



AOGD BULLETIN

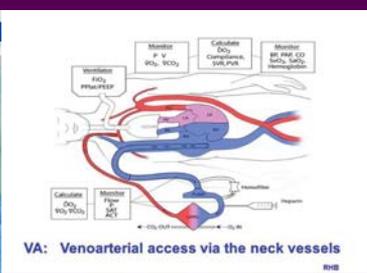
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AOGD Theme 2018-19
Empowering Providers:
Enhancing Women's Health

Issue: Current Update
Maternal Collapse
Quality and Safety in Gynecologic Surgery



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President's Message



Dear AOGD Members,

Warm Greetings for a bright and colourful Holi!

Congratulations to all on International Women's Day that was celebrated on 7th March by AOGD. This year's theme was, "Think Equal, Build Smart, Innovate for Change". A motivational talk on "Nurturing Inner Beauty" was delivered by Dr Mohit Gupta. Contribution made by women to various facets of life were remembered. Easy Yoga steps for better health were demonstrated by Yoga experts followed by a Zumba dance. The event was well attended.

A number of activities were held during cancer awareness week held between 10 and 11th February at Gynae OPD of LHMC. These included CME, public awareness campaign and screening for cervical and breast Cancer. Live endoscopy workshop was also organized by MAMC. An event "Ek kadam Cancer Se Bachav ki ore" was organized by FOGSI with Brahma Kumari's initiative from 15th-17th Feb at Om Shanti Retreat, Manesar. The monthly clinical meeting was held in UCMS and GTB Hospital, on 1st March, 2019.

This issue focuses on Sudden Maternal Collapse, a life threatening situation in obstetrics. Knowledge and skills in basic and advanced live support is an essential component of our training to deal with such emergencies. Hence it is imperative that we are well versed with the resuscitation manoeuvres and procedures. Another focus in this issue is Quality and Safety in gynaecological surgery which include adherence to safety checklist for every surgical procedure. I hope all will enjoy reading this issue and benefit from it in our daily practice.

As our tenure comes to an end with a great sense of satisfaction and gratitude we would hand over the office to AIIMS with Dr Sunesh as President to carry forward the legacy of AOGD. It had been a wonderful year and I thank all the members for their active participation in the activities of AOGD.

Dr Abha Singh
President AOGD (2018-19)

Secretary's Message



Greetings from the AOGD Secretariat LHMC.

As we rejoice Spring the season of colours, flowers, hope and sunshine AOGD secretariat wishes all our members health and happiness. We are in the last month of our tenure. It has been an extremely satisfying journey. It was a pleasure to interact with all the AOGD members through the bulletin, at the monthly meetings, at the Annual Conference, CME 'S Public awareness programmes walkathons, motivational talks and many other activities which were done throughout the year.

Annual Conference and preconference workshops went very well and were appreciated by all. We at Lady Hardinge hope that we were able to stand up to your expectations. All the subcommittee chairpersons have actively worked for their different areas of expertise.

In the last month we had numerous Breast and cervical screening programmes at different places. It is heartening to see everyone keen to keep this activity on the top priority. At Lady Hardinge we had an International Women's day celebration with a beautiful talk by Dr Mohit Gupta on "Nurturing the inner Beauty" followed by Yoga and Zumba. We had undergraduates, Nursing Sisters, senior AOGD members, faculty, and residents all enjoying and dancing.

The editorial team has brought out another issue of the bulletin updating you on Maternal Collapse and Quality and Safety in Gynecological Surgery a must know for everyone. Please save it as a ready reckoner.

We invite all of you on 5th April, 2019 at Lady Hardinge, Medical Education Hall, SJ Auditorium for the monthly clinical meeting, General Body Meeting of AOGD, and handing over to the new team of AOGD.

Keep interacting

Dr Kiran Aggarwal
Secretary AOGD

Monthly Clinical Meeting

Monthly Clinical Meet will be held at at SJ Auditorium, Lady Hardinge Medical College
New Delhi on Friday, 5th April, 2019 from 04:00pm to 05:00pm.



Editorial Team's Message



Dr Ratna Biswas
Editor



Dr Pikee Saxena



Dr Sharda Patra



Dr Swati Agrawal

Co-Editors

Hello Friends,

Warm greetings of the pleasant spring season!

The themes of March issue of bulletin are “Maternal Collapse “and & “Quality and Safety in Gynecological Surgery”.

The opening article of the section on Maternal Collapse is “Cardiopulmonary Resuscitation and Perimortem Cesarean”. It is often the obstetrician who has to start CPR before the arrival of anesthetist or critical care intensivist. Effective chest compression, intubation and ventilation are the steps of basic life support. Perimortem cesarean is done to aid in maternal resuscitation if circulation is not established within 4 minutes of CPR. In addition the cause of cardiac arrest is to be diagnosed and managed. This article contains all the essential information on Maternal CPR and is a must read section.

The Recent advances section has given insight on a new technique of “Advanced life support by Extra Corporeal Membrane Oxygenation(ECMO)”. There are two methods of ECMO-Veno-Venous (VV) and Venoarterial (VA). V V ECMO is for respiratory support whereas VA ECMO is for both cardiac and respiratory support. Since it's use in pregnancy is recent so the indications are evolving. It is also used as part of the resuscitation protocol if basic and advanced resuscitation fails.

Unexpected maternal collapse where no cause is identifiable is often due to embolism-Amniotic fluid or pulmonary. Differentiating the two is difficult. Amniotic fluid embolism presents as sudden hypotension, hypoxemia and coagulopathy during labor or in the immediate postpartum period. Management is supportive. Pulmonary embolism occurs in the setting of deep venous thrombosis or de-novo since pregnancy is a hypercoagulable state. CxR and ECG are the bedside investigations which can help in diagnosis. Pulmonary CT angiography, Ventilation/perfusion (V/Q) Scan and Echocardiography also aid in diagnosis. Anticoagulants may be started on strong clinical suspicion alone.

Case approach section has covered Cardiogenic Shock very comprehensively. Cardiogenic shock may be due to primary cardiac cause like peripartum cardiomyopathy, myocardial infarction or rheumatic heart disease or it can be due to affliction of the heart secondary to other cause like sepsis. This article has given a detailed review of the causes, evaluation and management of cardiogenic shock.

Section on Quality and Safety in Gynecologic Surgery begins with the Surgical Safety Checklist in the Standard of Care Section. It is mandatory to follow the checklist to prevent complications.

The “Natural Orifice Transluminal Endoscopic Surgery (NOTES)” using the vaginal route is the commonest route in gynecology wherein a single incision laparoscopic surgery is performed through either an anterior or posterior colpotomy. Almost all gynecological surgeries for benign to malignant causes can be performed by NOTES. It is a safe procedure in experienced hands.

Controversy section deals with "Safe Electrosurgical Principles in Hysteroscopic Procedures". Hysteroscopic procedures are mainly performed by monopolar cautery through the resectoscope. Rate of complications like perforation, electro thermal burn, air embolism is more with monopolar energy. Bipolar cautery using normal saline and electromechanical instruments like the hysteroscopic morcellator are safer than monopolar instruments. Principles of safe surgery are discussed in this chapter.

Prevention and Management of Ureteric Injuries in Different Case Scenarios -Endometriosis/Radical hysterectomy /Distorted anatomy is discussed in the closing article. Knowledge and familiarity with the retroperitoneal pelvic anatomy is a key to prevention of ureteric injuries. With distorted anatomy like in pelvic endometriosis tracing the ureter from the point where it enters the pelvis will help to avoid damage to it.

The motivational article is on “Roots and Wings.....of my Life”. It is a beautiful article on a acceptance of one's life as it is. The concept is that whatever happens to us, there is purpose to it and however much we try otherwise it will happen the same way. The joy is in giving and not in taking , nothing is everlasting so we must let go of experiences of the past and live in the present.

Journal scan has brought forth recent literature on maternal resuscitation and myomectomy by vaginal NOTES which is worth reading.

The maze of knowledge-crossword and pictorial quiz is a brain teaser and is awaiting your attempt. Cases presented in the clinical meetings were very interesting and those who missed out can go through the proceedings.

We thank our esteemed authors for their invaluable contribution.

Happy Reading!!

Maternal Cardio Pulmonary Resuscitation & Perimortem Cesarean

Pratima Mittal, Jyotsna Suri

Professor, Department of Obstetrics & Gynaecology, Vardhaman Mahavir Medical College & Safdarjung Hospital, New Delhi



Dr Pratima Mittal

Initial response to a case of maternal collapse

The initial approach aims to resuscitate the collapsed woman (Algorithm 1). Shout and tap shoulders of woman from front to check for response^{1,2}.

If woman is not responsive then-

- Don't waste time in starting resuscitation. Even if there is nobody around start resuscitation immediately and shout for help^{2,3}.
- Turn the woman on her back and quickly and open airway with head tilt and chin lift, at the same look, listen and feel for breathing².

If there are no sounds or movements of breathing or carotid pulse (do not waste precious time on looking for carotid- maximum time 10 seconds- checking for breathing and carotid pulse can be simultaneous), proceed to high quality chest compressions^{2,3}.

Agonal breaths are irregular, slow and deep breaths, frequently accompanied by a characteristic snoring sound. They originate from the brain stem, which remains functioning for some minutes even when deprived of oxygen. The presence of agonal breathing can be

interpreted incorrectly as evidence of a circulation and that CPR is not needed. Agonal breathing may be present in up to 40% of victims in the first minutes after cardiac arrest and, if correctly identified as a sign of cardiac arrest, is associated with higher survival rates²

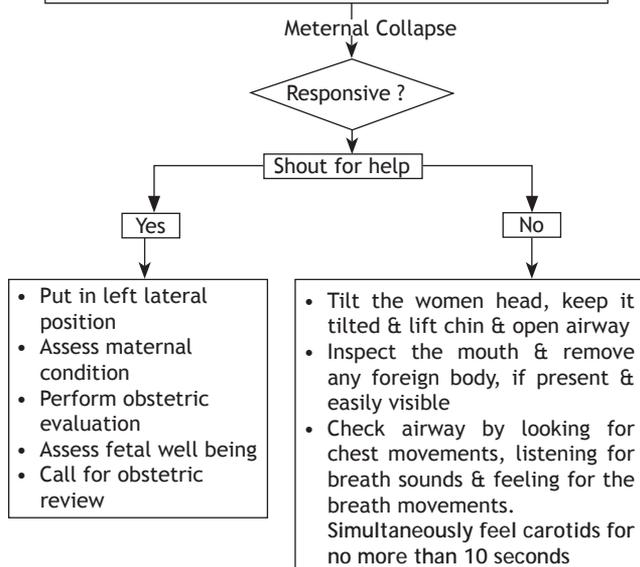
NOTE: The focus is more on response of woman and breathing rather than pulse as a trigger to start chest compressions.

Features of good quality compressions (Algorithm 2)

- Rate of CPR should be 100-120/min³
- The ratio of compressions to ventilation is 30:23.
- Compression should be given at the lower half of the sternum between the nipples with heel of one hand & the other hand on top with fingers interlocked³
- Push chest hard and fast. It should be compressed at least by 5-6 cm³.
- Allow complete recoil of the chest wall³
- Do not bend your elbows when doing chest compressions; doing so will deliver weak, ineffective chest compression³.
- The time interval between each compression and relaxation should be approximately the same³
- Minimise any interruptions to chest compression (hands-off time)³
- If available, use a prompt and/or feedback device to help ensure high quality chest compressions⁴.
- Do not rely on palpating carotid or femoral pulses to assess the effectiveness of chest compressions⁵.
- Resume compressions without any delay; place your hands back on the centre of the patient's chest (lower part of sternum)³.
- Ideally the person doing compression should be changed every 2 minutes if there are enough team members so that fatigue does not compromise the quality of compression. This change should be done with minimal interruption to compressions and should be done during planned pauses in chest compression such as during rhythm assessment.
- Use a bag and mask to start ventilation and supplemental oxygen should be added as soon as possible. A tight seal should be formed over the nose and with one hand such that a 'C' is formed (Figure 1). The other hand should be used to inflate the bag. The inspiratory time should be around 1 second. Give enough volume to produce a visible rise of the chest wall. Avoid rapid or forceful breaths^{2,3}.

Definition:

An acute event involving the cardiorespiratory system & /or brain, resulting in reduced/absent conscious levels & potentially death at any stage of pregnancy & upto 6 weeks postpartum.



Algorithm 1: Initial approach toward woman with maternal collapse

- The compression ventilation ratio should be no more than 30:2. Once advanced airway is in place the breaths should be given at a rate of 10/minute and compressions at 100-120/minute³.
- As soon as a defibrillator is available, the self-adhesive pads should be applied to the chest. Do not interrupt compressions during this process. The heart rhythm will be assessed with the electrodes during a brief pause (less than 5 seconds) in compressions².
- If the rhythm is ventricular fibrillation/pulseless ventricular tachycardia (VF/pVT), start defibrillation. All other team members are informed to stand clear of the patient, the fetal monitors and oxygen is placed away and shock is delivered^{2,3}. The energy used is the same as for non pregnant patients.
- Restart chest compressions immediately. Do not delay restarting chest compressions to check the cardiac rhythm^{2,3}.
- If rhythm is non shockable- asystole or pulseless electrical activity, do not defibrillate but continue CPR^{2,3}
- Using a manual defibrillator it is possible to reduce the pause between stopping and restarting of chest compressions to less than 5 seconds³.
- If staff cannot use a manual defibrillator, use an automated external defibrillator (AED). Switch it on and just follow the instructions
- If there is no access, IV access should be established once resuscitation is underway so as to deliver the drugs. Injection adrenaline 1mg IV, every 3-5 minutes, if non shockable rhythm; In case of refractory ventricular fibrillation, Inj amiodarone, 300mg IV

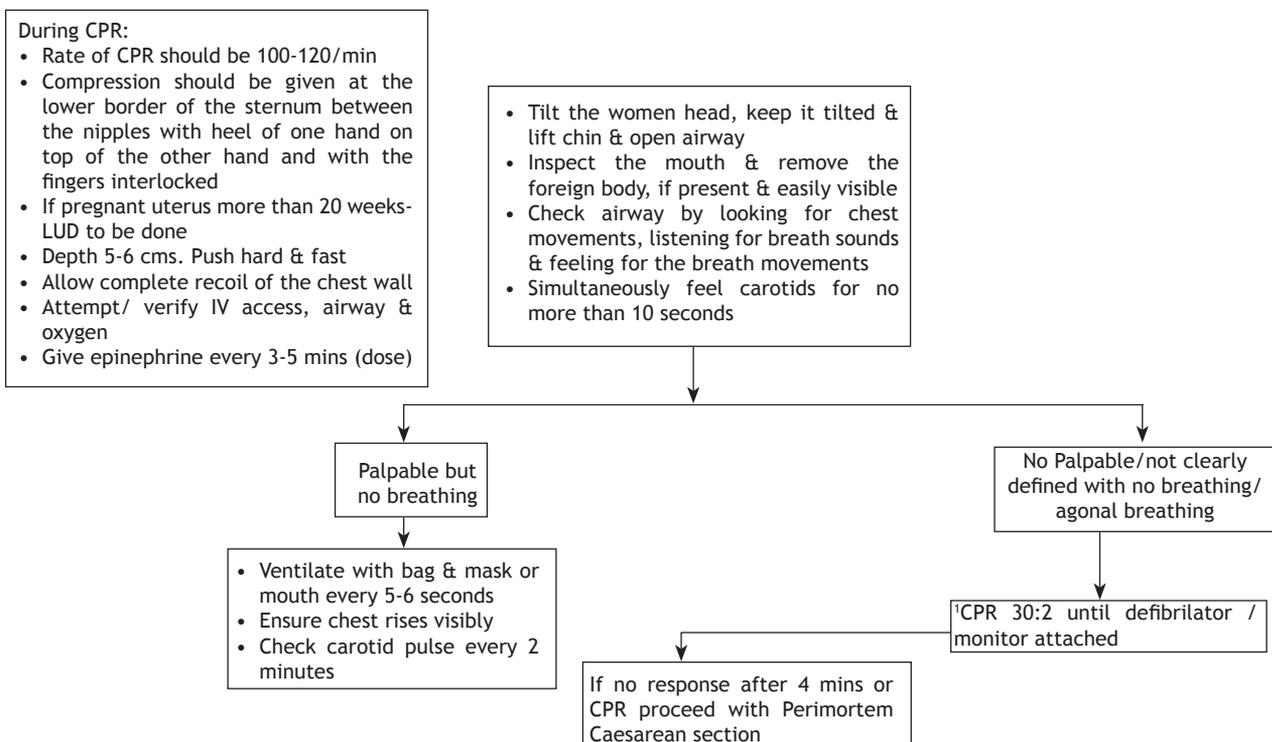


Figure 1: Technique for giving bag and mask ventilation

How is resuscitation different in pregnant women?

Chest compressions are performed in the same way as in a non pregnant person EXCEPT that if the pregnant uterus is above the umbilicus, it should be tilted towards the left side with one hand or both hands by the assisting personnel. This is to relieve the aortocaval compression effect of the uterus so as to increase the cardiac output and make the compressions more effective (Fig 2). The 15 degree tilt of the patient which was practiced earlier is not recommended any more as it hampers effective compressions³.

REMEMBER...
Leftward Displacement of Uterus During CPR Either



Algorithm 2: CPR in pregnant women

With Single Hand or with both Hands



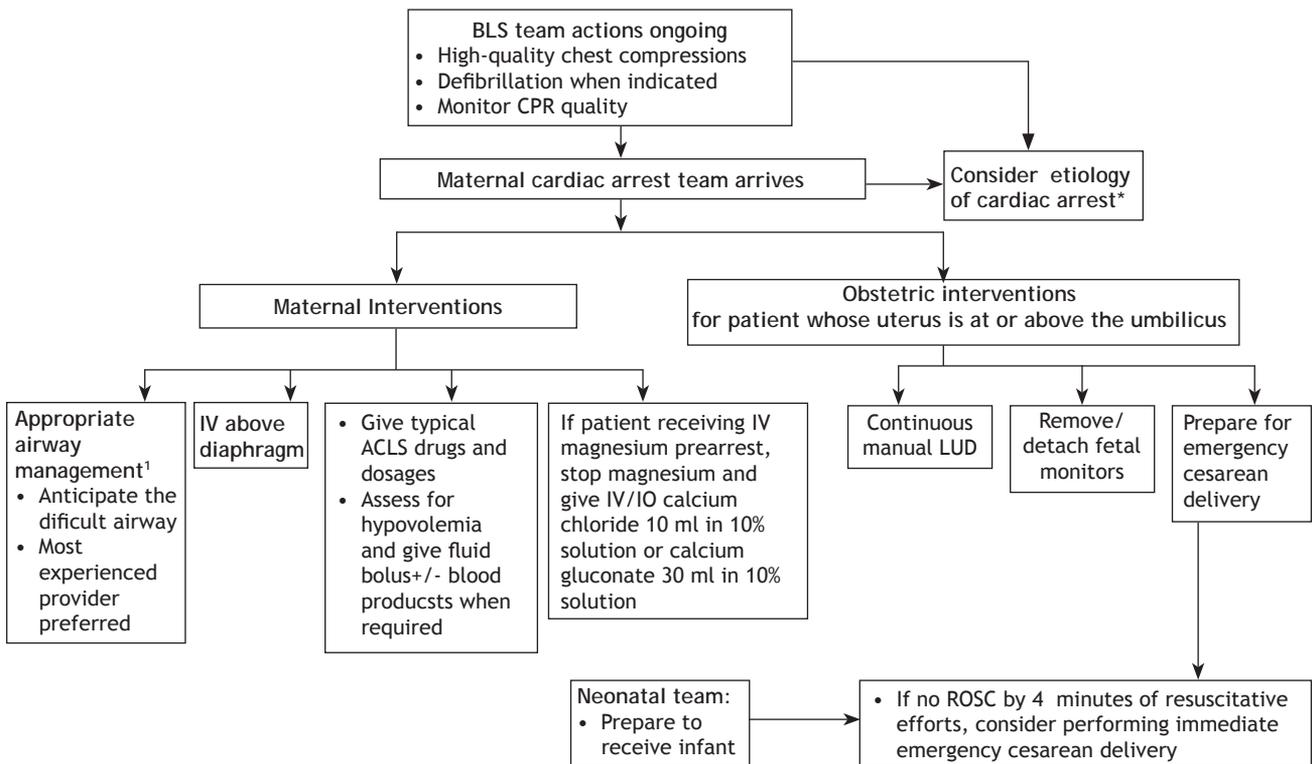
Figure 2: one handed and two handed method to achieve left uterine displacement.

