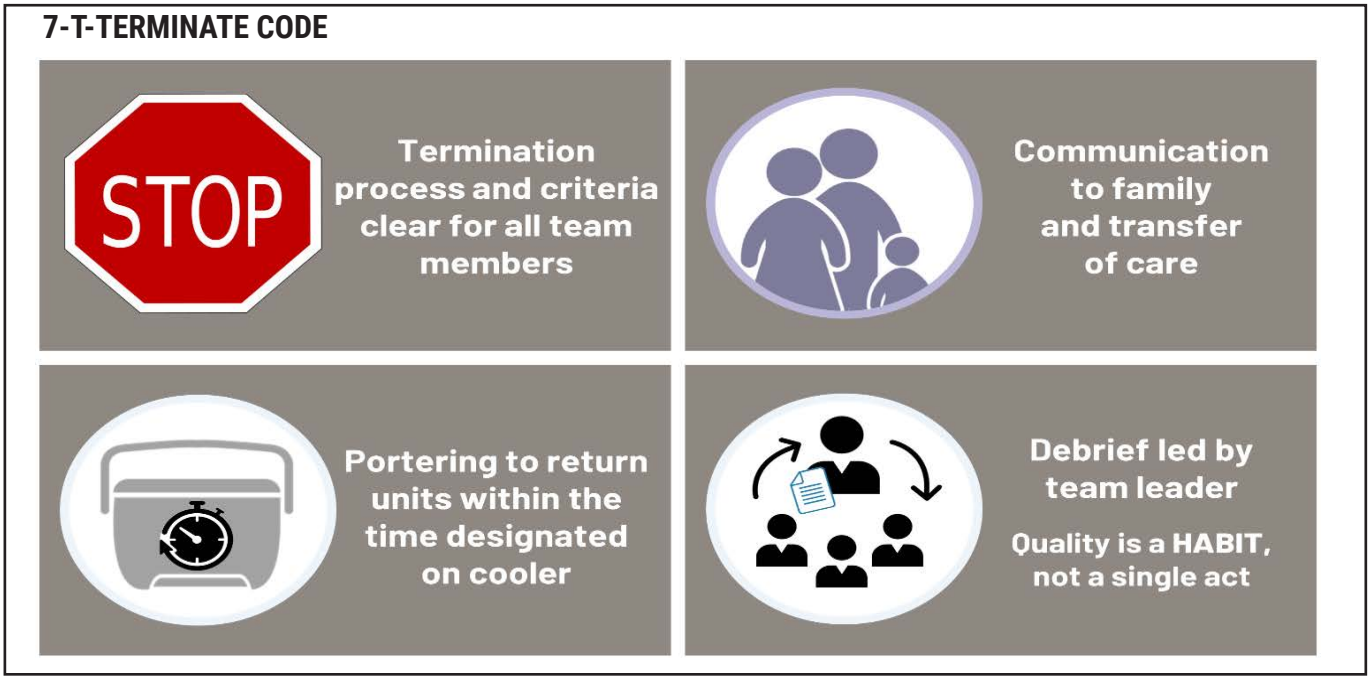
5.T-TRANSFUSE TO TARGET



6.T-TEMPARATURE MANAGEMENT







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EmOCaLS Activities

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