Evaluation of the cause of maternal collapse

Evaluate the causes of maternal collapse after initial resuscitation. The causes of cardiac arrest in pregnancy

can be remembered by mnemonic BEAU CHOPS

- Bleeding
- Embolism:
 - Pulmonary
 - Amniotic fluid
- Anesthetic Complication
- Uterine Atony
- Cardiac disease
- Hypertension:
 - Preeclampsia
 - Eclampsia
- Other:
 - Mg toxicity
 - Other differential diagnosis of standard ACLS i.e 5 Ts and 5 H



*Potential etiology of maternal cardiac arrest:

- A Anesthetic complications/accidents
- B Cardiovascular
- C Drugs
- E Embolic
- F Fever
- G General nonobstetric causes of cardiac arrest (H's and T's)
- H Hypertension

*Appropriate airway management for pregnancy:

- 100% oxygen at ≥ 15 L/min and continue BLS airway strategies
- Optimally 2 attempts per technique:
 - First intubation attempt - if failed go to
 - Second intubation attempts - if failed go to
 - First supraglottic airway attempts - if failed go to
 - Second supraglottic airway attempt - if failed go to mask ventilation
 - If mask ventilation inadequate - attempt cricothyrotomy
- Avoid airway trauma
- Ventilate with 8-10 breaths/min
- Minimize interruptions in chest compressions during advanced airway placement
- Recommend 6.0 to 7.0 mm inner diameter ETT

Algorithm 3: The American Heart Association cardiac arrest in pregnancy algorithm⁸

- Placenta abruptio/previa
- Sepsis.

Immediately after resuscitation steps should be taken to identify and treat the underlying cause.

Role of perimortem cesarean section (PMCD)

If CPR is not effective, consider resuscitative hysterotomy (also called perimortem cesarean delivery):

- PMCD should be considered at 4 minutes after onset of maternal cardiac arrest or resuscitative efforts (for the un-witnessed arrest) if there is no maternal ROSC... AHA 2015 GUIDELINES
- In patients who are > 20 weeks of pregnancy. Before 20 weeks of gestation there is no proven benefit from delivery of the fetus and placenta. Perimortem caesarean section should be considered a resuscitative procedure to be performed primarily in the interests of maternal, not fetal, survival.

The time frame can be extended to 6-14 minutes with good results as reported recently ⁴.

- A study by Rose et al reinforced the concept that arrangements for delivery should be made at the same time with initiation of maternal resuscitative efforts if the uterus is palpable at or above the umbilicus. The authors also added that if maternal condition is not rapidly reversible, hysterotomy with delivery should be performed regardless of fetal viability or elapsed time since arrest⁵.
- The resuscitation is more effective as the aorto-caval compression is relieved, the maternal oxygen requirement reduces and lung mechanics improve^{6,7}.
- Consent is not mandatory but it is advisable to inform simultaneously to the relatives.
- Perimortem caesarean section should not be delayed by moving the woman - it should be performed where resuscitation is taking place and there is no need to administer anaesthesia.

- A perimortem caesarean section tray should be available on the resuscitation trolley in all areas where maternal collapse may occur, including the accident and emergency department.
- The principle of successful CS delivery is rapid incision, rapid delivery and rapid closure. It is best obtained with large vertical abdominal incisions, Classical LSCS and closure with large running sutures in a single layer^{6,7}.
- CS will be relatively bloodless, since there is no circulation and cardiac output. Chest compressions and ventilation should be continued. If mother is resuscitated then she can be shifted to OT for proper closure of uterus & abdomen; and subsequently to ICU.
- Best survival rate for infants >28 weeks occurs when delivery of infant occurs in <5 minutes after the mother's heart stops beating.

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Calendar of Monthly Clinical Meetings 2018-19

Months	Name of the Institute
March, 2019	LHMC
April, 2019	Apollo Hospital

Advanced Life Support: ECMO & Beyond

Ranju Singh

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Dr Ranju Singh

Keywords

ECMO, ECLS, pregnancy, postpartum, respiratory failure, shock.

Introduction

Standard cardiopulmonary bypass is designed to ensure minutes to hours of support for patients undergoing surgery, and extracorporeal life support (ECLS) is a modified form of cardiopulmonary bypass that can provide support to the pulmonary and/or cardiac circulation for days to weeks. The term extracorporeal membrane oxygenation (ECMO) is preferred for patients who only require respiratory support, but both terms are sometimes used interchangeably. Blood is withdrawn from the venous circulation into tubing that is connected to a servo-regulated pump, then propelled to a membrane oxygenator, where carbon dioxide is removed and oxygenation occurs. Oxygenated blood is then rewarmed or cooled to the desired temperature and returned to the patient's circulation. In patients with adequate native cardiac function, blood may be both withdrawn and returned via the venous circulation of the patient (Fig 1). This mode of ECLS is termed *venovenous* (VV) and is predominant used in patients who require support for refractory respiratory failure thus is indicated only when native cardiac output is sufficient. Another mode of ECLS involves drainage of venous blood from the patient to the circuit, pump and

oxygenator, but the oxygenated blood is then returned to the arterial side of the patient's circulation (Fig 1). This type of support is termed *venoarterial* (VA). As it bypasses both the heart and lungs of the patient, it is preferred in patients with primary cardiac failure or in patients with both cardiac and respiratory dysfunction. The degree of support provided by ECLS is dependent on the caliber of cannulas used for venous drainage and arterial return, the size and resistance of tubing and circuit factors, and the quantity of blood diverted into the ECLS circuit. Physiologic factors such as the patient's available venous volume for bypass, systemic vascular resistance, and other physiologic factors also play a role into how much support ECLS can provide.

ECMO Circuits and Equipment

ECMO Circuits

All ECMO circuits involve four major components. There is an inflow cannula, which drains venous blood into the system, a pump which moves the blood through the system, an oxygenator which is a membrane system that functions analogous to the human lung, exchanging oxygen and carbon dioxide, and a return cannula which returns newly oxygenated blood to the systemic circulation. Additional components include a "blender" device which allows the specification of a particular percentage of oxygen versus room air components such as carbon dioxide and nitrogen, as well as a warming or cooling circuit which can control the temperature of the blood circulating through the system. When dealing with a patient on ECMO support, it is important to understand which vessel and site are providing inflow to the pump, what kind of tubing and oxygenator are being utilized, and where the outflow is located. Additionally, it is important to know what diameter the inflow and outflow cannulas are, as this will determine the amount of blood that can flow in litres per minute. Once cannulas are placed, the operator must connect to the ECMO circuit, but with extreme care to avoid even small bubbles of air. Once air-free connections are made, the pump is activated and ECMO commences. The clinician is advised to start slowly and increase the flow gradually.

Modes of Vascular Access

In VA ECMO the pulmonary circulation is bypassed by placing the artificial lung in parallel with the native lungs. Cannulation can be obtained centrally where blood drained directly from the right atrium and returned to the proximal ascending aorta or peripherally where

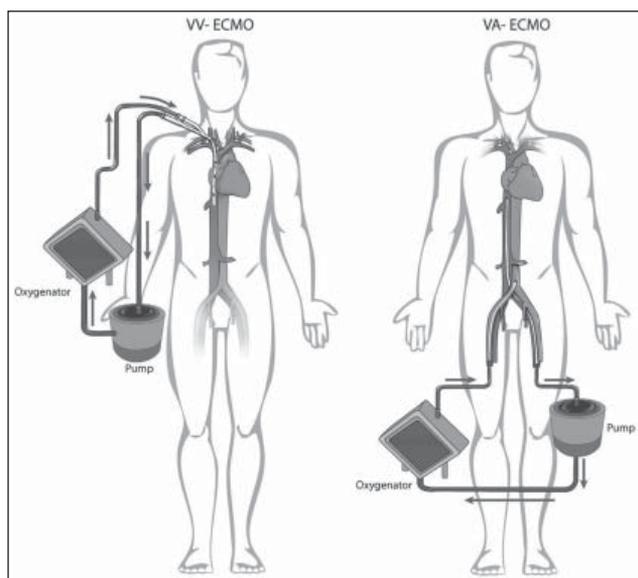


Figure 1: Commonly implemented venovenous (VV) and venoarterial (VA) extracorporeal membrane oxygenation circuit cannulation schemes.

blood drained from the proximal femoral or jugular vein and returned to the carotid, axillary, or femoral artery. VV ECMO places the native lungs in series with the artificial lung. In adults, several cannulation options currently exist. Traditionally, deoxygenated blood is drained from a femoral vein and returned to the right internal jugular vein.

Oxygenators and Pumps

ECMO oxygenators serve as artificial lungs to exchange both oxygen (to blood) and carbon dioxide (from blood) in place of the patient's native lungs. Two types of pumps are currently available in ECMO units: roller and centrifugal pumps. Centrifugal pumps, which are smaller, move blood by creating a pressure differential across a pump head that contains a magnetically driven impeller spinning at up to 3000 revolutions/min. Roller pumps move blood by progressively compressing segments of tubing along a curved raceway. Centrifugal pumps have been associated with a lesser degree of hemolysis compared with roller pumps, and therefore the use of these pumps in adult patients is increasing.

Monitoring

ECMO flows and the hemodynamic parameters including the heart rhythm and central venous pressures should be monitored. The adequacy of gas exchange support must be verified by arterial blood gases. Markers of total body oxygenation - SvO₂ and lactate should be tracked to ensure adequate perfusion and oxygen delivery to the end organs. The hemodynamic effects of ECMO upon the myocardium may be gauged by following the pulsatility of the arterial waveform. Coagulation parameters and temperature monitoring are of course essential.

Patient Populations Treated with ECMO

ECMO is now increasingly being used in adult patients with either cardiac or respiratory failure or both^{1,2}. The Extracorporeal Life Support Organization (ELSO) is an international consortium of health care institutions that maintains a registry of ECMO use. As of January 2016, the Extracorporeal Life Support Organization has captured more than 73,000 ECMO implementations, with more than 19,000 in adult patients³. The volume of adult ECMO cases increased by 433% from 2006 to 2011 in the United States⁴ with corresponding increases in expenditures and resource use. Patients categorized as respiratory failure have the best survival, while patients receiving ECMO for cardiac etiologies or during cardiac arrest have much lower survival rates. Conventional therapy for acute respiratory distress syndrome (ARDS) includes (among others) lung-protective mechanical ventilation, conservative fluid management and prone ventilation. In refractory cases, VV-ECMO may be considered since it provides transient respiratory support while allowing the clinician to avoid injurious ventilator settings, providing a period of "lung rest" until the pulmonary insult resolves. Importantly, in ideal candidates, the

underlying disease should be reversible (unless waiting for a lung transplant), and the patient should have a good chance of recovery after a few days of VV-ECMO support. Table 1 & 2 provides criteria that may be used to identify appropriate candidates for VV and VA-ECMO. Importantly, none of these criteria is an absolute indication for VV-ECMO; experienced clinicians must individualize patient selection. Patients with multiple organ failure from any etiology, septic shock, burns, trauma and immunocompromised patients all represent categories of disease that would have precluded ECLS use in the past but have been successfully supported with ECMO in more recent years.

Table 1: Potential indications for VV-ECMO support during pregnancy and postpartum.

- Severe (but potentially reversible) respiratory failure.
- Hypercapnia with severe respiratory acidosis despite optimal conventional mechanical ventilation with respiratory rate increased upto 35 breaths/min.
- PaO₂/FiO₂ ratio less than 100 with inspired fraction of oxygen ≥0.9 and PEEP ≥10 cm H₂O despite optimal ventilator support and use of usual adjunctive methods (e.g., cisatracurium, recruitment maneuvers, prone ventilation, and adequate PEEP).

Table 2: Potential indications for VA-ECMO support during pregnancy and postpartum.

- Refractory left ventricular failure from peripartum cardiomyopathy, myocardial infarction, myocarditis
- Bupivacaine intoxication requiring prolonged cardiopulmonary resuscitation
- Refractory right or left ventricular failure in suspected cases of amniotic fluid embolism
- Inability to wean from cardiopulmonary bypass after heart surgery
- Massive pulmonary embolism with refractory right ventricular failure
- Need for prolonged cardiopulmonary resuscitation (atleast 10 min) with a potentially reversible precipitating condition

Acceptance of ECMO as a useful support technique in adult patients was slow. In the 1970s a National Institutes of Health sponsored randomized trial of ECMO versus conventional mechanical ventilation found that ECMO was not superior to conventional care⁵. That trial, however, was marred by the fact that patients in both groups had ventilator settings maintained at high levels (FIO₂ 1.0 and high peak pressure) even if there were on ECMO. Excessive bleeding complications occurred in the ECMO group, and many of the centres involved had little to no prior ECMO experience. Nonetheless, the dismal survival rate of 9% in each group precluded the use of ECLS in adults in many clinicians' minds for many years. Then the Conventional Ventilation or ECMO for Severe Adult Respiratory Failure (CESAR) trial⁶ was published. Of 180 patients entered into the CESAR trial (90 in the conventional group and 90 in the ECMO arm), survival at 6 months without disability in the ECMO arm was significantly better than the conventional arm (63% vs 47%, P=0.03). The CESAR trial showed a positive benefit for ECMO use in adult respiratory failure, but also raised a few questions that need continued research and

discussion. Soon after the publication of the CESAR trial came the global pandemic of the H1N1 virus in 2009-2010 that led to a higher incidence of acute respiratory distress syndrome (ARDS) refractory to conventional therapy, but the patients had better survival rates with use of ECMO⁷. Besides this, the use of ECMO in adults has expanded due to several other factors such as improvements in technology that allow more successful applications of ECMO and development of infrastructure of specialized centres capable of transporting patients requiring ECMO from outside facilities to their intensive care units.

A growing new category among ECMO patients is that of extracorporeal cardiopulmonary resuscitation (ECPR), which is ECMO applied during active cardiopulmonary resuscitation. The survival rate for this group of patients is 30-40%. While duration of CPR prior to ECMO has not been proven to be associated with outcome in most recent studies, provision of adequate CPR efforts remains imperative^{8,9}. As with all resuscitative rescue efforts, the goal of ECMO is not just to provide circulatory survival, but intact neurodevelopmental outcome as well. As with all areas of ECLS, data on short-term and long-term neurologic outcome and functionality of patients who survive ECLS following cardiac arrest is another area that needs investigation.

Although the overall use of ECMO has increased, there is scant literature addressing the use of ECMO for either cardiac or respiratory failure in patients who are pregnant or postpartum. However, there are many potential indications, such as the acute respiratory distress syndrome (due to pneumonia, especially influenza pneumonia; aspiration; transfusion-related lung injury; or non-pulmonary sepsis, trauma), pulmonary embolism, amniotic fluid embolism, pulmonary hypertension, cardiomyopathy (including postpartum cardiomyopathy), and extracorporeal cardiopulmonary resuscitation (most frequently in the setting of pulmonary embolism or amniotic fluid embolism). Mortality due to ARDS during pregnancy is not significantly different than that in non-pregnant patients (23%-39%) but is associated with marked perinatal morbidity and a high rate of fetal loss (23%)¹⁰. Multiple organ dysfunction syndrome has been reported as the most common cause of maternal death¹⁰. The overall approach to treating ARDS during pregnancy closely follows that for the general patients with ARDS and includes providing supportive care while identifying and treating the underlying cause. However few strategies commonly used in non-pregnant patients with ARDS might not be acceptable in pregnant patients, such as permissive hypercapnia which may have significant fetal effects, and although prone positioning may be possible in early pregnancy, it has obvious limitations in late pregnancy¹⁰.

The use of ECMO in pregnant patients with refractory hypoxemia has shown promise. The extent of published experiences with ECMO during and immediately after pregnancy is mostly limited to some case reports¹¹⁻¹⁴.

These case reports are beginning to illuminate that ECMO in this setting may be beneficial to save the lives of both the mother and child. Much is unknown about the unique risks associated with ECMO in the peripartum period, although concerns have arisen about both hypercoagulability and hemorrhage. Likewise, the preferred method and timing of fetal monitoring and delivery are not well described. No current guidelines are available from the Extracorporeal Life Support Organization, the American College of Obstetricians and Gynaecologists, or the Society for Maternal-Fetal Medicine on the use of ECMO during or after pregnancy. The adult population has shown improved survival in patients who received mechanical ventilation for <5 days before the initiation of ECMO. Maternal and fetal outcomes also appear to be better in patients receiving mechanical ventilation for <7 days before initiation of ECMO¹⁵. An important consideration to keep in mind in pregnant women who require ECMO is the fact that during late pregnancy, the enlarged uterus may compress the vena cava, leading to such adverse effects as reduced maternal cardiac output and fetal oxygenation. This condition may explain the difficulty faced when advancing a femoral venous cannula through the inferior vena cava into the right atrium. Ngatchou and colleagues¹⁶ proposed using a 15°-30° left lateral tilt position during femoral cannula insertion to reduce aortocaval compression in late pregnancy.

A case series of four patients reported survival in all four mothers and in three of the four fetuses¹⁷. The largest case series in the literature reported on 18 peripartum patients, four of whom were pregnant at the time of cannulation¹⁸. Mortality in that series was 11.1% with only two patients not surviving to hospital discharge. Fetal survival was 100% in those patients cannulated after fetal viability - overall fetal survival was 77.8%. Two patients successfully delivered on ECMO. One-third of the patients (33.3%) in this cohort had bleeding as a complication of their ECMO with no fetal complications attributable to ECMO. Other complications in the mothers included: disseminated intravascular coagulation, as well as occlusive and non-occlusive deep vein thromboses. The duration of ECMO was relatively brief overall (median 6.6 days). One case report describes the use of ECMO in a woman at 37 weeks' gestation, following cardiac arrest from pulmonary embolism immediately post-partum from an emergent Caesarean section and the patient achieved complete physical and neurologic recovery¹⁹. Ho YK also describes a case developing pulmonary embolism after cesarean section and successful treatment with early application of ECMO and anticoagulant agents²⁰. ECMO has been successfully used to help a 43-year-old woman survive after a cardiorespiratory arrest during her cesarean section due to amniotic fluid embolism²¹.

A delivery plan should be prepared for all pregnant patients who receive ECMO which considers both patient and fetal condition. Oxygen delivery to the placenta is determined by oxygen content of uterine arterial blood

and uterine artery blood flow, which is about 10% of maternal cardiac output (600 to 700 mL oxygen/ min) at term. Thus, timing of delivery should include assessment of the burden of the fetoplacental unit (ie, fetal oxygen consumption) on maternal oxygenation and fetal stability. This can be done in early consultation with a high risk maternal-fetal medicine specialist to ensure adequate fetal support, identify signs of physiologic stress, and optimize the fetus for potential premature or emergent delivery. Although ideally the pregnancy would be supported to term or until the patient's cardiopulmonary recovery, planning for prompt delivery on ECMO is key to optimize both maternal and fetal outcomes. There are few reports of deliveries occurring on ECMO support, which have occurred vaginally and by cesarean delivery^{17, 22, 23}. In all patients, but particularly those with pre-existing cardiomyopathy or pulmonary hypertension, when alterations in hemodynamic or intravascular volume status carry a high risk of death, careful consideration should be given to the risks and benefits of cesarean delivery versus vaginal delivery. ECMO can also be used in the delivery room on standby for extremely high-risk deliveries. In these cases, careful multidisciplinary planning with possible placement of micro puncture sheaths will enable the ECMO team to rapidly gain vascular access if the patient decompensates during delivery and may be an evolving application of extracorporeal support.

Complications

Complications can arise from patient factors or malfunctions of ECMO circuit components. Two critical circuit complications may require the immediate clamping and discontinuation of ECMO to facilitate resolution: gas embolism and massive blood loss secondary to tubing ruptures or disconnections. Other ECMO circuit complications include blood clots, loss of circuit flow (usually secondary to hypovolemia) and primary failure of circuit components. Patients are particularly susceptible to bleeding (at the insertion site, surgical site, intra-cranially, or intra-abdominally) due to required anticoagulation therapy as well as thrombocytopenia and clotting factor deficiencies that are common while on ECMO. Platelets, leukocytes and clotting factors are activated and consumed when blood contacts the foreign material in the ECMO tubing. Therefore, the majority of patients on ECMO are thrombocytopenic and at risk for bleeding complications. Lower extremity ischemia sometimes needing fasciotomy, and systemic infections also complicated many of the ECMO runs. Neurologic complications during ECMO are particularly devastating. The most common neurologic complications include intracerebral hemorrhage, ischemic stroke and seizures. Intracerebral hemorrhage, typically a fatal complication, is a significant risk due to the challenge of balancing adequate systemic anticoagulation therapy with the thrombocytopenia manifested in the majority of ECMO patients. Assessing a patient's neurological

status can be difficult due to the sedatives and paralytics often prescribed during ECMO. Table 3 summarizes some of the most common complications that may occur with ECMO.

Table 3: Common complications with VV-/VA- ECMO support.

Circuit thrombosis	Prevent with systemic anticoagulation (most commonly with unfractionated heparin).
Bleeding	Etiology is multifactorial, including anticoagulation, thrombocytopenia, and acquired Von Willebrand disease secondary to destruction of large multimers in the extracorporeal circuit. Threshold to transfuse varies among centers. Maintain hemoglobin above 7-8 g/dL.
Infection	Some centers advocate broad-spectrum antibiotics while on ECMO support despite limited evidence.
Hemolysis	Some degree of hemolysis may occur from the negative pressure generated by the pump. Excessive hemolysis may be due to cannula malposition or hypovolemia with less venous return to the circuit.
Thrombocytopenia	May require transfusion of platelets if active bleeding or less than 20,000/mm ³ .

Weaning from ECMO

The process of weaning of ECMO involves reducing the flow through the device as native organ function improves and assessing the response. Anticoagulation must be sufficient so that the circuit does not develop clots during the time of lower flows. The earliest sign of cardiac recovery in patients on VA ECMO is the return of pulsatility on the arterial waveform. Cardiac function and hemodynamic parameters can also be continually assessed with transoesophageal echocardiography during weaning. A variety of metrics are available to determine if patients on VV ECMO are recovering pulmonary function: an increase in oxygen saturation at a constant circuit flow; a progressive increase of oxygen saturation above venous oxygen saturation, improving lung compliance and clinical improvements in chest radiography.

Summary

The field of ECLS is moving forward at lightning speed. Continued technical advances are making ECMO safer, easier, and more widely available to patients, from neonates through adults. Better understanding of physiology and improved patient management continue to evolve. While ECMO appears from case reports and case series to be effective, feasible and reasonably safe in patients who are pregnant or postpartum with cardiac or respiratory failure and for her fetus, more data are clearly needed to better appreciate the potential indications, contraindications, and specific techniques involved. However, given the potential for recovery in a population that skews younger and healthier than

the general population, the expanded use of ECMO in high-risk obstetric populations, such as those with ARDS and pulmonary hypertension, may result in improved maternal and fetal outcomes and may be appropriate in centres experienced with the use of ECMO for cardiac and respiratory failure. For centres that do not have this experience, early referral is encouraged in those cases where deterioration may be anticipated.

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CONTROVERSY

Amniotic Fluid Embolism or Pulmonary Thromboembolism? Differentiating The Two



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Pulmonary thromboembolism (PTE) and Amniotic fluid embolism (AFE) make up 2 of the most common causes of maternal death in the United States, together accounting for almost 23% of maternal death. AFE accounted for 14% of the total maternal deaths, and pulmonary thromboembolism accounted for 9% of the maternal deaths.

Amniotic Fluid Embolism

Amniotic fluid embolism is a rare but potentially lethal complication of pregnancy caused by the entry of amniotic fluid contents into the maternal circulation. UK data from 2016 give an incidence of AFE of 1.7 per 100 000 maternities.¹ Survival rates seem to have improved significantly over time, from 14% in 1979,² to approximately 30% in 2005³ and 81% by 2014.¹ However, neurological morbidity in survivors is well recognised. 70% of cases of amniotic fluid embolism occur during labor, 11% after a vaginal delivery, and 19% during a caesarean delivery.⁴ In rare instances, amniotic fluid embolism may occur during the first or second trimesters of pregnancy, at the time of pregnancy termination, or amniocentesis

Pathophysiology The pathophysiology of AFE is an area of controversy. It is presumed that amniotic fluid enters the maternal circulation. Paradoxically, AFE has been described up to 48 hours postpartum. It has been proposed that amniotic fluid and fetal debris may be trapped in the uterine veins and released into the circulation during uterine involution. Fetal squamous cells have been found in the circulation of women who do not experience AFE, and conversely, AFE has been diagnosed in women in whom fetal cells and debris were not present post-mortem. Benson et al. reported that C3 and C4 levels in AFE patients were significantly lower than normal⁵, suggesting that complement activation has an important role in the pathophysiology of AFE.

Disruption of the maternal/fetal interface with potential passage

of amniotic fluid to maternal circulation leads to increased levels of

pulmonary vasoconstrictors (e.g. endothelin) and mechanical obstruction from cellular and acellular components of amniotic fluid.

Initiating event and the complete pathophysiology are poorly understood. Progression usually occurs in 2 phases.

- In phase I, pulmonary artery vasospasm with pulmonary hypertension and elevated right ventricular pressure cause hypoxia.
- Hypoxia causes myocardial capillary damage and pulmonary capillary damage, left heart failure, and acute respiratory distress syndrome.
- Women who survive these events may enter phase II.
- This is a hemorrhagic phase characterized by massive hemorrhage with uterine atony and DIC; however, fatal consumptive coagulopathy may be the initial presentation.
- Amniotic fluid activates Factor VII and platelets with consequent disseminated intravascular coagulation (DIC). Inflammatory response further activates clotting cascade Hemorrhage contributes to hemodynamic instability.

Diffuse intravascular clotting from DIC contributes to ischemic distal organ dysfunction and multi organ failure.⁶

Diagnosis The classic history is that a woman in the late stages of labor becomes acutely dyspnoeic with hypotension. There may be a preceding period of agitation or a sense of impending doom.

The classic triad of AFE is hypoxia, hypotension and coagulopathy. The following signs and symptoms are indicative of possible AFE:

- Hypotension: Blood pressure may drop significantly with loss of diastolic measurement.
- Patients may progress rapidly to cardiac arrest, with pulseless electrical activity, asystole, ventricular fibrillation, or pulseless ventricular tachycardia.
- Dyspnea: Labored breathing and tachypnea may occur.
- Seizure: Tonic clonic seizures are seen in 50% of patients.
- Cough: This is usually a manifestation of dyspnea.
- Cyanosis: As hypoxia/hypoxemia progresses, circumoral and peripheral cyanosis and changes in mucous membranes may manifest.
- In cases occurring prior to delivery, electronic fetal monitoring will demonstrate decelerations, loss of variability, and terminal bradycardia as oxygenated blood is shunted away from the uterus, and catecholamine induced uterine hypertonus causes a further decline in uterine perfusion.⁷
- Pulmonary edema: This is usually identified on chest radiograph.

- Uterine atony: Uterine atony usually results in excessive bleeding after delivery. Failure of the uterus to become firm with bimanual massage is diagnostic.
 - Coagulopathy or severe hemorrhage in absence of other explanation (DIC occurs in 83% of patients.)⁸
 - Altered mental status/confusion/agitation⁹
- Remember all occurring in relation to labor and delivery.

Differential Diagnosis

- myocardial infarction,
- pulmonary embolism,
- air embolism,
- anesthetic complications,
- anaphylaxis, and
- eclampsia and
- sepsis

The use of any specific diagnostic laboratory test to either confirm or refute the diagnosis of AFE is not recommended at the present time; AFE remains a clinical diagnosis. (GRADE 1C)⁶. The clinical diagnosis is often one of exclusion because no single specific diagnostic test is currently available.

Adjuvant laboratory tests in amniotic fluid embolism

Complete blood counts Peripheral smear Coagulation profile-PT, aPTT, D-dimer, fibrin degradation products, fibrinogen Thromboelastography/thromboelastometry Serum electrolytes ABG ECG Cardiac enzymes Echocardiography (transthoracic/transesophageal) Chest radiograph
aPTT: Activated partial thromboplastin time, PT: Prothrombin time, ABG: Arterial blood gas, ECG: Electrocardiogram

Management is supportive.

Pulmonary Embolism

The incidence of pregnancy-related venous thromboembolism has been reported to be as high as 1.72 per 1000 deliveries, and the incidence of pulmonary embolism in pregnancy is 200 per 100,000 woman-years.¹¹ Thromboembolism usually presents unprovoked and with little warning, therefore rapid diagnosis and treatment is critical for preventing maternal deaths. An understanding of the risk factors, clinical symptoms, diagnostic testing, and treatment modalities is necessary to make a rapid diagnosis and institute timely therapy.¹²

Risk factors

Venous thromboembolism can occur at any point in pregnancy or postpartum, although half of pregnancy-related venous thromboembolism occurs in the postpartum period.¹³ Many changes that occur during

pregnancy and postpartum period make a woman more prone to develop thromboembolism.

These are _

- Hypercoagulability
- Decreased mobility
- Venous stasis

Pregnancy is a state of relative hypercoagulability with increase in levels of fibrinogen; factors VIII, IX, and X; von Willebrand factor; and plasma activator inhibitors 1 and 2. During labor woman may have decreased mobility because of pain epidural analgesia and fetal monitoring. Women undergoing cesarean delivery are especially at risk and carry twice the risk of venous thromboembolism. The American College of Obstetricians and Gynecologists recommends that all women undergoing cesarean

delivery have pneumatic compression devices placed before cesarean delivery and that women with additional risk factors may require thromboprophylaxis with heparin.¹⁴

Diagnosis

The symptoms of PE include dyspnoea, chest pain, haemoptysis and collapse. It is noteworthy that a low-grade pyrexia and leucocytosis can occur with VTE. If DVT remains untreated, 15-24% of these patients will develop PE. PE during pregnancy may be fatal in almost 15% of patients, and in 66% of these, death will occur within 30 minutes of the embolic event.

What investigations are needed for the diagnosis of an acute PE?

Women presenting with symptoms and signs of an acute PE should have an electrocardiogram (ECG) and a chest X-ray (CXR) performed. While the CXR is normal in over half of pregnant patients with objectively proven PE, abnormal features caused by PE include atelectasis, effusion, focal opacities, regional oligoemia or pulmonary oedema. The radiation dose to the fetus from a CXR performed at any stage of pregnancy is negligible (less than 0.01 mSv).¹⁵

In the setting of fatal pulmonary embolism, 65% of the fatalities occur in the first hour after onset of symptoms.¹⁶ Because of the risk of sudden death with pulmonary thromboembolism, treatment should not be delayed for diagnostic testing if there is a high clinical suspicion of pulmonary embolus. Anticoagulation should be instituted immediately in any pregnant woman who complains of acute onset of shortness of breath and in whom pulmonary embolism is of concern¹²

Approximately 80% of women with a pulmonary embolism have evidence of a deep venous thrombosis (DVT). For this reason, pregnant women who are suspected of having a pulmonary embolism and have signs or symptoms of a DVT should undergo evaluation of the lower extremities. Compression duplex ultrasound should be performed. If compression ultrasonography confirms the presence of DVT, no further investigation is

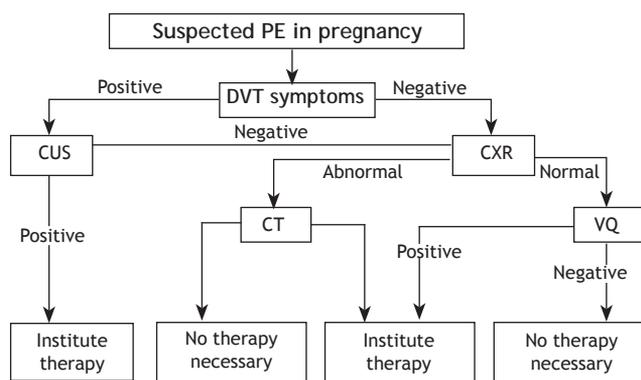
necessary and treatment for VTE should continue.

In pregnant women who are suspected of having a pulmonary embolism and who do not have signs or symptoms of DVT, the evaluation should start with ruling out pulmonary embolism and not with DVT evaluation. In women with suspected PE without symptoms and signs of DVT, a ventilation/perfusion (V/Q) lung scan or a computerised tomography pulmonary angiogram (CTPA) should be performed.¹⁵ The radiation dose required for either V/Q scanning or CT-PA is below the teratogenic fetal dose of radiation, and should not be a contraindication to performing definitive imaging if required.¹⁷

When the chest X-ray is abnormal and there is a clinical suspicion of PE, CTPA should be performed in preference to a V/Q scan. Alternative or repeat testing should be carried out where V/Q scan or CTPA is normal but the clinical suspicion of PE remains. Anticoagulant treatment should be continued until PE is definitively excluded. If the result of the initial chest radiograph is normal, then VQ scan may be more likely to yield a diagnostic result than a CT scan. ABG analysis is of limited diagnostic value. V/Q scanning has high negative predictive value in this situation and it gives substantially lower radiation dose to pregnant breast tissue.

While CTPA is associated with a low risk of radiation for the fetus, this must be offset by the relatively high radiation dose (up to 20 mGy) to the mother's breast tissue, which is associated with an increased risk of breast cancer.

Treatment In clinically suspected DVT or PE, treatment with low-molecular-weight heparin (LMWH) should be commenced immediately until the diagnosis is excluded by objective testing, unless treatment is strongly contraindicated. Before anticoagulant therapy is commenced, blood should be taken for a full blood count, coagulation screen, urea and electrolytes, and liver function tests. Performing a thrombophilia screen prior to therapy is not recommended.



CUS, compression ultrasound, CXR, chest radiograph; DVT, deep venous thrombosis embolism; PE, Pulmonary embolism

Figure 1. flow diagram of tests to diagnose pulmonary embolism¹²

Collapsed, shocked women who are pregnant or in the

puerperium should be managed by multidisciplinary team. Intravenous unfractionated heparin is the preferred, initial treatment in massive PE with cardiovascular compromise. Women should be managed on an individual basis regarding: intravenous unfractionated heparin, thrombolytic therapy or thoracotomy and surgical embolectomy.¹⁵

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CASE APPROACH

Cardiogenic Shock

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Dr Aparna Agrawal

One important category of causes of maternal collapse is shock. Shock is the clinical syndrome that results from inadequate tissue perfusion wherein imbalance between the delivery of oxygen and substrates and their requirement leads to cellular dysfunction. Clinical shock is usually accompanied by hypotension (SBP < 90 mmHg or mean arterial pressure < 60 mmHg in previously normotensive persons and a fall of ≥ 20 mmHg systolic blood pressure and/or, ≥ 10 mmHg diastolic blood pressure from previously recorded values in a hypertensive patient).

Classification of Shock	
Hypovolemic	Neurogenic
Traumatic	Hypoadrenal
Cardiogenic	Septic
Intrinsic	Hyperdynamic (early)
Compressive	Hypodynamic (late)

Courtesy: Maier RV. Approach to the Patient with Shock. In: Kasper DL, Hauser SL, Jameson LJ, Fauci AS, Longo DL, Loscalzo J (Eds). HARRISON'S PRINCIPLES OF INTERNAL MEDICINE, 19th edition. Vol. 2. The McGraw-Hill Companies, Inc.; 2015. p. 1744-51.

Among these types, approach to cardiogenic shock will be discussed in the present article.

Cardiogenic shock

Definition

Cardiogenic shock is a life-threatening condition that should be treated as a medical emergency. It is characterized by systemic hypoperfusion due to severe depression of the cardiac index (<2.2 L/min/m²) and sustained systolic arterial hypotension (<90 mmHg) despite an elevated filling pressure (pulmonary capillary wedge pressure >18 mmHg).

Aetiology

Causes specific to pregnancy
- Peripartum cardiomyopathy
- Amniotic fluid embolism
- Pulmonary embolism from a deep venous thrombus (pregnancy is a hyper-coagulable state)
- Pre-eclampsia with severe features
- HELLP syndrome (haemolysis, elevated liver enzymes, low platelets)
- AFLP (acute fatty liver of pregnancy)
- Hyperglycaemia/ ketoacidosis (gestational diabetes mellitus)
Causes common in pregnancy
- Aortic dissection with aortic insufficiency or tamponade e.g. Marfan's syndrome
- Ehlers-Danlos syndrome (type 4)

- Severe valvular heart disease (rheumatic, congenital, etc.)
Critical aortic/mitral stenosis
Acute severe aortic regurgitation or MR
- As a part of multiorgan dysfunction syndrome
Infection (like pyelonephritis, post-partum endomyometritis, septic
Pelvic thrombophlebitis)
Hyperglycaemia/ ketoacidosis (Type 1 or 2 diabetes mellitus)
- Causes unrelated to pregnancy
- Congenital heart diseases
Hypertrophic cardiomyopathy with severe outflow obstruction
Primary pulmonary hypertension
Eisenmenger's syndrome
- Ischemic heart disease
Acute myocardial infarction/ischemia
LV failure
Ventricular septal rupture
Papillary muscle/chordal rupture- severe mitral regurgitation (MR)
Ventricular free wall rupture with subacute tamponade
- Rhythm disturbances
Refractory sustained tachyarrhythmias
Refractory sustained bradyarrhythmia
- Others
Post-cardiac arrest
Post-cardiotomy
Acute fulminant myocarditis
Pericardial tamponade
- Miscellaneous
Toxic/metabolic
(Beta-blocker or calcium channel antagonist overdose, severe acidosis, severe hypoxemia)

Clinical Approach

History

- Symptoms (past or present): exertional breathlessness or breathlessness at rest (including paroxysmal nocturnal dyspnoea, orthopnoea) suggestive of left heart failure, palpitations (LV dysfunction, arrhythmia), chest pain or discomfort (myocardial ischemia), haemoptysis, leg/ facial swelling, dizziness/syncopal episodes, exertional fatigue, squatting or cyanotic spells (congenital heart disease), fleeting joint pains, recurrent sore throat (rheumatic heart disease), fever (rheumatic fever, viral myocarditis), unilateral leg swelling with or without dilated venous channels (deep venous thrombosis), headache, blurring of vision, reduced urine output (preeclampsia/eclampsia), polydipsia, polyuria, recurrent infections (gestational diabetes

mellitus), yellow discoloration of eyes and urine, pain abdomen, vomiting, gastrointestinal blood loss (acute fatty liver of pregnancy) may give a clue to potential underlying condition.

- Prior pregnancies: any ante-, intra- or perinatal complications during prior pregnancies may direct attention to previously undiagnosed heart disease or risk factors for heart disease in the expecting mother.
- Past history of hypertension, myocardial infarction, diabetes mellitus, prior DVT, any heart disease, arrhythmia, etc. should be inquired into.
- Family history of any heart disease (premature coronary artery disease, hypertrophic cardiomyopathy), type 2 diabetes mellitus, essential hypertension, hyperlipidaemia or history of gestational diabetes mellitus in the mother may hold significance. Cigarette/bidi smoking may also be contributory.
- Treatment suggestive of use of diuretics, anti-hypertensives or penicillin prophylaxis should be asked.

Clinical Examination

- Assessment of the general appearance of the patient is important-
 - in pain or resting quietly
 - dyspnoeic or diaphoretic
 - alert or drowsy
- Vital signs: Blood pressure (which may be low), pulse rate (for arrhythmia), respiratory rate, pulse oximetry for low oxygen saturation, spot dextrose and temperature should be measured and monitored. Clinical shock is usually accompanied by hypotension (i.e. mean arterial pressure < 60 mmHg. Mean arterial pressure is calculated as:

$$\text{MAP} = \frac{\text{SBP} + 2(\text{DBP})}{3} \text{ or, } \text{MAP} = \frac{1}{3}(\text{SBP} - \text{DBP}) + \text{DBP}$$

Check for postural tachycardia or hypotension which may be a precursor for full blown shock. Pulse is typically weak and rapid but severe bradycardia may be manifestation of high grade heart block. Systolic blood pressure is usually reduced with a narrow pulse pressure. Tachypnoea, Cheyne-Stokes breathing, increased jugular venous pressure may be present.

- General physical examination should include a comprehensive head to toe survey with attention to detail. Skin or mucosal pallor, cyanosis and icterus can be appreciated readily and provide additional clues. Lower extremity or pre-sacral oedema in the setting of an elevated jugular venous pressure defines volume overload. Malar flush, petechial rashes, asymmetrical leg swelling with or without varicosities and venous ulcers (DVT), high-arched palate, arachnodactyly, positive “wrist” or “thumb” sign, increased arm span to height ratio (Marfan’s syndrome), hypertelorism, low-set ears, micrognathia, clubbing (associated with congenital heart disease), Janeway lesions, Osler nodes, splinter haemorrhages (subacute bacterial endocarditis) if present may contribute.

Cardiovascular system examination:

All cardiac areas should be individually and systematically assessed.

Inspection

Scars (past surgery), prominent venous collaterals, any chest deformity like pigeon or funnel chest (congenital heart diseases/other long-standing cardiac disease), visible pulsations (especially apical impulse which may be weak) anywhere over precordium or otherwise should be looked for.

Palpation

The position and character of apical impulse, palpable heart sounds called shocks (palpable P2 is an important sign of pulmonary hypertension), thrills (systolic/diastolic) and parasternal heave should be looked for.

Auscultation

Heart sounds, murmurs (grade, timing-systolic/diastolic/continuous, pitch, character, radiation, conduction, best heard where and in what position, whether better heard with a bell or diaphragm of the stethoscope) and other added sounds (like third/fourth heart sound causing a gallop rhythm, opening snap, ejection click, pericardial rub, etc.) if present should be noted. Dynamic auscultation (using simple bedside manoeuvres) should be done cautiously if required especially in advanced pregnancy.

Other system examination:

Tender hepatomegaly (congestive heart failure), systolic liver pulsations (tricuspid regurgitation), reduced liver span (AFLP), ascites, discharge/bleeding per vaginum, audible wheezing, adventitious sounds in lungs (fine basal crepitations in acute cardiogenic pulmonary oedema), etc. should be looked for.

Investigations

All routine and some special investigations may be required depending on the patient profile and clinical clues to confirm the diagnosis.

1. Hemogram and biochemistry

Falling haemoglobin levels suggest bleed/rupture/abruptio placentae. Low platelets may indicate disseminated intravascular coagulation (check for intra uterine death/ abruptio placentae) or sepsis. The white blood cell count is typically elevated with a left shift in sepsis. Blood urea nitrogen and creatinine may rise progressively with or without development of oliguria (acute kidney injury). Hepatic transaminases (AST-aspartate transaminase, ALT-alanine transaminase), bilirubin, lactate dehydrogenase (LDH), prothrombin time may be markedly elevated due to congestive hepatopathy, liver hypoperfusion or AFLP. Serum electrolyte monitoring should be tailored to risks or presence of renal failure. D dimer levels (pulmonary embolism), urine routine and urine culture, urine for protein

(pre-eclampsia) may be indicated. Any combination of elevated LDH, AST, ALT with low platelets should alert one to suspect partial or complete HELLP syndrome. Monitor blood glucose levels for hypoglycaemia.

2. Arterial blood gas analysis

This usually demonstrates hypoxemia, anion gap metabolic acidosis and elevated lactic acid levels (lactate > 1.5 times upper limit of normal for reporting lab). Lactate clearance is a marker of resolving end-organ hypoperfusion, and lack of clearance is associated with a high risk of mortality.

3. Cardiac markers

Serum creatine phosphokinase and its MB fraction, and troponins I and T are typically markedly elevated in myocardial infarction. Natriuretic peptides are significantly elevated in the setting of acute heart failure culminating in cardiogenic shock.

4. Electrocardiogram

ST segment depression, elevation, bundle branch block, Q waves may be seen in ischemia/infarction (STEMI/NSTEMI). It can also suggest pulmonary embolism, acute myocarditis, electrolyte imbalances and drug toxicity.

5. Chest roentgenogram

It may reveal a pulmonary vascular congestion and pulmonary oedema, cardiomegaly in long-standing cardiac disease, etc. It may help in suggesting alternate diseases like aortic dissection, pericardial effusion, pneumothorax, pulmonary embolism.

6. Echocardiogram

A comprehensive transthoracic two-dimensional echo with colour-flow Doppler should be obtained promptly to help define the aetiology. Evidence of valvular heart disease, tamponade, ventricular dysfunction, proximal aortic dissection, regional wall motion abnormality, pulmonary embolism can all be obtained. When images are inadequate, or the diagnosis remains uncertain, a transoesophageal echocardiogram should be considered.

7. Computed tomography scan may be appropriate if an acute aortic syndrome or pulmonary embolism is suspected.

8. Pulmonary artery catheterization using pulmonary artery or Swan-Ganz catheter is generally recommended for measurement of filling pressures and cardiac output to confirm the diagnosis and optimize the use of intravenous fluids, inotropic agents and vasopressors in persistent shock.

9. Assessment of fetal well being needs to be done by an obstetrician.

Management of Cardiogenic Shock (CS)

A. Management

Once the patient is admitted to the hospital, management of CS frequently requires the primary care team to coordinate the multidisciplinary patient/ fetal monitoring, pharmacological therapies, mechanical technologies and may be delivery of the baby.

1. Vasoactive pharmacologic management (Vasopressors and inotropes)

Various intravenous drugs may be used to augment BP and cardiac output in patients with CS, however none has been shown to change the outcome in patients with established shock.

- Norepinephrine (started at 2-4µg/min, titrated upward as necessary) should be considered reasonable as initial vasopressor therapy as it is associated with fewer adverse events, including arrhythmias, compared to dopamine.
- Dopamine has varying hemodynamic effects based on the dose with moderate doses (2-10µg/kg/min) having positive inotropic and chronotropic effects as a consequence of B-adrenergic receptor stimulation.
- Dobutamine (2-20µg/kg/min) is a synthetic sympathomimetic amine with positive inotropic action.

Other agents which may be considered include epinephrine, vasopressin (vascular smooth muscle receptor stimulator), phenylephrine, milrinone (phosphodiesterase 3 inhibitor) and levosimendan (myofilament calcium sensitizer).

2. Non-vasoactive pharmacologic management

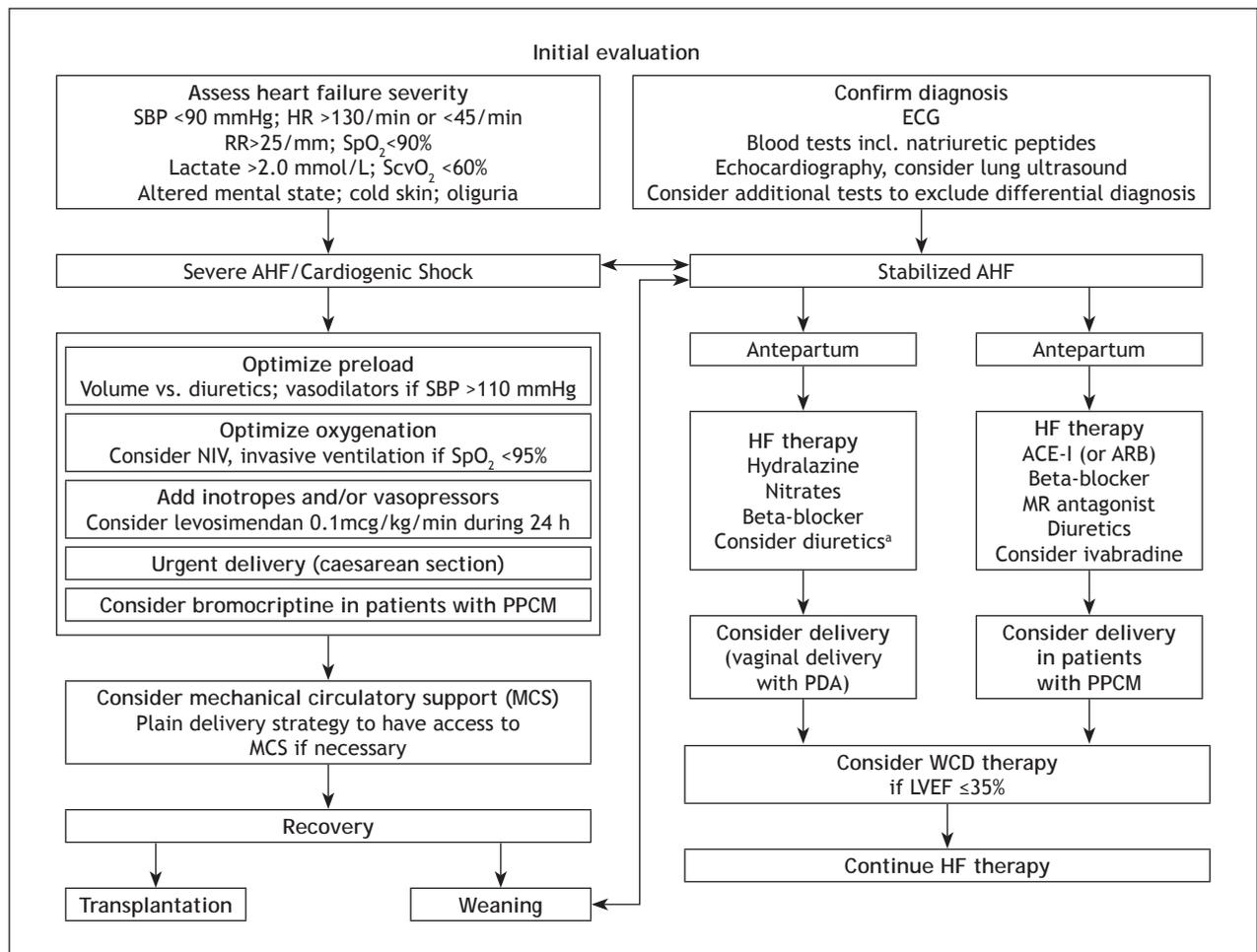
- AHA suggests that it may be reasonable to initiate B-blockers when the patient is euvolemic and off inotropes and vasopressors for at least 24 hours.
- RAAS inhibitor therapy initiation can be considered when the patient has been off vasopressors for 24 hours, provided that the patient's renal function has returned nearly to baseline levels and the risk of RAAS-associated hyperkalaemia or hypotension is low.
- Also, it is reasonable to administer statin in patients with MI-associated CS.
- Diuretics, especially loop diuretics, are the most efficacious in relieving clinical symptoms of shortness of breath and signs of peripheral oedema. The diuretic-induced decreases in ventricular filling pressures and ventricular cavity size, reduction in mitral regurgitation and resulting increase in cardiac output, all may be favourable.

B. Critical care unit monitoring (1:1 Nurse-to-patient ratio is ideal):

Monitoring Parameter	Frequency	Comment/Rationale
Noninvasive monitoring		
Telemetry, pulse oximetry, respiratory rate	Continuous	High incidence of arrhythmias, respiratory failure, and pulmonary edema
		High incidence of hemodynamic deterioration and multisystem organ failure
Invasive monitoring		
Arterial BP monitoring	Continuous	Consider continuing until vasoactive medications have been discontinued for 12-24 h
CVP	Continuous	Required for delivery of vasoactive medications; longitudinal CVP trends may provide information on trends in fluid status
Central venous oxygen saturation	Every 4 h	Trends in central venous oxygen saturation in patients with a central line can be used to help monitor trends in cardiac output
Urine output	Every hour	Urine output and serum creatinine monitoring are markers of renal perfusion and acute kidney injury
PAC or noninvasive cardiac output monitor	Selected use	Consider using early in the treatment course in patients not responsive to initial therapy or in cases of diagnostic or therapeutic uncertainty

Ref: Contemporary Management of Cardiogenic Shock. A Scientific Statement From the American Heart Association. Circulation. 2017; 136:e232-e268

C. Management of acute heart failure during/after pregnancy

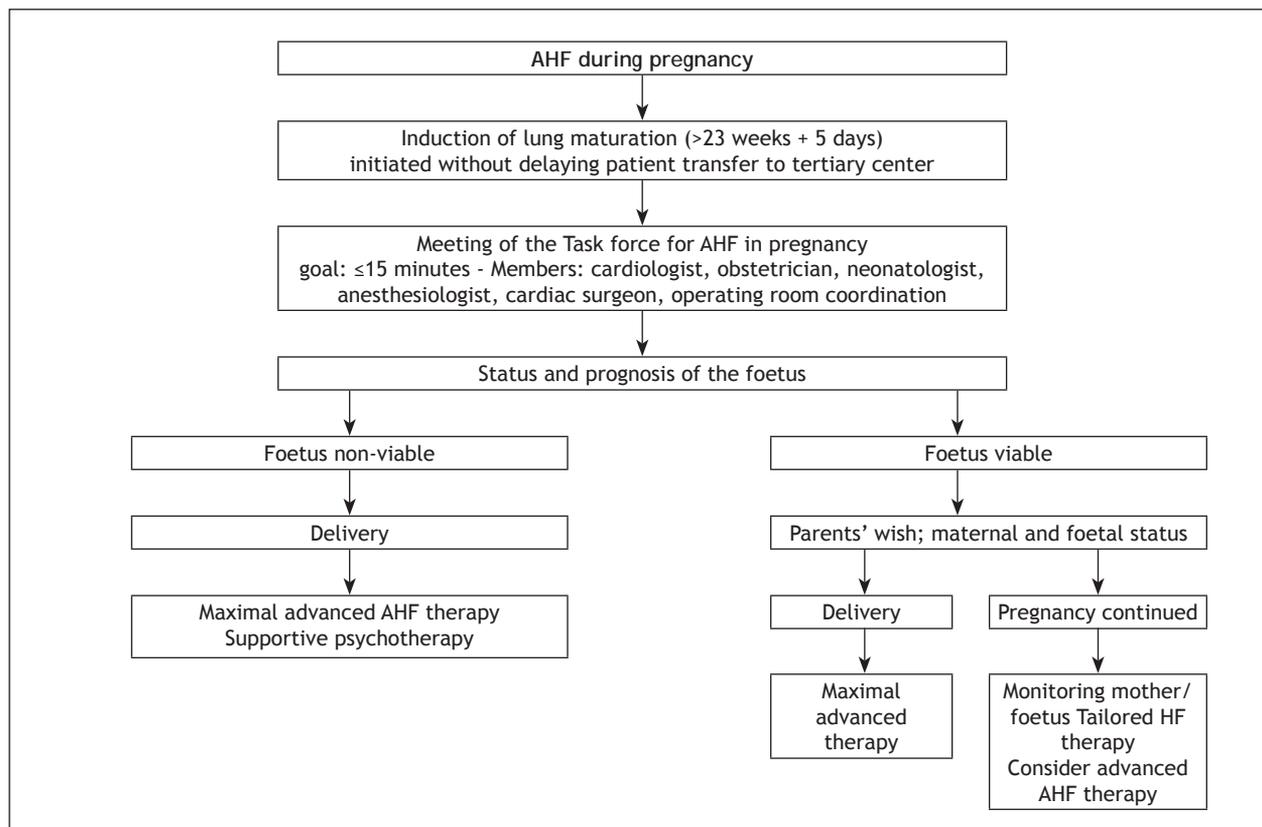


Courtesy: 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. European Heart Journal (2018) 39, 3165-3241

^aDiuretics have to be used with caution due to potential reduction in placental blood flow

Key: ACE-I-Angiotensin converting enzyme inhibitor, AHF- Acute heart failure, ARB- Angiotensin receptor blocker ECG- Electrocardiogram, HF- Heart failure, HR- Heart rate, LVEF- Left ventricular ejection fraction MCS- Mechanical circulatory support, MR- Mineralocorticoid receptor NIV- Non-invasive ventilation, PDA- Peridural analgesia PPCM- Peripartum cardiomyopathy, RR- Respiratory rate, SpO₂- oxygen saturation, SBP- Systolic blood pressure, ScvO₂- Central venous oxygen saturation, WCD- wearable cardioverter-defibrillator.

D. Management of acute heart failure during pregnancy: rapid interdisciplinary work-up and treatment of mother and fetus.



Courtesy: 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. *European Heart Journal* (2018) 39, 3165-3241

Key: AHF- acute heart failure, HF- heart failure

Management of Haemodynamic Instability and Cardiogenic Shock

HF in dilated cardiomyopathy (DCM) or PPCM can develop rapidly and Guidelines for the management of acute HF and cardiogenic shock apply. If the patient is in cardiogenic shock or dependent on inotropes or vasopressors, she should be transferred early to a centre where mechanical circulatory support teams are available. PPCM patients are sensitive to the toxic effects of beta-adrenergic agonists, which should be avoided whenever possible. Levosimendan may be the preferred inotrope.

Management goals are similar to non-pregnant acute HF, while avoiding fetotoxic agents (ACE inhibitors, ARB, ARNI, MRA, and atenolol). HF with pulmonary congestion is treated with loop diuretics and thiazides if required; however, diuretics should be avoided in the absence of pulmonary congestion, due to the potential reduction in placental blood flow.

Hydralazine and nitrates appear safe but should only be used in the presence of hypertension, severe LV dysfunction, and/or evidence of congestion in decompensated HF. Beta blockers should be initiated cautiously and gradually titrated up to the maximum tolerated dose. High resting heart rate is a predictor of adverse outcome in PPCM, and treatment with

ivabradine may be useful if the patient is not pregnant or breastfeeding. Relapse of PPCM has been observed after rapid tapering of HF therapies, and therefore treatment should continue for at least 6 months after full recovery of LV function followed by gradual tapering. Addition of bromocriptine to standard HF therapy may improve LV recovery and clinical outcome in women with acute severe PPCM. Bromocriptine treatment must always be accompanied by anticoagulation with heparin (LMWH or UFH), at least in prophylactic dosages.

Anticoagulation

In PPCM patients with very low EF, prophylactic anticoagulation should be considered. The choice of anticoagulant agent depends upon the stage of pregnancy and patient preference.

Delivery and Breastfeeding

Urgent delivery irrespective of gestation duration should be considered in women with advanced HF and haemodynamic instability despite treatment. Caesarean section is recommended with central neuraxial anaesthesia. To prevent abrupt pressure or volume changes, epidural anaesthesia might be the method of choice but should be carefully titrated, guided by an expert anaesthetic team. In stable congestive HF, vaginal delivery is preferred with spinal/epidural analgesia. In

HF with reduced EF, breastfeeding is discouraged in more severe cases (e.g. NYHA III/IV). Stopping lactation reduces the high metabolic demand and enables early optimal HF treatment.

E. Mechanical ventilation (MV)

It is often required for the management of acute hypoxemia, increased work of breathing, airway protection, and hemodynamic or electric instability.

1. Non-invasive ventilation (NIV)

Continuous positive airway pressure (CPAP) has been in use to treat acute cardiogenic pulmonary oedema since 1930s. The increased intrathoracic pressure brings about a reduction in transmural pressure, as well as the pre-load and after-load; thereby enhancing cardiac function in patients with LV dysfunction. CPAP leads to an increase in functional residual capacity, secondary to opening of collapsed alveoli and quickly improves compliance and oxygenation. It lowers the respiratory rate, decreasing sensation of dyspnoea and thus, helps in avoiding intubation. Although NIV can improve dyspnoea and hypoxemia, along with their associated metabolic derangements, its influence on mortality is unclear.

2. The majority of patients with CS, however, will require invasive MV. There is insufficient evidence to recommend specific ventilation modes, strategies (including lung protective ventilation), or physiological end points in the CS population.

F. Acute kidney injury

- Patients with CS often do not hemodynamically tolerate fluid shifts that can occur with intermittent haemodialysis. Instead, continuous renal replacement therapy, which applies a veno-venous driving force with an external pump to gradually remove fluid and toxins, is more commonly used for those with CS.

- AHA concurs with KDIGO (Kidney Disease Improving Global Outcomes) guidelines that continuous renal replacement therapy can be considered with stage 2 acute kidney injury (defined as an increase in serum creatinine ≥ 2.0 times baseline and urine output < 0.5 mL/kg/h⁻¹ for ≥ 12 hours or when “life threatening changes in fluid, electrolyte, and acid-base balance” exist).

G. Mechanical circulatory support and heart transplantation

- There is little evidence to guide the timing or selection of patients with CS who are suitable for MCS. Both the AHA and International Society for Heart and Lung Transplantation guidelines concur that patients with persistent CS, with or without end-organ hypoperfusion, should be evaluated for MCS candidacy by a multidisciplinary team with expertise in the selection, implantation, and management of MCS devices.

- It is suggested that all patients being evaluated for MCS implantation should concurrently be assessed for transplantation. Heart transplantation may be performed after temporary or durable MCS device implantation in suitable candidates in whom heart function is not expected to recover.

For details refer to the article on “Advanced Life Support in Pregnancy: ECMO & Beyond”

H. Novel therapies and opportunities

- Hypothermia has wide-ranging systemic and hemodynamic effects that might be particularly advantageous in the systemic manifestations of CS (especially in the post-infarction setting).

- Inotropic agents are theoretically appealing in CS treatment, but the current evidence is scarce. From some limited data, levosimendan may be appealing. However, this agent is not approved in the United States and requires additional validation with larger studies. Furthermore, the effect of other medications that have shown positive results in acute, non-shock HF populations such as sotalolol requires examination in CS cohorts.

- The newly introduced Heart Mate Percutaneous Heart Pump features a novel design with a collapsible elastomeric impeller and nitinol cannula, which gives this device a low profile but high flow rate. Once placed in a retrograde fashion across the aortic valve, the cannula can expand to 24F and support a continuous mean blood flow of > 4 L/min.

I. Treatment of cardiogenic shock in community setting

If maternal collapse occurs in the community setting, basic life support should be administered and rapid transfer arranged. [GPP]

Tilt

Manual displacement of the uterus to the left is effective in relieving aortocaval compression. [D]

A left lateral tilt of 15-30° on a firm surface will relieve aortocaval compression in the majority of pregnant women and still allow effective chest compressions to be performed. [C]

In cases of major trauma, the spine should be protected with a spinal board before any tilt is applied. In the absence of a spinal board, manual displacement of the uterus should be used. [GPP]

Airway

Intubation in an unconscious woman with a cuffed endotracheal tube should be performed immediately by an experienced anaesthetist. [GPP]

Breathing

Supplemental high flow oxygen should be administered as soon as possible to counteract rapid deoxygenation. [GPP]

Bag and mask ventilation should be undertaken until intubation can be achieved. [GPP]

Circulation

If the airway is clear and there is no breathing, chest compressions should be commenced immediately. [B]

Two wide-bore cannula (minimum 16 gauge) should be inserted as soon as possible. If peripheral venous access is not possible, early consideration for central venous access, intraosseous access or venous cutdown should be considered. [GPP]

There should be an aggressive approach to volume replacement, although caution should be exercised in the context of pre-eclampsia or eclampsia. [GPP]

Abdominal ultrasound by a skilled operator can assist in the diagnosis of concealed haemorrhage. [C]

The same defibrillation energy levels should be used as in a nonpregnant woman. [B]

Drugs

There should normally be no alteration in algorithm drugs or doses used in the Resuscitation Council(UK) protocols. [GPP]

Other considerations

Common, reversible causes of maternal cardiopulmonary arrest should be considered through out the resuscitation process. [D]

Resuscitation efforts should be continued until a decision is taken by the Consultant Obstetrician and Consultant Anaesthetist to discontinue resuscitation efforts. This decision should be made in consensus with the cardiac arrest team. [GPP]

Differential Diagnosis

A prompt and accurate identification of the underlying cause of a pregnant patient presenting in shock is most important as it can help in instituting appropriate health care to reduce maternal and foetal mortality and morbidity on an urgent basis or a speedy referral to specialist centres depending on the need.

Characteristics of the various forms of shock

Type of shock	CVP and PCWP	Cardiac Output	Systemic Vascular Resistance	Venous O ₂ saturation
Hypovolemic	Low	Low	High	Low
Cardiogenic	High	Low	High	Low
Septic Hyperdynamic Hypodynamic	Low/ high Low/ high	High Low	Low High	High Low/high
Traumatic	Low	Low/ high	High/low	Low
Neurogenic	Low	Low	Low	Low
Hypoadrenal	Low	Low	Normal/low	Low

Courtesy: Maier RV. *Approach to the Patient with Shock*. In: Kasper DL, Hauser SL, Jameson LJ, Fauci AS, Longo DL, Loscalzo J (Eds). *HARRISON'S PRINCIPLES OF INTERNAL MEDICINE, 19th edition*. Vol. 2. The McGraw-Hill Companies, Inc.; 2015. p. 1744-51.
Key: CVP central venous pressure, PCWP pulmonary capillary wedge pressure

Modified World Health Organization (mWHO) Classification of Maternal Cardiovascular Risk

The WHO classification is currently the most accurate system of risk assessment, the general principles of which are outlined in the following table. The risk estimation needs to be re-evaluated during each ante-natal visit, because the risk of complications may change over time.

	mWHO I	mWHO II	mWHO II-III	mWHO III	mWHO IV
Diagnosis	-mild/small PS/PDA/MVP -isolated atrial/ventricular ectopic beats - successfully repaired simple lesions (ASD/VSD/PDA)	-unoperated ASD/VSD -repaired TOF -most arrhythmias (supra-ventricular)	-mild LV impairment (45%<EF<60%) -hypertrophic CMP -native or tissue valve disease not considered WHO I or IV	-moderate LV impairment (EF 30-45%) -previous peripartum CMP without any residual LV impairment -mechanical valve -ventricular tachycardia -severe symptomatic AS -unrepaired cyanotic heart disease -moderate MS	-PAH -severe LV dysfunction (EF<30% or, NYHA class III-IV) -previous peripartum CMP with any residual LV impairment -severe MS -severe symptomatic AS
Risk	No detectable increased risk of mortality and no/mild increased risk in morbidity	Small increased risk of mortality or moderate increase in morbidity	Intermediate increased risk of mortality or moderate/severe increase in morbidity	Significantly increased risk of mortality or severe morbidity	Extremely high risk of mortality or severe morbidity
Cardiac event rate	2.5-5%	5.7-10.5%	10-19%	19-27%	40-100%
Counselling	Yes	Yes	Yes	Yes; expert counselling required	Yes; pregnancy contraindicated. If pregnancy occurs, termination should be discussed

Care during pregnancy	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease
Minimal follow-up visits during pregnancy	Once or twice	Once per trimester	Bimonthly	Monthly or bimonthly	Monthly
Location of delivery	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease

Courtesy: Regitz-Zagrosek V, Roos-Hesselink J, Bauersachs J, Blomström-Lundqvist C, Čífková R, De Bonis M et al. 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. *European Heart Journal* (2018) 39, 3165-3241.

Key: ASD atrial septal defect, PS pulmonary stenosis, VSD ventricular septal defect, EF ejection fraction, PDA patent ductus arteriosus, AS aortic stenosis, MVP mitral valve prolapse, LV left ventricular, TOF tetralogy of Fallot, CMP cardiomyopathy, MS mitral stenosis, PAH pulmonary artery hypertension, NYHA New York Heart Association.

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Events Held

- Cancer Awareness Week from 4th to 9th February, 2019 under the aegis of Breast and Cervical Cancer Awareness Screening Committee of AOGD at Deen Dayal Upadhyay Hospital.



- Public Awareness Programme on Screening of Genital Malignancies on 12th & 13th March, 2019 under aegis of AOGD at Lady Hardinge Medical College.





- CME on Breast and Cervical Cancer Screening and Prevention under the aegis of AOGD on 12th, February, 2019 at Fortis Hospital, Shalimar Bagh.



- CME on Screening for Gynecological Cancer under the aegis of AOGD on 15th February, 2019 at Lady Hardinge Medical College.



- 25th Annual Conference Narchi Delhi, Pre Conference Workshop on “Vulval Disorders from Adolescence to Menopause” on 21st February, 2019 at Safdurjung Hospital under the aegis of AOGD.



- International Women's Day Celebration on 7th March, 2019 at Lady Hardinge Medical College under the aegis of AOGD.



Roots and Wings....of My Life

Mohit D Gupta

Professor of Cardiology, G B Pant Institute of Postgraduate Medical Education and Research

The Author is Associated with Brahma Kumaris World Spiritual University



Dr Mohit D Gupta

It is in this giving and receiving that our humanity is shared and our highest potentials are reached

A balanced and comfortable journey is always one that is governed by rules and regulations. Just imagine a busy road governed by a single traffic light. When everyone is obeying the rules and the light is functional, traffic is smooth. But what happens when the light goes off; The traffic goes off too and one can witness chaos. You may be the best driver, but it won't work out in that situation. Our mind is on a similar journey too. The traffic of thoughts is never ending and ever flowing. It will, because that is what it is destined for. When governed by certain principles (what we can name them as traffic lights) then the flow will be proper and yield joy, happiness and peace. These principles are the spiritual principles that we are going to understand today.

By spiritual, I am referring to thoughts, behavior, attitudes and actions relating to, or affecting the human spirit or soul, in contrast to material or physical commodities.

We all are aware of these principles. Once we practice them by creating a conscious awareness, the journey of life becomes comfortable.

1. "Whatever you want to see outside, must be created inside":

Everything that happens in our life, happens twice. We first make it happen inside our mind, then we create it outside. Being a spiritual millionaire means to have a 100% confidence in the law of attraction. This means the ability to create what one desires. Such a mind requires stability and purity of thoughts. It doesn't just believe but it knows and makes it happen. A simple way to create success is to be clear on your intentions. This is a good first step. However, a more powerful and life-changing step is trusting that those intentions are ALREADY a reality on the non-physical plane of consciousness, and that they must manifest in your physical reality if you do not hold any opposing thoughts. So, one must understand today is that we have the power to write our destiny. Let us practice this for a few days and the life will change.

2. "Every Person you encounter is the right one"

No one comes into our life by chance. Everyone who is around us, every person with whom we interact, has a defined purpose - whether to teach us something, or to help us cope with a current situation. This is the law of Karma. The beauty with which we understand it makes our mind comfortable and life easy. Keeping a pure consciousness and attitude of giving is what we need in all our interactions; its not about exchange of materialistic gifts but about exchange of pure vibrations that bring peace and harmony in our relations.

3. "Whatever has happened, is the only thing that could have happened"

How many times in our life do we blame self, others and situations for what is happening to me. Our common wish is that it could have been better. This brings pain and non-acceptance of what is happening. If we want to be peaceful in our life in every situation and with every person, then a change in consciousness is needed. Nothing, absolutely nothing of that which we experienced could have been any other way. Not even in the least important detail. A deeper understanding that this world is like a stage where every actor is playing a perfect part and every situation, whether it has pain or pleasure, is perfect too. It tells us to play our role in this world drama as perfectly as possible. There is no "If only I had done that differently...", then it would have been different...". What happened is the only thing that could have taken place. Every single situation in life which we encounter is absolutely perfect, even when it defies our understanding and our ego.

4. "Each Moment in which something begins is the right moment":

As Buddha very beautifully put it: "When the student is ready, the teacher will appear". When we have a pure consciousness and a clear intellect, what we want and what is right for us will happen. Nature, vibrations and energy get together to create a beautiful destiny. So, if we want to be happy in our life, we have to live in present and create a perfect moment. It is these perfect moments that give us a perfect life.

5. "What is over, is over"

Living in past is what steals my joy and happiness. Thinking about past and creating emotions (whether positive or negative) is the reason for imbalance in my mind. When something in our life ends, it helps our evolution. That is why, enriched by each recent experience, it is better to let go of the past and move on.

6. "Nothing is Permanent":

This is a Universal Truth. Nothing in our lives is Eternal. Everything will change - some things earlier, some things later, but change is inevitable. The paradox of human life is that we live today as if we are going to live forever; when we are not even sure about next moment. Knowing that nothing is permanent gives us a clear insight to live our life in present and create happiness every moment.

Spiritual understanding of these principles is essential in the turbulent times. They help us experience peace, joy and inner sense of satisfaction. Let us practice them and create a difference.

Om Shanti

How to Run the Checklist

In order to implement the Checklist during surgery, a single person must be made responsible for performing the safety checks on the list. This designated Checklist coordinator will often be a circulating nurse, but it can be any clinician participating in the operation. The Checklist divides the operation into three phases, each corresponding to a specific time period in the normal flow of a procedure—the period before induction of anaesthesia, the period after induction and before surgical incision, and the period during or immediately after wound closure but before removing the patient from the operating room. In each phase, the Checklist coordinator must be permitted to confirm that the team has completed its tasks before it proceeds onward. As operating teams become familiar with the steps of the Checklist, they can integrate the checks into their familiar work patterns and verbalize their completion of each step without the explicit intervention of the Checklist coordinator. Each team should seek to incorporate use of the Checklist into its work with maximum efficiency and minimum disruption while aiming to accomplish the steps effectively.

All steps should be checked verbally with the appropriate team member to ensure that the key actions have been performed. Therefore, before induction of anaesthesia, the person coordinating the Checklist will verbally review with the anaesthetist and patient (when possible) that patient identity has been confirmed, that the procedure and site are correct and that consent for surgery has been given. The coordinator will visualize and verbally confirm that the operative site has been marked (if appropriate) and will review with the anaesthetist the patient's risk of blood loss, airway difficulty and allergic reaction and whether an anaesthesia machine and medication safety check has been completed. Ideally the surgeon will be present during this phase as the surgeon may have a clearer idea of anticipated blood loss, allergies, or other complicating patient factors. However, the surgeon's presence is not essential for completing this part of the Checklist.

Before skin incision, each team member will introduce him or herself by name and role. If already partway through the operative day together, the team can simply confirm that everyone in the room is known to each other. The team will confirm out loud that they are performing the correct operation on the correct patient and site and then verbally review with one another, in turn, the critical elements of their plans for the operation, using the Checklist for guidance. They will also confirm that prophylactic antibiotics have been administered within the previous 60 minutes and that essential imaging is displayed, as appropriate. Before leaving the operating room, the team will review the operation that was performed, completion of sponge

and instrument counts and the labelling of any surgical specimens obtained. It will also review any equipment malfunctions or issues that need to be addressed. Finally, the team will discuss key plans and concerns regarding postoperative management and recovery before moving the patient from the operating room. Having a single person lead the Checklist process is essential for its success. In the complex setting of an operating room, any of the steps may be overlooked during the fast-paced preoperative, intraoperative, or postoperative preparations. Designating a single person to confirm completion of each step of the Checklist can ensure that safety steps are not omitted in the rush to move forward with the next phase of the operation. Until team members are familiar with the steps involved, the Checklist coordinator will likely have to guide the team through this Checklist process. A possible disadvantage of having a single person lead the Checklist is that an antagonistic relationship might be established with other operating team members. The Checklist coordinator can and should prevent the team from progressing to the next phase of the operation until each step is satisfactorily addressed, but in doing so may alienate or irritate other team members. Therefore, hospitals must carefully consider which staff member is most suitable for this role. As mentioned, for many institutions this will be a circulating nurse, but any clinician can coordinate the Checklist process.

Successful use of a Surgical Safety Checklist requires the commitment of the inter-disciplinary surgical team who are provided with training that emphasizes teamwork and communication. The support of leadership and administration is essential to ensuring continuous quality improvement that includes outcome measurement, education and feedback.

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Natural Orifice Transluminal Endoscopic Surgery (NOTES)



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Introduction

Natural Orifice Transluminal Endoscopic Surgery (NOTES) is an emerging field in the area of minimally invasive surgery. NOTES can be performed via a variety of approaches, including through the stomach, esophagus, bladder, and rectum, but the majority of cases have been performed transvaginally. This technique has been used for diagnostic and therapeutic procedures, also used to increase the feasibility of moderately complex procedure.

HYBRID procedures include both endoluminal and laparoscopic approaches.

Routes to do NOTES

- Transvaginal
- Transgastric
- Transvesical
- Transcolic
- Transesophageal

In gynecology, the vagina of a woman can be considered as an additional route for surgery. The concept of transvaginal endoscopy was originally called "culdoscopy." Recently, clinical application of transvaginal NOTES has broadened significantly. Initially, NOTES was used only for diagnostic purposes¹ or performed with transabdominal assistance,^{2,3} but now it is being used to accomplish complex procedures. Different gynecologic procedures have been effectively performed by means of pure transvaginal NOTES. These procedures seem to be feasible and safe. Reduced pain and improved cosmesis are supposed to be the potential advantages of transvaginal NOTES. Recently, clinical application of transvaginal NOTES has broadened significantly in gynecology. Using transvaginal NOTES by applying the method of single-incision laparoscopic surgery via the vaginal route, not only adnexal surgery and hysterectomy, but also myomectomy and oncologic surgery could be performed safely and effectively in selected patients.⁴

History

NOTES was originally described in animals by Johns Hopkins University by Dr Anthony Kalloo, et al., and was used for transgastric appendectomy in humans in India (by Drs GV Rao and Reddy). The transvaginal access to NOTES (TV NOTES) seems to be safest and feasible.

In 2007, the NOTES research Group in Rio de Janeiro, Brazil, lead by Dr Ricardo Zorron, performed the first series of transvaginal NOTES cholecystectomy in four patients with fewer complication.

Advantages of NOTES

- Lack of abdominal incision (scarless)
- Lower anaesthesia requirement iLess post-operative pain
- Improved cosmesis
- Shorter hospital stay, faster recovery
- Improved visibility as compared to transabdominal approach
- Avoidance of transabdominal wound infection and hernias
- Decrease ileus and adhesions

Disadvantage

- Leak of pneumoperitonium because of larger port size
- Technically challenging
- Need of technology
- Prolong operative time
- Sepsis through entry site into the peritoneal cavity
- Inadequacy of closure of port site opening
- Long learning curve
- Cost issues

NOTES Challenges

- Access to tissues with safety
- Retraction of tissues
- Problems in Ligation of vessels
- Triangulation of instruments
- Free movements / visualization due to limited space
- Closer security
- Acceptance among surgeons

Types of Surgeries with NOTES

Adnexal Surgery

Lee et al reported the first case series of pure transvaginal NOTES for adnexal diseases in 2012. Ten consecutive patients underwent transvaginal NOTES, including tubal sterilization in three, salpingectomy because of ectopic pregnancy in three, and ovarian tumor enucleation in four.⁵ The NOTES procedure failed in one patient

because a misdiagnosed peritoneal mucinous tumor was located in front of the uterus and was inaccessible using the transvaginal approach, leading to subsequent conversion to conventional laparoscopy. They found that transvaginal NOTES, compared with transumbilical SILS, offered a larger space and a decreased incidence of instrument clashing during handling because of the large colpotomy wound. They also found several technical drawbacks to transvaginal NOTES. In comparison with transumbilical SILS, transvaginal NOTES was performed in an anatomically reverse direction, which might initially cause disorientation for surgeons; however, operators were quickly able to adapt to the new orientation because gynecologists were familiar with vaginal surgical procedures. They concluded that their method of combining the concepts of culdoscopy using the vaginal approach and SILS with the wound retractor represented a new way to perform transvaginal NOTES. Ahn et al⁶ and Kim⁷ described their initial experience in 10 women with benign adnexal diseases that were treated successfully with transvaginal NOTES using a single port. Procedures consisted of oophorectomy in three patients, salpingostomy and salpingectomy in two each, and ovarian cystectomy, paratubal cystectomy, and ovarian wedge resection in one each. They concluded that the selection of appropriate patients could be important for successful surgical outcomes because of the requirement of secure colpotomy. Yang et al⁸ also described the initial clinical experience of transvaginal NOTES using a wound retractor and a surgical glove performed in seven women with adnexal masses. Main procedures consisted of unilateral salpingo-oophorectomy in three patients, unilateral oophorectomy in three patients, and paraovarian cystectomy in one patient. Transvaginal NOTES was successfully and safely completed in all cases. They concluded that transvaginal NOTES was a feasible and effective surgical technique in properly selected female patients with adnexal masses.

Myomectomy

Myoma types 0-2 can be resected hysteroscopically. Myoma types 3-7 are traditionally resected via laparotomy, laparoscopy, or transabdominal robotic surgery. vNOTES provides a new less invasive approach for the resection of myoma types 3-7. No peri- or postoperative complications occurred. Anterior myomas can be resected through an anterior colpotomy and posterior myomas can be resected through a posterior colpotomy via the pouch of Douglas, the uterine scar can be sutured via vNOTES with the use of a standard absorbable suture.⁹

Ovarian Cystectomy

Benign ovarian cysts can be treated by vNOTES through a posterior colpotomy via the pouch of Douglas as described by Liu et al.¹⁰ A pneumoperitoneum is created, and the ovarian cyst is identified. The ovarian cortex

is incised over the cyst using cold scissors. The cyst is dissected from the ovarian cortex by a combination of blunt and sharp dissection. Ovarian hemostasis is achieved using bipolar forceps. The ovarian cyst is removed through the colpotomy in an endobag. The vNOTES port is removed, and the colpotomy sutured using a resorbable suture.

Sacrocolpopexy

Surgical techniques that aid in effectively performing transvaginal NOTES sacrocolpopexy include the use of hydrodissection, Y mesh division, anterior mesh anchoring before reducing prolapse, retroperitoneal tunneling, and hand suturing. Using the techniques mentioned, port is inserted only once, which improves the efficiency and safety of this surgery.

Ectopic Pregnancy

Ectopic pregnancy is treated by vNOTES salpingectomy or salpingostomy.¹¹ In case of a PUL on ultrasound, transvaginal hydrolaparoscopy (TVHL), an established technique for fertility exploration under local or general anesthesia, is used to investigate. If a tubal pregnancy is confirmed on TVHL, the colpotomy is extended to a 2.5-cm incision, and the ectopic pregnancy is treated transvaginally by vNOTES. If the TVHL investigation of the pelvis is negative (fallopian tubes and ovaries are normal), the procedure is stopped and the patient is followed up further.

Hysterectomy

Transvaginal NOTES is a feasible technique for performance of hysterectomy and can be used in procedures that are difficult to complete via conventional vaginal surgery because posterior colpotomy is achievable. This procedure was not impeded by uterine volume, and had the advantage of no abdominal incision.

Baekelandt^{12,13} reported his technique of total vaginal NOTES hysterectomy (TVNH), in which the entire procedure was performed using transvaginal NOTES under the pneumovagina. TVNH performed in 10 patients with benign uterine diseases was successfully completed within reasonable operative time, and without major complications and conversion to conventional laparoscopy or laparotomy. The major difference between TVNH and vaginally assisted NOTES hysterectomy (VANH) lay in the opening of the anterior and posterior peritoneum and the transection of the uterosacral ligaments. This procedure was performed entirely endoscopically in the TVNH, whereas it was performed by conventional vaginal surgery in the VANH (Table 1). Therefore, he found that due to the pneumovagina, TVNH was not more difficult in nulliparous than in parous women. He concluded that by incorporating the advantages of endoscopic

surgery, TVNH broadened the indications for vaginal hysterectomy and helped overcome its limitations.

Table 1: Types of NOTES hysterectomy

Abbreviation	Name	Description
VANH	Vaginally assisted NOTES hysterectomy	Total hysterectomy where, first, the caudal part of the uterus is dissected vaginally under direct vision, and afterward the rest of hysterectomy is performed by means of transvaginal NOTES using an endoscope and laparoscopic instruments
TVNH	Total vaginally NOTES hysterectomy	Total hysterectomy where the entire uterus is dissected by means of transvaginal NOTES using an endoscope and laparoscopic instruments

Tubal Ligation and Reanastomosis

Transvaginal NOTES tubal re-anastomosis as an alternative route for tubal re-anastomosis. Initiated with a posterior colpotomy.¹⁴ A single-site gelport is placed. The fallopian tubes are hydrodissected, the blocked portion of each tube is removed, an epidural catheter is threaded through each lumen, and the two remaining segments of each tube are sutured together in an end-to-end fashion using single-site suturing skills. This gives the patient a 60%-90% intrauterine pregnancy rate postoperatively.

Gynae-Oncology

NOTES staging surgery is a new, safe, and feasible minimally invasive surgery for endometrial cancer. It not only overcomes the limitations but also broadens the indications of NOTES surgery to oncologic surgery. However, there are several disadvantages in NOTES staging surgery, including restricted surgical field, poor visualization, and difficult approach in patients with a narrow vagina, large uteri, or adhesions. However, a large case series or even prospectively randomized controlled trials should be conducted to evaluate the true clinical feasibility, safety, and most importantly, the long-term survival outcomes of this approach.¹⁵

Preoperative Preparation

The transvaginal access requires no special prior preparation. Important steps is the gynecological evaluation preoperatively are-

To rule vulvovaginitis- In the presence of vaginal infections, antibiotic treatment is recommended at least one week before surgery in order to avoid pelvic infectious and its associated complications which result from the introduction of microorganisms into the peritoneal cavity during the development of the transvaginal access.

Informed consent- It is important to obtain the informed consent from the patient, especially in the

young and nulliparous women. Although not frequent, the transvaginal access can lead to colpotomy-related dyspareunia postoperatively and In addition, the scar on the posterior vaginal fornix and the posterior cul-de-sac, can lead to the development of which can complicate a future pregnancy in nulliparous women.

Careful selection of the patient- The most important point of evaluation and preoperative preparation is the careful selection of patients for transvaginal endoscopic surgery. Although the surgical indications are the same, regardless of the approach being used, some relative and absolute contra-indications must be respected when this new access route is used.

Contraindication

The transvaginal endoscopic access cannot be applied to all patients. The contraindications are:

Deep endometriosis: the patients with severe endometriosis often have their lesions located posterior to the uterus, either in utero-sacral ligaments, in the retrocervical region or in the rectovaginal septum. This prevents access to the pelvic cavity through the posterior fornix of the vagina due to the high risk of iatrogenic injuries of adjacent organs.

Suspected adnexal lesions: All suspicious adnexal lesions are to be addressed with surgical oncologic principles. We cannot expose patients to the risk of a possible rupture of a malignant adnexal lesion and consequent contamination of the pelvic cavity with tumor cells.

Previous pelvic surgery and history of pelvic inflammatory disease: Surgical procedures in the pelvic region and previous episodes of pelvic inflammatory disease may lead to the formation of dense adhesions.

Complex surgical procedures: The lack of triangulation of the instruments and the endoscope image obtained through the retroflected view (upside down and mirror) do not allow complex surgical gestures can be accomplished.

Future Perspectives of Notes

With ongoing efforts to decrease the size and/or number of incisions, improve patient outcomes, and increase patient satisfaction, SILS and NOTES represent the next leap in laparoscopic surgery. The goal of NOTES is to improve patient outcomes by rapid convalescence and superior cosmesis. Conventional transvaginal surgery has the advantage of the absence of abdominal scarring.¹⁶ In comparison with conventional transvaginal surgery, the surgical field of transvaginal NOTES can be demonstrated clearly with endoscopic guidance, and any pathology beyond the reach of operator's fingers can be managed easily with the assistance of laparoscopic instruments. Transvaginal NOTES is especially beneficial in patients with nulliparity, obesity, or narrow vagina, which are all considered as relative contraindications in conventional

transvaginal surgery because of restricted downward traction of pelvic organs for surgical manipulation and hemostasis. Transvaginal NOTES appears to be another form of SILS, but provides invisible scar and a lesser degree of loss of triangulation and instrument crowding due to vaginal elasticity. A surgeon who wants to perform transvaginal NOTES should be confident in SILS. Being experienced in SILS certainly helps keep the learning curve short and shorten operative time.

Conclusion

Tv-NOTES could cure primary disease, improve the postoperative quality of life, it does not increase the incidence of related complications, or cause negative effect on the female sexual function, pregnancy and fertility, good cosmetic outcome and little pain, which is worth applying in clinical practice.

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Forthcoming Events

- CME on 'Update on Ovarian Tumors' under aegis of AOGIN and AOGD on 23rd March, 2019 at MAMC, LNJP Hospital.
- Next Monthly Clinical Meeting on 5th April, 2019 (4:00-5:00 pm) at SJ Auditorium, Lady Hardinge Medical College.
- AOGD General Body Meeting on 5th April, 2019, 5 pm, Venue at SJ Auditorium, Lady Hardinge Medical College.

CONTROVERSY

Safe Electrosurgical Principles in Hysteroscopy

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Dr K K Roy

Introduction

The term electrosurgery refers to cutting and coagulation of tissue using high frequency electrical current. The terms 'electrosurgery' and 'electrocautery' are often used interchangeably, however, these are two distinctly different modalities. Electrocautery uses direct current (DC) to heat an element which in turn is used to burn a specific site. On the other hand, in electrosurgery, alternating current (AC) at radiofrequency levels is used which passes through the tissue to cause the desired effect. Medical practitioners using electrosurgery should have a thorough knowledge about the working principle of this modality in order to avoid potential complications and manage troubleshooting.

Electrosurgical Devices in Hysteroscopy

Monopolar Devices

Use of electrosurgery in operative hysteroscopy is unique in a way that electrosurgery has to work within a fluid medium. Monopolar devices complete their electrical circuit via patient return electrode which means that the current needs to pass through the patient's body in an unpredictable pathway to complete its circuit. Hence, while using monopolar energy source, the fluid distension medium should be electrolyte free or non-conducting; eg. Glycine. In electrolyte rich solution such as Normal Saline, monopolar energy becomes ineffective. Typically, monopolar electrodes are used with a Resectoscope and 1.5% Glycine as distension medium. Collin's knife, loop electrode, ball and barrel electrodes are the available monopolar devices for various operative hysteroscopic procedures (Fig 1).



Figure 1: Resectoscope with various monopolar electrodes.

As previously discussed, monopolar energy sources use patient return electrode pad, through which the current returns to the ESU, for completion of electrical circuit. Hence, placement of patient return electrode pad has its own importance in monopolar electrosurgery. While

placing the patient return electrode, the following surgical safety principles are to be followed:

- Select a site over large muscles.
- Choose a site which is as close to the operating site as possible.
- Avoid bony prominences, scar tissue, hairy areas and hyperkeratosis.
- Select skin areas over tissue with good vascular supply to carry off heat.
- Protect the return electrode from fluid invasion.
- Avoid use of inflammable agents for cleaning the area.
- Ensure complete contact of the electrode with the skin surface.
- Use REM (Renewable Energy Management) system :- this will continuously monitor the heat build up under the return electrode and if detected in excess will shut off the current flow to prevent patient injury.

Monopolar electrosurgical devices pose potential complications such as stray current injuries and burns due to improper placement of patient return electrode. Moreover, complications associated with excessive absorption of Glycine is quite high as compared to Normal Saline in terms of morbidity as well as mortality.

Bipolar Devices

Bipolar electrosurgical instruments integrate both active and return electrodes in single device. The current's pathway is limited to the tissue between the two electrodes well within the vicinity of the operating surgeon. Bipolar energy provides precise tissue cutting with minimal collateral damage (Fig 2).

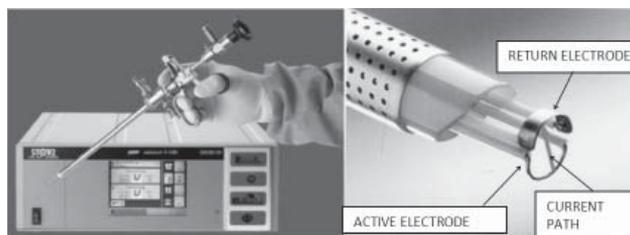


Figure 2: Bipolar electrosurgical system

Operating Room Set-Up and Ergonomics

For operative hysteroscopy, patient is positioned in lithotomy and the height of the table should be

adjusted so as to ensure comfort of the surgeon and easy maneuverability of the instruments. Monitor should be in line of view of the surgeon. Too high positioning of the operating table and uncomfortable positioning of the monitor are two potential sources of complications in operative hysteroscopy. The surgeon should have adequate experience in operative hysteroscopy and sound knowledge about the fundamentals, safety aspects and complications of electrosurgery. The scrub nurse and the floor assistants should be well versed with the assembly of resectoscope, functioning of Hysteromat (fluid management system) and ESU setting adjustments.

General Anaesthesia is preferred in operative hysteroscopy especially in the setting of concurrent laparoscopy being performed. The anaesthesiologist should have a sound knowledge about complications in hysteroscopic electrosurgery as well as early detection and management of fluid overload.

Fluid Management

Recommendations on Fluid Management in Hysteroscopic Electrosurgery

- Normal Saline should be used as distension medium wherever possible as the risk of encephalopathy is less.
- Before starting the procedure, air bubbles should be purged out of the system to avoid potential air embolism.
- Reducing preoperative hydration may reduce the effects of fluid overload during the procedure.
- Pre-operative administration of GnRH analogue reduces fluid absorption in premenopausal women. Intracervical injection of 8 ml of dilute vasopressin (0.05 U/ml) immediately prior to surgery reduces fluid absorption.
- Uterine cavity pressure should be kept the lowest necessary to distend the cavity; should be maintained below the mean arterial pressure (<100 mm of Hg).
- Risk of hypotonic encephalopathy is more in reproductive age group than in postmenopausal due to the effect of estrogen on cellular sodium pump.
- Risk of fluid absorption is more in surgeries where myometrial integrity is breached (Myomectomy).
- Surgical team should accurately measure the fluid input and output. Use of an automated fluid management system is recommended.
- Maximum acceptable volume for each patient should be pre-determined.
- For elderly patients and others with comorbidities, the maximum acceptable fluid deficit is 750ml. For others, a fluid deficit of 1000ml for Glycine and 2500ml for Normal Saline are the maximum permissible limits.

Hysteroscopic Electrosurgical Procedures

Trans Cervical Resection of Myoma (TCRM / Hysteroscopic Myomectomy)

Heavy menstrual bleeding, dysmenorrhoea, infertility and recurrent pregnancy loss are the usual indications for myomectomy. Hysteroscopic resectability of a submucous leiomyoma is assessed by STEP-W classification as depicted in Table 1.

Table 1: STEP-W classification of submucous leiomyoma

Score	Size (cm)	Topography	Extension of Base	Penetration	Lateral Wall
0	≤ 2	Low	≤ 1/3	0	+ 1
1	>2-5	Middle	>1/3 to 2/3	≤ 50 %	
2	> 5	Upper	> 2/3	> 50 %	
Score	Group	Complexity and Therapeutic Options			
0-4	I	Low complexity hysteroscopic myomectomy			
5-6	II	High complexity hysteroscopic myomectomy. Consider two-step procedure			
7-9	III	Consider alternatives to hysteroscopic myomectomy			

Hysteroscopic loop resection is the commonly employed method in TCRM. Vapourization, morcellation and cold loop myomectomy are the other surgical options available. Loop electrosurgical resection is performed with the electrode activated with low voltage (“cutting”) current to allow the repetitive creation of “strips” of myoma, with periodic interruptions of the procedure to allow removal of the tissue fragments. The dictum is to activate the electrode only while being withdrawn towards the surgeon and not while being advanced into the cavity. This will avoid inadvertent perforation of the uterine wall.

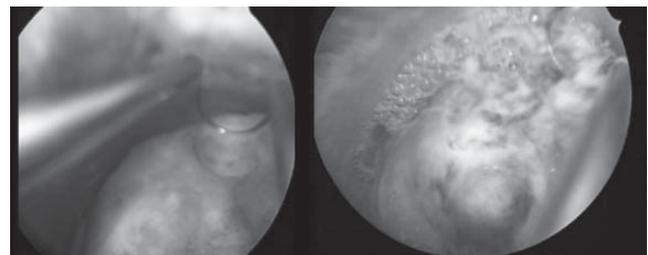


Figure 3: Hysteroscopic loop resection of submucous leiomyoma

Bulk electrosurgical vapourization is performed with a large surface-area electrode activated with low voltage current to vapourize relatively large volumes of tissue. Ideally such vapourization results in no tissue fragments, with the tumor gradually reduced in volume until it is feasible to extract the residual mass with grasping forceps. One advantage of this technique is less absorption of distending medium. Chances of air embolism and uterine perforation are more in this procedure.

Pre operative administration of GnRH analogue is helpful in correction of anaemia and may assist in thinning of endometrium. This can also help in reduction of operating time and reduction in fluid absorption. However, with GnRH analogues, a submucous leiomyoma may prolapse through the os causing a surgical emergency. It is believed that pre-treatment with GnRH analogue may cause 'missing out' of small seedlings of leiomyoma and recurrence soon after. However, further evidence is required in this matter before concluding. It is a common practice to do ablation of nearby endometrium of the leiomyoma. If the myomectomy is being done for HMB only, and there is no future fertility concern, concomitant endometrial ablation is recommended.

When there are three or more leiomyomas, an abdominal approach may be considered. The more the number of leiomyomas, the more would be the fluid absorption risk and chances of synechiae formation. Similarly, myomas on the opposing walls of the uterus (the so-called kissing myomas) should not be resected in a single sitting due to higher risk of synechiae formation.

Hysteroscopic Septal Resection

Septal resection, Septal incision and Septoplasty are commonly used terminologies in the context of hysteroscopic septal resection and all of them mean the same surgical procedure. In a patient with infertility, prior pregnancy loss and poor pregnancy outcome, septal resection is recommended. Even without infertility and prior pregnancy loss, it is reasonable to advise surgery, if uterine septum is diagnosed. Hysteroscopic resection with Collin's knife or with hysteroscopic scissors are the commonly employed surgical method (Fig 4). The end point of procedure is determined by increased tissue vascularity, serosal trans-illumination at the fundus (if concurrent laparoscopy is being performed) and reaching a level in line with tubal ostia. Undercutting is always better. Fluid absorption in septal resection is less as compared to myomectomy owing to relatively poor vascularity of septum and lesser breach of myometrium.

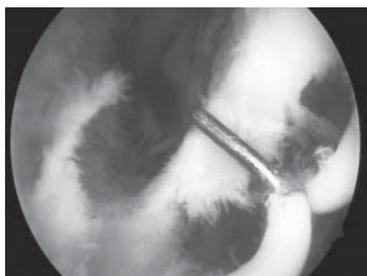


Figure 4: Hysteroscopic Septal Resection with Collin's knife.

Hysteroscopic Adhesiolysis

Asherman's syndrome constitutes intrauterine synechiae, menstrual disturbance, cyclic pelvic pain and subfertility in varying severity. Hysteroscopy is the gold standard for diagnosing intrauterine synechiae. Hysteroscopic lysis of adhesions by direct vision and

a tool for adhesiolysis is the recommended approach. Monopolar/bipolar electrosurgical instruments (usually Collin's knife), Nd YAG Laser or scissors can be used for adhesiolysis. Intra uterine device (Cu-T after removing the copper), post operative estrogen therapy and adhesion barriers (Hyaluronic acid) are useful in prevention of recurrence.

Complications of Hysteroscopic Electrosurgery

Fluid overload

Fluid overload, hypo-osmolality, hyponatraemia, pulmonary and cerebral oedema are the most detrimental complications which can result in mortality. The surgeon, the floor assistant as well as the anaesthesia team should be vigilant during hysteroscopic electrosurgical procedures and fluid deficit should be checked at frequent intervals. Whenever the maximum recommended absorption limit is crossed, the procedure should be immediately stopped and serum electrolytes and osmolality measured. If the serum sodium level falls below 125mEq/L, further management should be done in critical care setting. Inj Lasix 20 - 40 mg intravenously is administered to ensure diuresis. Correction of hyponatraemia is done with intravenous infusion of 3% sodium Chloride at the rate of 1mEq/L/h with an aim to reach a serum sodium level of 135mEq/L in 24 hours. Over-correction is not recommended.

Uterine Perforation

Uterus can be perforated during sounding, cervical dilatation or during the electrosurgical procedure. Perforation with blunt instruments rarely causes any visceral injury and can be managed conservatively. On the other hand, perforation caused by an active electrode during electrosurgery should be considered serious and bowel injury should be ruled out by laparoscopy or laparotomy. Uterine perforation with active electrode can be prevented by avoiding activation of electrode while being advanced into the uterine cavity.

Haemorrhage

Heavy bleeding can happen during or after the procedure. Smaller vessels can be coagulated with the electrode itself, may not work for bigger ones. If haemorrhage persists, a Foley catheter can be inserted into the uterine cavity, inflated with normal saline (10-15ml) until moderate resistance is felt and left in-situ for 24 hours. A collection bag can be attached with Foley catheter to monitor if further bleeding occurs.

Thermal Injuries

Thermal burns can happen either with the active electrode, the dispersive electrode or can occur due to current diversion. Unintentional injury to the surrounding organs like abdominal wall, vulva vagina etc. can be avoided by careful management of the activation pedals and by delaying the attachment

of electrosurgical cable until the surgeon is ready to place the resectoscope in the uterine cavity. Dispersive electrode injuries are relatively rare with the advent of modern ESUs with electrode impedance monitoring system.

Electrical burns are known to occur due to stray currents with monopolar resectoscope. Normally, the outer sheath of the resectoscope when in full contact with the cervix disperses or defocuses the current. If the sheath is not in good contact with the cervix, the current will flow to whatever tissue it is in contact with, such as vulva or vagina, causing a burn. The surgeon should take care not to dilate the cervix more than the diameter of the cervix.

Insulation failure is another cause for thermal burns during electrosurgery. Damage to insulation can cause 100% energy transfer to the sheath if the electrode is not in contact with tissue. This 'open activation' when the electrode is not in contact with the tissue should be avoided and a thorough check of the insulation should be done prior to starting the procedure.

Gas Embolism

Air bubbles may enter the circulation if vessels are opened during electrosurgical procedure. Embolisation can cause sudden cardiovascular collapse. Sudden onset dyspnoea, desaturation and hypotension are the usual findings. 'Mill wheel' cardiac murmur is a characteristic feature. Management includes placing the patient in left lateral decubitus position with head tilted downwards. The risk of gas embolism can be minimized by avoiding Trendelenberg's position during hysteroscopy. The

surgeon should ensure that all tubings are purged out of air bubbles before starting the procedure. Minimizing the effort required for mechanical dilatation of cervix, keeping the intrauterine pressure below 100mm of Hg, avoiding deep myometrial resections and avoiding multiple removal and re-insertions of resectoscope will reduce the risk of air embolism.

Conclusion

Electrosurgery is a very useful technology in the field of operative hysteroscopy in safe surgical hands. The surgeon as well as his team members should be well versed with the technical aspects, functioning and complications of electrosurgery. Surgeon's experience is the most important aspect in prevention and management of complications in hysteroscopic electrosurgery.

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AOGD Sub Committee Nomination (2019-2021)

Nominations are invited for the post of chairperson of the following sub-committees for the year 2019-2021

1. Urogynecology committee
2. Endoscopy Committee
3. Adolescent Committee
4. Safe Motherhood Committee
5. Fetal Medicine and Genetics -committee
6. Oncology Committee
7. Endometriosis Committee
8. Reproductive Endocrinology Committee

Eligibility Criteria

1. Person should be a member of AOGD and have at least 10 years standing in the profession with at least 5 years duration of holding senior position in the respective institutions.
2. Chairperson of a subcommittee has to be a member of any subcommittee earlier for at least 1 year.
3. No repeat nomination will be considered after one term of two years.
4. In case of two people applying for the same post, the decision of the executive will be final.
5. In case of any deviation, the decision would be taken by executive committee.
6. Two posts cannot be held by any member at one particular time.

The nominations on plain paper should reach: AOGD Secretariat: Gyne Office, Ground Floor, New Building, Lady Hardinge Medical College, by 20th March, 2019 along with the bio-data stating the eligibility.

CASE APPROACH

Prevention and Management of Uretric Injuries

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Dr Sonal Bathla

Ureteric injury is a potential complication of any open or endoscopic pelvic procedure. Iatrogenic trauma is the leading cause of ureteric injury and gynaecological surgeries account for over half of all iatrogenic ureteric injuries.¹ Although having a low incidence, ureteric injury may have serious implications in terms of morbidity and litigation. The morbidity arising from ureteric injury is incapacitating. The fact that 50% of injuries occur in uncomplicated surgeries, poses special problems. Although extra precautions after identification of high risk patients might save the surgeon's day, the importance of detailed knowledge of ureteric anatomy cannot be overemphasized for the purpose of avoiding complications in routine cases.

Incidence

Ureteric injury has an incidence of 0.2-1.0% during any abdominal or pelvic surgery.² The cochrane review quotes a higher incidence of ureteric injury in laparoscopic surgeries (<1-2%) as compared to open or vaginal surgery. It may be as high as 21% in cases of deep infiltrating endometriosis.^{3,4} Expectedly, laparoscopic procedures for endometriosis account for nearly 38% of ureteric injuries.⁵ Ureteric injuries are also common in radical hysterectomies (incidence up to 10%) and other uro-gynaecological procedures. However, clear guidelines for indications, surgical experience, or surgical techniques to prevent such injuries during laparoscopic hysterectomies are lacking. Ureteric complications are often related to surgical experience.

Anatomical Considerations

The good old saying of 'prevention is better than cure' cannot hold more true than for ureteric injuries. Familiarity with ureteric course and the areas where it is most susceptible to trauma is essential knowledge, and is the foundation for identifying and safeguarding ureters during surgery. Ureters are retroperitoneal tubular structures measuring approximately 25 to 30 cm in length, extending from the renal pelvis to the urinary bladder (Figure 1). The abdominal portion of the ureter lies on the anterior surface of the psoas muscle, descending postero-laterally. As the ureter approaches the pelvis, it is crossed anteriorly by the ovarian vessels. The right ureter enters the pelvis by crossing over the external iliac artery while the left ureter crosses over the common iliac artery. At the midplane of the pelvis, the ureter is crossed anteriorly by the uterine

artery. Here it tunnels into the cardinal ligament, approximately 1.5 to 2.0 cm lateral to the cervix near the internal cervical os and vaginal fornices as it enters into the trigone of the bladder. The outer adventitial layer contains the arterial supply, nerve supply, and lymphatics of the ureter.

Due to its close proximity with the genital organs, ureter is at greater risk at certain points during the gynaecological surgery. The lower third of the ureter is the most commonly injured segment in gynaecological procedures.⁶ The common sites of injury, especially in laparoscopic surgery are:

1. At the pelvic brim (where the ureter comes into close proximity with the infundibulo-pelvic ligament which contains the ovarian vessels⁴)
2. Just lateral to the cervix (during division or coagulation of the uterine artery or the uterosacral and cardinal ligaments)
3. Ovarian fossa
4. The area of the uretero-vesical junction close to the cardinal ligaments

Ureters have a unique blood supply, such that they derive their blood supply from the vessels placed medially in abdomen and from laterally in the pelvis. Thus, peritoneal incision to expose the ureter should be made laterally to the ureter in the abdomen and medially in the pelvis. The ureters must be lifted in the peritoneal fold as the adventitial layer carries their blood supply.

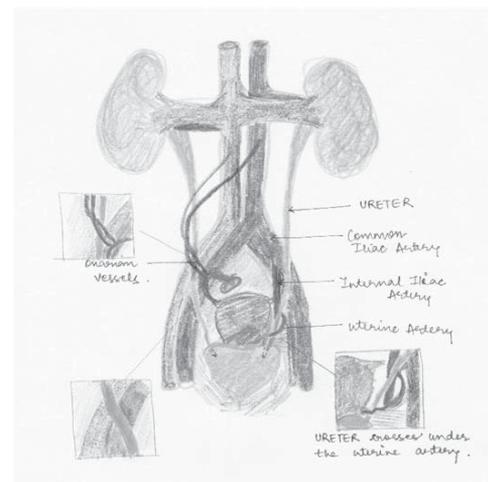


Figure 1. Diagrammatic depiction of ureteric anatomy highlighting the important sites of injury in insets.

Risk Factors

Majority of ureteral injuries occur in patients who have no identifiable risk factors. However, there are certain conditions that increase the likelihood of ureteral injuries, particularly those that disrupt the normal anatomy and architecture of the ureters (Table 1). The distorted anatomy of the ureters may pose a significant challenge to the uninitiated and inexperienced surgeon. In these situations having an in depth knowledge of anatomy allows careful identification of ureters and thus help avoid ureteric trauma.

Table 1: Risk factors for ureteric injury

1. Endometriosis
2. Cancer
3. Adhesions, distorted pelvic anatomy (previous surgery/ infection/inflammatory disease/radiation)
4. Severe genital organ prolapse
5. Obesity- the higher the body mass index the closer the ureter was found to be to the cervix
6. Pregnant uterus

Prevention of Ureteric Injury - General Principles

Knowledge of the anatomy, safe electrosurgery and meticulous technique are the three cornerstones for prevention of ureteric injury. Preoperative and intraoperative measures can be taken to reduce the risk. An astute surgeon will have a high preoperative suspicion for distorted anatomy on surgery in certain cases. A preoperative intravenous urogram (IVU) or contrast CT may help trace the course of ureter in these complex cases. However such investigations do not offer significant benefit and thus may not be cost effective in routine cases.

Intraoperatively, the most reliable method to avoid iatrogenic ureteric injury are generous surgical exposure, meticulous surgical technique, and clear identification of the ureter throughout the operative field. A decrease in ureteric injury during abdominal hysterectomy from 0.7% to 0.2% has been reported when the ureters are dissected out from the lesion gently.⁷ It has been suggested that during laparoscopic surgery specifically for endometriosis, adnexal mass and radical hysterectomy, the ureter is at greatest risk of injury at the infundibulo-pelvic ligament, in the ovarian fossa, and in the ureteric canal.⁸ A systematic Delphi procedure for the prevention of urinary tract injuries suggested that in distorted anatomy the course of ureter must be traced.⁸ Ureters are identified in its course by ureteric peristalsis provoked on gentle stroking. The detailed vision offered by the magnified laparoscopic view would help in minimally invasive surgery. If direct visualisation is not possible as in case of distorted anatomy, cystoscopy should be employed to see the urine efflux through the ureteric opening in order to see the functional integrity.⁹ It is recommended to dissect and expose the ureter in complex cases such as extensive pelvic endometriosis, large ovarian cysts,

pelvic adhesions and cervical fibroids and to stay close to the pathology.

Ureters carry their blood supply in surrounding adventitia, and care must be taken not to strip it. Thus, mobilisation of the ureter during pelvic surgeries should routinely be performed through a medial peritoneal incision such that ureter remains protected in laterally reflected peritoneal fold. Laparoscopically, a medial to lateral blunt sweeping technique should be used.¹⁰ In radical pelvic surgery, the ureter may get skeletonized when dissecting out the adjacent tumour, and hence stands risk of ischaemia and delayed necrosis.

Ureteric stents are of no benefit in routine cases and of questionable benefit in complex cases.¹⁰ They may be useful in very select cases, where the pelvic anatomy is severely distorted and/or usual methods of identification of ureter have fail eg; infiltrating endometriosis. Ureteric stents may help in identification of injury that has occurred rather than preventing the injury and hence optimise the subsequent management in cases where dissection is difficult.¹⁰ De Cicco et al.¹¹ suggested that in cases of severe endometriosis associated with ureteric obstruction and hydronephrosis, preoperative stenting is mandatory, though care must be taken when mobilising a rigid stented ureter. Lighted stents have been proposed to aid in identification of ureters during laparoscopic procedures, but cost remains a big deterrent.¹² Moreover, they are also associated with haematuria (98%) which is though reversible.

Bleeding around ureter must be controlled by specifically identifying bleeding points rather than blind clamping. Electrocautery is the culprit in up to one quarter of ureteric injuries. The electrical current may damage the vascular supply and perivascular tissue, leading to delayed tissue necrosis and lateral thermal damage. In laparoscopy, excessive electrocoagulation of uterine vessels and cardinal ligaments near the ureter increases the risk of injuries. Coagulate uterine vessels close to the uterus from ipsilateral side with a perpendicular approach, this would minimize risk on bleeding and enlarge distance between uterine artery and ureter. Shortest possible applications must be used. In laparoscopic management of endometriosis, the bleeding points at uterosacral ligaments should be secured with sutures or clips instead of electrocoagulation.

Another manipulation during hysterectomy which reduces the risk of injury is adequate mobilisation of the bladder in a downward and outward direction as ureters are moved away from the uterine vessels and thus away from the operative field.¹³ This also holds true in total laparoscopic hysterectomy.

Table 2. Summary of preventive strategies to reduce the risk of ureteric injuries

1. Appropriate operative approach
2. Adequate exposure
3. Avoid blind clamping of blood vessels
4. Ureteric dissection and direct visualisation
5. Mobilise bladder away from operative site
6. Short diathermy applications

Types of Ureteric Injuries

The various types of iatrogenic ureteric injuries, in descending order of frequency, are

- Ligation
- Kinking by suture
- Transection/ avulsion
- Partial transection
- Crush
- Devascularization (leading to delayed necrosis/ stricture)

In laparoscopy, transection is the most commonly reported injury.¹¹

According to the Organ Injury Scaling System developed by the Committee of the American Association for the Surgery of Trauma,¹⁴ ureteric injuries are classified as follows:

- grade I haematoma; contusion or haematoma without devascularisation
- grade II laceration; < 50% transection
- grade III laceration; ≥50% transection
- grade IV laceration; complete transection with < 2 cm of devascularisation
- grade V laceration; avulsion with > 2 cm of devascularisation.

This anatomical classification does not, however, appear to have clear prognostic implications.

Identification of Ureteric Injury

Intraoperative

Unfortunately, only a third of iatrogenic ureteric injuries are recognised intraoperatively.¹¹ Therefore if any doubt about the integrity of the ureter exists, prompt intraoperative investigation to determine the extent and severity of injury is warranted and an experienced urologist should be called for. Intraoperative identification of damage to ureteric integrity is important as it allows for prompt repair and improved outcomes. Furthermore, greater patient satisfaction is achieved with decreased morbidity minimizing the possibility of litigation.

Cystoscopy can be done intra-operatively as it visualises the ureteric orifices and urine jets, thus ruling out obstruction. Presence of blood or air suggests injury. Intravenous administration of indigo carmine colours the urine blue within 5 to 10 minutes and assists cystoscopic as well as laparoscopic assessment of urinary leak. Ureteroscopy and ureteric stenting may help in diagnosing total occlusion or transaction. Retrograde and/or intravenous uretero-pyelography may prove extremely useful in difficult situations as they can definitively confirm or refute the diagnosis and localise the site of injury intra-operatively.

Postoperative

Approximately two-third of all ureteric injuries are identified only postoperatively. Postoperative anuria and uraemia occur with bilateral occlusion or total transaction or unilateral injury in solitary functioning kidney. Such cases require immediate intervention to preserve renal function. High index of suspicion holds the key for diagnosing unilateral injury, as it is often missed easily. A rise in serum creatinine of more than 0.2mg/dl may point towards a possibility of unilateral ureteral obstruction. Fever, flank tenderness, haematuria, ileus, oliguria or watery vaginal loss highlight the presentation in the first few days of an acute injury. Retroperitoneal leakage of urine followed by encapsulation by reactive fibrous tissue may lead to formation of a cyst containing urine (urinoma). This may evolve into an abscess and present with sepsis and associated complications.

Ischemic and thermal injuries usually present later at 10-14 days. Ultrasound helps in diagnosis of a urinoma. Immediate cystoscopy, retrograde ureterogram and intravenous urogram should be performed, which will aid in diagnosis and location of the injury. If above investigations are inconclusive or cannot be performed then computed tomography with intravenous pyelogram(CT-IVP) should be done. A CT-IVP allows the visualization of the relevant anatomy, continuity of the urinary tract as well as the location of extravasated urine that often develops near the site of injury.

Ureteric injury may go unrecognized resulting in fistula or stricture formation, eventually affecting kidney of that side. This may occasionally require nephrectomy. Upto 25% of unrecognised ureteral injuries result in eventual loss of the ipsilateral kidney.¹⁵

Management

Treatment of ureteric injury depends on the time of recognition and cause of injury. Urological consultation is recommended. An injury that is recognized intraoperatively is more likely to be treated with immediate repair with excellent outcomes. When recognition of ureteric injury is in the post operative period, repair should not be delayed unless there is sepsis, extensive haematoma or abscess formation at the site of injury, or when the woman is haemodynamically unstable. Percutaneous nephrostomy drainage of the renal pelvis or a retrograde ureteric stent placement is needed till the repair is done.

Successful surgical management requires familiarity with the reconstructive options which are further discussed.

Distal ureteral injuries

Ureteroneocystostomy- The majority of operative injuries during gynaecological surgeries occur in the distal ureter. Ureteroneocystostomy is an ideal option for distal ureteral repair. A nonrefluxing reimplantation into the bladder is performed. The reimplanted ureter should be stented for 6 weeks and a Foley's catheter

maintained in the bladder for few days.

Vesico-psoas hitch-When there is lengthy defect in the distal ureter, such that performing a ureteroneocystomy would result in tension on the anastomosis, this distance can be bridged with a vesico-psoas hitch. A large series of 181 patients for which a vesicopsoas hitch was employed for ureteroneocystostomy reported a 97% success rate at a mean follow up of 4.5 years. In this series the authors stated that the keys to success are a tension-free anastomosis, an antirefluxing, long submucosal tunnel, and a straight course of ureteral reimplantation to prevent kinking at the point of entry into the bladder.¹⁶

Upper and mid-ureteral injuries

Ureteroureterostomy- Often with small (2-3 cm) defects of the mid-ureter and upper ureter a primary ureteroureterostomy can be performed. The anastomosis should be stented and, if possible, covered with peritoneum or omentum.

Boari tubularized bladder flap-When the distal ureteral segment is not suitable for anastomosis, a Boari tubularized bladder flap is a surgically challenging alternative. The bladder is opened on its anterior surface, and a full thickness bladder flap is swung cranially and tubularized for anastomosis to the proximal ureteral segment.

Transureteroureterostomy - When primary reanastomosis to a distal segment is not feasible, or if a ureteroneocystostomy is precluded (i.e. rectal injury, major vascular injury, or extensive bladder injury), then TUU is an acceptable option. Because of the high risk of complication, and concern for injuring the contralateral ureter, TUU is seldom elected.

Renal autotransplantation. -When the ureter is damaged beyond repair.

Ureteral substitution-The use of gastro intestinal segments, such as ileum, appendix, tubularized stomach, and colon for ureteral substitution is an option.¹⁷

Flow Chart- Management of Ureteric Injury

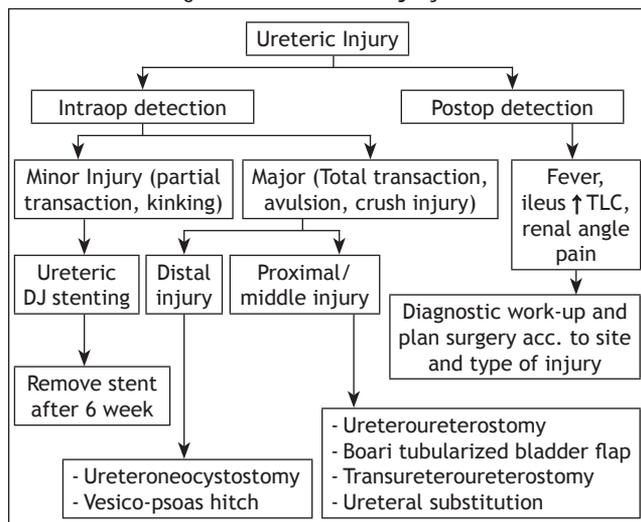


Table 3: General principles of ureteric repair

1. Tension-free anastomosis by ureteric mobilisation
2. Ureteric dissection preserving adventitial sheath and its blood supply
3. Minimal use of fine absorbable suture to attain water-tight closure
4. Use of peritoneum or omentum to surround the anastomosis
5. Drain the anastomotic site with a passive drain to prevent urine accumulation
6. Stent with a ureteric catheter
7. Consider a proximal diversion

Laparoscopic and minimally invasive treatment of ureteral injuries

Possibly the most minimally invasive treatment of an iatrogenic ureteral injury is cystoscopy and retrograde ureteral stent placement or antegrade placement of a ureteral stent. A recent series describes the management of iatrogenic ureteric injury with stenting and reported successful recanalization or dilation of the affected ureter in 18 out of 25 patients (72%).¹⁸

Ureteral iatrogenic injuries continue to be managed with minimally invasive techniques and laparoscopic forms of traditional ureteral reconstruction techniques as mentioned above. In a comparative retrospective review of patients undergoing laparoscopic and open techniques for ureteral reimplantation, patients undergoing distal ureteral reimplantation laparoscopically required less pain medication, had a shorter length of stay, and less blood loss.¹⁹

The complications which can occur following surgery for ureteric injury are mentioned in table 4.

Table 4: Complications following surgery for ureteric injury

1. Stricture
2. Urinary tract infection
3. Ureteric obstruction or reflux
4. Boari flap complications
5. Haematoma
6. Wound infection

As long as surgeons operate near the ureters, the potential for iatrogenic ureteral injury will exist and will require a dynamic approach for its management. It is said 'The venial sin is injury to the ureter, but the mortal sin is failure of recognition'. One must try not to injure the ureter but if it happens must always identify and manage.

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Congratulations !!!

to Dr Anita Rajohria on answering the quiz and crossword of February issue correctly!

* * * * *

Answer: February Issue

Crossword

Down: 1. Pyoperitoneum, 2. Atosiban, 4. Cabergoline, 5. Dienogest

Across: 3. indomethacin, 6. Chorioamnionitis, 7. MRSA, 8. NTG, 9. SOS, 10. Bacteruria

Pictorial Quiz

Figure 1: Ans 1. As anticonvulsant in Eclampsia & severe preeclampsia ;and as tocolytic to arrest preterm labour.

Ans 2. Fetal neuroprotection.

Figure 2: Ans 1. The qSOFA score (also known as quickSOFA) is a bedside prompt that may identify patients with suspected infection who are at greater risk for a poor outcome outside the intensive care unit (ICU).

Ans 2. It uses three criteria, assigning one point for low blood pressure (SBP \leq 100 mmHg), high respiratory rate (\geq 22 breaths per min), or altered mentation (Glasgow coma scale $<$ 15).



Dr Ratna Biswas

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Cardiac Arrest During Pregnancy: Ongoing clinical conundrum

Zelop CM, Einav S, Mhyre JM, Martin S

Abstract

While global maternal mortality has decreased in the last 25 years, the maternal mortality ratio in the United States has actually increased. Maternal mortality is a complex phenomenon involving multifaceted socioeconomic and clinical parameters including inequalities in access to health care, racial and ethnic disparities, maternal comorbidities, and epidemiologic ascertainment bias. Escalating maternal mortality underscores the importance of clinician preparedness to respond to maternal cardiac arrest that may occur in any maternal health care setting. Management of maternal cardiac arrest requires an interdisciplinary team familiar with the physiologic changes of pregnancy and the maternal resuscitation algorithm. Interventions intended to mitigate obstacles such as aortocaval compression, which may undermine the success of resuscitation interventions, must be performed concurrent to standard basic and advanced cardiac life support maneuvers. High-quality chest compressions and oxygenation must be performed along with manual left lateral uterine displacement when the uterine size is ≥ 20 weeks. While deciphering the etiology of maternal cardiac arrest, diagnoses unique to pregnancy and those of the nonpregnant state should be considered at the same time. If initial basic life support and advanced cardiac life support interventions fail to restore maternal circulation within 4 minutes of cardiac arrest, perimortem delivery is advised provided the uterus is ≥ 20 weeks' size. Preparations for perimortem delivery are best anticipated by the resuscitation team for the procedure to be executed opportunely. Following delivery, intraabdominal examination may reveal a vascular catastrophe, hematoma, or both. If return of spontaneous circulation

has not been achieved, additional interventions may include cardiopulmonary bypass and/or extracorporeal membrane oxygenation. Simulation and team training enhance institution readiness for maternal cardiac arrest. Knowledge gaps are significant in the science of maternal resuscitation. Further research is required to fully optimize: relief of aortocaval compression during the resuscitation process, gestational age and timing of perimortem delivery, and other interventions that deviate from nonpregnant standard resuscitation protocol to achieve successful maternal resuscitation. A robust detailed national and international prospective database was recommended by the International Liaison Committee on Resuscitation in 2015 to facilitate further research unique to cardiac arrest during pregnancy that will produce optimal resuscitation techniques for maternal cardiac arrest.

Editor's Comment

Maternal resuscitation is hindered with the pregnant uterus causing aorta caval compression as well as impeding the diaphragmatic movement and mechanical ventilation. Perimortem cesarean should be done in the setting of maternal collapse if circulation is not restored within 4 minutes of resuscitation to assist in CPR. High quality chest compression and advanced life support is effective in reviving mothers with minimal sequelae. Routine use of extracorporeal membrane oxygenation (ECMO) in the setting of maternal cardiac arrest is not recommended, however it may be used after 10 minutes of cardiopulmonary resuscitation in cases with reversible causes of cardiac arrest. Recent meta-analysis has shown a survival advantage of VV-ECMO in pregnancy with ARDS due to H1N1 infection with 75% maternal survival.

Fertil Steril. 2018 Jan;109(1):179. doi: 10.1016/j.fertnstert.2017.09.009. Epub 2017 Nov 9.

Transvaginal Natural-Orifice Transluminal Endoscopic Surgery:

A new approach to myomectomy

Baekelandt J

Objective

To demonstrate a new approach for performing a myomectomy via transvaginal natural-orifice transluminal endoscopic surgery (vNOTES) as an alternative to laparoscopic myomectomy.

Design

Stepwise explanation of the technique with the use of original video footage.

Setting

Hospital.

Patient(S)

Eight patients were treated transvaginally for intramural, subserosal, and pedunculated myomas.

Intervention(S)

In case of a posterior myoma, a 2.5-cm posterior colpotomy was made under general anesthesia. The pouch of Douglas was opened and a vNOTES port was inserted transvaginally. In case of an anterior myoma, an anterior colpotomy was made and the peritoneum was opened between the uterus and the bladder. A vNOTES port was inserted transvaginally. A pneumoperitoneum was created and the myoma was identified. With the use of conventional endoscopic instruments and a standard endoscope, all inserted through the vNOTES port, the uterus was incised over the myoma and the myoma was resected. After achieving hemostasis the uterine scar was sutured in two layers with the use of a standard absorbable suture or an autolocking suture. An adhesion-preventing barrier was applied over the uterine scar. The myoma was removed through the colpotomy in an endobag. The vNOTES port was removed and the colpotomy was sutured with the use of an absorbable suture. The following data were collected: age, body mass index, number of previous abdominal procedures, myoma size, myoma weight, operating time, length of hospital stay, visual analog scale pain score, and serum hemoglobin drop.

Main Outcome Measure(S)

Successful minimally invasive myomectomy via vNOTES without abdominal scars.

Result(S)

All fibroids were successfully removed via vNOTES without complications or conversions to standard

laparoscopy. No peri- or postoperative complications occurred. All patients were discharged within 24 hours, two of them within 12 hours. Anterior myomas can be resected through an anterior colpotomy and posterior myomas can be resected through a posterior colpotomy via the pouch of Douglas. In a low-resource setting, a self-constructed gloveport can be used and the uterine scar can be sutured via vNOTES with the use of a standard absorbable suture. In a first-world setting, the surgical time can be reduced with the use of an autolocking suture and a commercially available vNOTES port.

Conclusion(S)

Myoma types 0-2 can be resected hysteroscopically. Myoma types 3-7 are traditionally resected via laparotomy, laparoscopy, or transabdominal robotic surgery. vNOTES provides a new less invasive approach for the resection of myoma types 3-7. This first IDEAL stage 1 study confirms the feasibility of vNOTES myomectomy. It remains, however, a novel approach that requires further investigation. It can provide better cosmetic results and improved patient comfort.

Editor's Comments

Natural orifice transluminal endoscopic surgery (NOTES) is a recent advancement in endoscopic surgery. However literally speaking gynecological surgery is greatly a natural orifice surgery be it a vaginal hysterectomy for a benign cause like pelvic organ prolapse or radical vaginal hysterectomy / radical trachelectomy for cancer cervix. Vaginal NOTES is just a modification of surgery via vaginal route using standard endoscopic equipment through a V NOTES port. There is a potential to significantly increase the range of procedures which may be carried out by this method and in times to come it will become more popular.

CROSSWORD

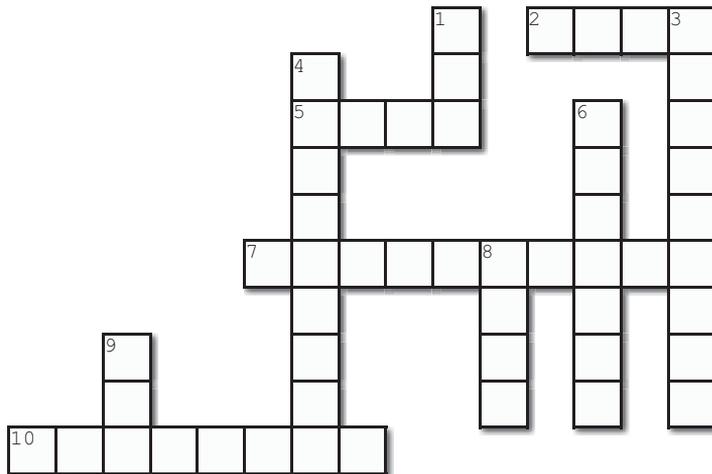
The Maze of Knowledge

Swati Agrawal

Associate Professor, Department of Obs & Gynae, LHMC & SSK Hospital, New Delhi



Dr Swati Agrawal



Down

1. Published the surgical safety checklist in 2008
3. Complication of ureteric injury
4. Name given to aspiration pneumonia in pregnant woman
6. Route for NOTES hysterectomy
8. Cause of cardiogenic shock during pregnancy
9. Cause of maternal collapse

Across

2. Aids resuscitation during unresponsive cardiac arrest in a pregnant woman
5. Advanced life support in pregnancy
7. Safe electrosurgical system for hysteroscopy
10. Method to prevent ureteric injury

PICTORIAL QUIZ

A Picture is Worth a Thousand Words



Figure 1:

Q1. Which technique is being used in the above picture?

.....

Q2. Name any 2 procedures which can be done using this technique.

.....

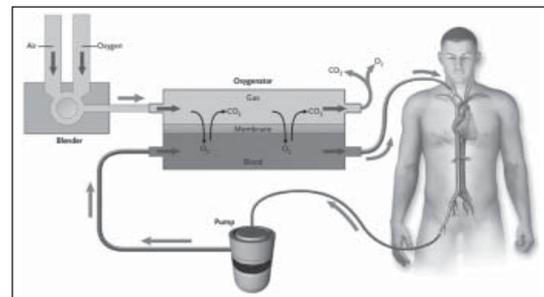


Figure 2:

Q1. Which technique is being used in the above picture?

.....

Q2. What are the indications of its use?

.....

WhatsApp your answers to 9953938995. The names of first three correct entries will be mentioned in our next issue.

Refer page 46 for previous answer key.

Clinical Proceedings of AOGD Clinical Meeting conducted on 1st March, 2019 at GTB Hospital, Delhi

Maternal Complication Nipped with a “Clip in Time”

Alpana Singh, Gurbachan Singh, Pallavi
Gupta, Gita Radhakrishnan, Radhika AG

Background: Prevalence of intracranial aneurysm (most commonly of internal carotid artery) has been observed in approximately 1.8% women of childbearing age. The prevalence of intracranial hemorrhage during pregnancy ranges from 0.01% to 0.05% with reported rupture in 1 to 10 per 100,000 pregnancies.

Case Summary: Ms X, 24y, G₂A₁, presented at 20 wks of pregnancy to Gynae casualty on 3/2/2018 with severe headache and vomiting of 12 hrs duration along with an episode of syncopal attack. There was history of an episode of suspected convulsions and slurring of speech followed by recovery 3 months back. On examination, she was conscious but disoriented, talking irrelevantly. Vitals were normal. DTR : brisk; Plantar reflex: withdrawal. Pupils were normally reacting. Uterus was 18- 20 wks & relaxed. MRI revealed left gangliothalamic bleed with mass effect. Mannitol, glycerol, Levetiracetam, Nimodipine were started. MR angiography revealed 4.8x5.5x4.4 mm aneurysm at bifurcation of internal carotid artery. Left pterional craniotomy was performed on 21/2/18. Frontal hematoma and a large aneurysm with narrow neck were seen. Titanium clip was used to clip the aneurysm neck. Patient regained consciousness within few hours of surgery and was discharged on day 6. She continued regular follow ups in neurosurgery and ANC Clinic. At 33 weeks, she was re-admitted for oligohydramnios & FGR and underwent LSCS at 36 wks. A healthy 1.8 kg female child was delivered. Mother & baby were discharged on day 5. Patient remained asymptomatic till 6 months of follow up

Conclusion: Diagnosis, mode & time of intervention are major challenges in the management of intracranial aneurysms especially during pregnancy. Appropriate & timely intervention with multidisciplinary approach is crucial to saving life. As per available evidence, LSCS is the preferred method of delivery in these women.

“Bolt from the Blue”: (Oh) Bombay Blood Group

Bhanupriya, Shalini Rajaram, Sandhya Jain,
Bindiya Gupta, Anshuja Singla, Tanvi Gupta
Department of Obstetrics & Gynecology
UCMS & GTB Hospital, Delhi

Abstract: We present a rare case of a 29- year old

G3P1L1A1at 36 weeks 3 days period of gestation with severe anaemia with oligohydramnios. She was identified to have Bombay blood group. Bombay blood group is a rare blood group, with an incidence of 1 in 10000 in Indian population. Bombay phenotypes lack H antigen on the red cell membrane and have anti-H in their serum. This group is frequently misdiagnosed as blood group ‘O’ and transfusion may be fatal. We stress the importance of both ‘forward’ and ‘reverse’ blood group typing so that no case is missed. This case is presented to report the challenges in sourcing this rare blood group and in our case the donor was flown in from Mumbai.

Inflammatory Markers in Preeclampsia

Bindiya Gupta¹, Shalini Rajaram¹
Priyanka Gogoi², Priyanka Fimal¹
Pallavi Sinha²

¹Department of Obstetrics and Gynecology

²Department of Pathology, UCMS & GTB Hospital, Delhi

Objective: To compare the values of neutrophil lymphocyte ratio, platelet lymphocyte ratio and platelet indices, in women with preeclampsia and gestational age matched controls.

Methods: In a cross sectional study 67 pregnant women between 18-40 years with preeclampsia at term and equal number of matched controls (n=67) were included. Venous blood samples were drawn into 2ml EDTA tubes and complete hemogram was analyzed. The parameters noted were hemoglobin, red cell distribution width, platelet count, mean platelet volume (MPV), plateletcrit, and platelet distribution width. Differential leucocyte counts were done on peripheral smear and neutrophil lymphocyte ratio (NLR) and platelet lymphocyte ratio (PLR) were calculated after obtaining the absolute values.

Results: The mean \pm SD of NLR in women with preeclampsia was 6.8 ± 7.6 while in healthy pregnant females, mean \pm SD was 3.0 ± 0.98 ($p = 0.0001$). There was a significant difference in PLR ($p=0.01$) and MPV ($p=0.029$) in patients with preeclampsia compared to healthy pregnant controls. Platelet count was significantly less in cases (mean \pm SD, 188 ± 89.7) than controls (mean \pm SD, 226.17 ± 67.2).

Conclusions: Markers of inflammation namely Neutrophil lymphocyte ratio, Platelet lymphocyte ratio and markers of platelet activation i.e. Mean platelet volume are significantly increased in preeclampsia.

Puberty Triggered Tumultuous Journey of A Benign Pathology

Rashmi, Taruna S, Kiran G, Amita S, Abha S
Priyanka G, Shruthi B

Case Presentation: A 22 year old girl presented with recurrent lump abdomen associated with weakness and loss of weight. She had undergone myomectomy for a giant uterine neoplasm at 15 years of age. Final histopathology was Angiomyolipoma - A benign variant of Leiomyoma. She had recurrent masses (omental mass with multiple nodules on peritoneum of right anterior abdominal wall) after 2 years. Masses were excised along with infracolicomentectomy and partial peritonectomy. Again histopathology suggested Angiomyolipoma with all benign elements. After 3 years, she again reported with large vascular uterine mass. Due to suspicion of malignancy because of repeated recurrences, her slides were reviewed. Taking her clinical behavior into consideration, the reviewed report given was leiomyosarcoma. Now patient was advised hysterectomy, but she delayed treatment by 2 years.

On presentation, she had poor general condition with severe anaemia. She had large abdominopelvic mass of around 30 weeks pregnant uterus size. Imaging studies detected multiple nodules in sub hepatic region along with large uterine mass. Staging laparotomy was done. Large uterine mass was burrowing in mesentery of sigmoid colon and abutting sacrum. Left ovary was engulfed in mass. Right ovary was bulky. There was a multinodular mass on right parietal peritoneum and all the peritoneal surfaces had multiple small nodules. Total abdominal

hysterectomy with bilateral salpingo oophorectomy with complete peritonectomy with supracolicomentectomy with excision of all visible disease was performed.

Patient is asymptomatic 4 months after surgery.

On histopathology, all masses were found to be benign leiomyomas and final diagnosis was Disseminated Peritoneal Leiomyomatosis.

Discussion: Disseminated Peritoneal Leiomyomatosis (DPL) is a rare benign peritoneal disease of reproductive age women, though rarely seen in postmenopausal women and men also. Most of the cases follow uterine leiomyoma. Pathogenesis is not well understood, but metaplasia, hormonal (high levels of exogenous or endogenous ovarian steroidal hormones) genetic and iatrogenic causes seem to be responsible. Recently many cases have been reported following unconfined power morcellation during laparoscopic myomectomy or hysterectomy. Spontaneous regression has been seen, mostly after the removal of hormonal factors. Multiple recurrences, metastasis and infiltrative growth has been reported, but most ominous is malignant transformation seen in 2-10% of cases.

No definitive management guidelines are there. Medical therapy with GnRH agonists, Ulipristal acetate, aromatase inhibitors seem promising. Conservative surgery is done in young age. But with multiple recurrences, definitive treatment is Total Abdominal Hysterectomy with Bilateral salpingo oophorectomy. HRT may be given but close surveillance is required as recurrences can occur.



Royal College of Obstetricians & Gynaecologists
AICC Northern Zone India

Website: www.aicccognzindia.com

Chairperson: Dr Nirmala Agarwal: (n.menoky@gmail.com /9811888732)

Vice Chairperson
Dr Anita Kaul

Hon. Secretary
Dr Arbinder Dang

RCOG UK Non Franchise MRCOG Final Preparation: Part III Course

Saturday 13th – Sunday 14th April 2019 (Total 2 Days)

Limited to 28 candidates only (First Come First Serve basis)

Overview

This Part 3 Clinical Skills Course will give delegates a unique opportunity to practice and rehearse the clinical tasks set down in the new MRCOG Part 3 oral examination. There will be two different circuits, each with 14 active stations where you will receive individual feedback after each of the tasks from the examiners, some of which will use local role players and lay examiners.

There will also be workshop-based sessions incorporating communication skills with patients and colleagues, issues of patient safety, applied clinical knowledge and information gathering using different task materials to increase the delegate's exposure to more questions.

Videos of different tasks types will be presented and discussed.

After the examination, we plan to send the delegates a feedback survey to help maintain and improve the quality of this course for the future.

Before attending the course be: Read your 14 core curriculum, StratOG, Green-top guidelines, Scientific Impact Papers, Consent Advice, Good Practice, TOG, & BJOG. Read Ed Neale's book on Part 3- "Part 3 MRCOG, Your Essential Revision Guide" Lisa Joels & Edmund Neale"

MRCOG Part 3 examination will be conducted in Delhi 29-30 April 2019

Who should attend?

- Candidates who have passed the MRCOG Part 2 written examination and plan to sit the next MRCOG Part 3 Examination

Learning objectives

- To describe the structure and format of the MRCOG Part 3 examination
- To reproduce the components parts of the blueprint matrix of the MRCOG Part 3
- To relate the five clinical skills domains to clinical situations from the 14 modules of the MRCOG Part 3 Syllabus at an ST5 level of competence
- To identify personal strengths and weaknesses in the clinical skills domains exposed during the course, identify good and unsatisfactory performances
- To reflect on how to improve individual performances prior to the examination

Course Fee: Rs 35,000

Venue - Sant Parmanand Hospital
18 Sham Nath Marg, Civil Lines, Delhi- 110054

UK Conveners of International Part 2 Revision Course -

India Conveners and Contacts for details - Dr Nirmala Agarwal (n.menoky@gmail.com / 9811888732)
Dr Arbinder Dang (arbidang@gmail.com 9871356917)
Dr Shelly Arora & Dr Shweta Gupta

**For Accommodation, Hotel Bookings, Travel Enquiry Contact Miss Carolina Fernandez Cox & Kings +919711992043/
Carolina.fernandes@cox&kings.com**

Registration Guidelines (Online registration available on website)

- Registration form to be downloaded from website www.aicccognzindia.com
- Bank Transfer or Demand Draft must be made in favour of "RCOG NZ 2012 Plus" payable at New Delhi. (Cheques not accepted).
- There will be no refunds on cancellation.
- Registration request along with Demand Draft to be posted to the Secretariat mailing address as given below:-

Mailing Address:

RCOG North Zone Secretariat

OT Complex 3rd Floor Sant Parmanand Hospital, 18 Shamnath Marg, Civil Lines, Delhi 110054

Mr Asif Muniri (Administrative Assistant) +919560069925 / 9716801190, Tel No - 91-11-23981260, 23994401-10 Ext 314

Email: rcognz2017@gmail.com/ n.menoky@gmail.com/ arbidang@gmail.com

Association of Obstetricians & Gynaecologists of Delhi

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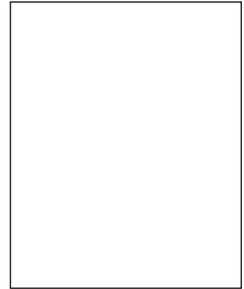
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Date of Birth: Date..... Month..... Year.....

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Proposed by.....

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Enclosed: Cheque/Demand Draft should be drawn in favour of:

For Life Membership : Rs. 11,000 + Rs. 1,980 (18% GST applicable) = Rs. 12,980

For New Annual Membership* : Rs. 2,000 + Rs. 360 (18% GST applicable) = Rs. 2,360

For Old Renewal Membership+ : Rs. 1,200 + Rs. 216 (18% GST applicable) = Rs. 1,416

Encl.: Attach Two Photocopies of All Degrees, DMC Certificate and Two Photographs

*-Annual Membership is for the calendar year January to December.

+ - In case of renewal, mention old membership number.

Note: 18% GST will be applicable as FOGSI requires it.

Send Complete Membership Form Along With Cheque / DD and Photocopy of required documents.

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Dr Anita Kaul

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Dr Arbinder Dang

RCOG UK MRCOG Final Preparation: Part II Course

Friday 3rd , Saturday 4th Sunday 5th May 2019 (Total 3 Days)

Limited to 40 candidates only (First Come First Serve basis)

Overview

In March 2015 the MRCOG Part 2 Written exam changed its format. The two written papers now consist of Single Best Answer Questions (SBAs) and Extended Matching Questions (EMQs). The course focuses on polishing your exam techniques to improve your chances of passing the NEW written papers.

Developed and taught by experienced MRCOG Examiners, you will have tutorials about the new exam question formats and ample opportunity to practice SBAs and EMQs. This course will map the RCOG core curriculum and the examination syllabus; you will also have lectures from experts about current developments and hot topics in key curriculum area.

We recommend you book early to avoid disappointment. There are a maximum of 40 places.

Who should attend?

- Candidates sitting the July 2019 Part 2 MRCOG Examination

After completing this course, you will be able to:

- Gain familiarity with the new format of the part 2 MRCOG written papers
- Understand the standard of the required knowledge
- Understand core O&G topics in relation to UK practice
- Understand training within the NHS

Course Fee: Rs 35,000

Venue - Sant Parmanand Hospital
18 Sham Nath Marg, Civil Lines, Delhi- 110054

UK Course Organizer & Convener -

UK Faculty

India Conveners and Contacts for details -

Dr Nirmala Agarwal (n.menoky@gmail.com / 9811888732)
Dr Arbinder Dang (arbidang@gmail.com 9871356917)

**For Accommodation, Hotel Bookings, Travel Enquiry Contact Miss Carolina Fernandez Cox & Kings +919711992043/
Carolina.fernandes@cox&kings.com**

Certificate of attendance for this course will be provided by the RCOG UK

Registration Guidelines (Online registration available on website)

- Registration form to be downloaded from website www.aicccognzindia.com
- Bank Transfer or Demand Draft must be made in favour of "RCOG NZ 2012 Plus" payable at New Delhi. (Cheques not accepted).
- There will be no refunds on cancellation.
- Registration request along with Demand Draft to be posted to the Secretariat mailing address as given below:-

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