

**Special Article****Obstetric Anaesthesia Challenges and Management in COVID - 19 Patients**

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Abstract

COVID-19, a pandemic infectious disease has created havoc worldwide with rising count of affected people at an alarming rate. All pregnant women despite the COVID-19 pandemic have a right to have a safe childbirth experience. Infection prevention and control measures play a pivotal role in perioperative management of COVID-19 positive obstetric patient. A strict anaesthesia and surgical protocol can prevent the cross- infection while providing care to the patient in the perioperative settings.

Keywords: Anaesthesiology; Corona virus; COVID-19; infectious disease; obstetric anaesthesia

Key message: *All women despite the COVID-19 pandemic have a right to have a safe childbirth experience. Principles of perioperative management of obstetric patients remain same except infection prevention and control measures should be arranged.*

Introduction

Covid-19 has created havoc worldwide with rising count of affected people at an alarming rate. World Health Organization (WHO) declared novel corona virus outbreak a “pandemic” on March 11th, 2020. Health workers are making untiring efforts akin to soldiers at frontline around the globe. Although obstetric patient are more prone to viral infection due to physiological changes associated with pregnancy and relative immunosuppression state in pregnancy. Till this time there is lack of evidence that pregnant patient is more susceptible to COVID-19 infection as compared to general population¹.

Effect of COVID-19 infection on mother

Covid-19 suspected patients can present clinically with mild flu like symptoms to community acquired pneumonia. Patients can present as ARDS (Acute Respiratory Distress Syndrome) with refractory hypoxemia. Immunocompromised and elderly pregnant patient may present with fatigue, malaise, body ache, nausea, diarrhea².

Transmission of COVID-19

Human to human transmission occurs by droplet, fomites and contacts. Samples from COVID-19 positive patient’s amniotic fluid, cord blood, neonatal throat swabs and breast milk were tested negative for the virus in a case series³.

Furthermore, three placentas of infected mothers were swabbed and tested negative for the virus in a different paper by Chen et al⁴. Three infants born to symptomatic COVID-19 mothers tested for the corona virus had negative tests in another case series⁵.

Effect of COVID-19 infection on fetus

COVID-19 infection is not associated with increased risk of miscarriage, early pregnancy loss. There is unclear evidence whether preterm birth in COVID-19 patient is iatrogenic or spontaneous¹. Although there was evidence of fetal compromise and prelabour premature rupture of membrane, iatrogenic delivery was indicated predominantly for maternal indications related to the viral infection⁶. There is no evidence of intrauterine fetal infection, congenital malformation.

Time of delivery

The timing of delivery is entirely dependent on the maternal and fetal conditions. Stable cases can be delivered at term vaginally, while critically ill mothers delivered earliest possible with early cord clamping and maternal separation for 2 weeks postnatally to prevent direct contact transmission⁷. COVID-19 symptoms may cause confusion e.g. fever with ruptured membranes, dyspnoea as physiological changes of pregnancy. If uncertainty arises, investigate and treat as suspected COVID-19 until medical advice can be sought. Do not delay obstetric management in order to test for COVID-19. Where practical, appointments should be conducted on the telephone or using videoconferencing, provided there is a reasonable expectation that maternal observations or tests are not required¹.

Mode of birth should not be influenced by the presence of COVID-19, unless the woman's respiratory condition demands urgent delivery¹. Caesarean section is indicated only when medically justified and advised by usual obstetric practice.

General preparation

Admit to isolation room, preferably a negative pressure room, and limit the number of care providers to the strict minimum. There should be a separate delivery room and operation theatre for suspected or confirmed COVID-19 patient. Neonatal resuscitation corner should be 2 meter away from delivery table⁸. Planning with the NICU team should be done beforehand for separation of the infant to prevent maternal-infant transmission. Mock drill and simulate scenarios for the care of COVID19 positive patients. It should include the donning and doffing of PPE, intubation and extubation and transport to the operating room.

For elective procedures e.g. planned cesarean delivery, elective induction of labor, cerclage ; patients should be phoned the night before to screen for symptoms consistent with COVID-19¹. Avoid crash situations by anticipating needs, as donning and doffing takes time. Avoid emergent cesarean deliveries as much as possible by proactive communication with obstetrical and nursing teams. For respiratory distress intubate early using appropriate PPE.

Anaesthetic management

Planning of anaesthesia becomes very crucial while taking all the necessary precautions. There is no evidence that spinal or epidural anaesthesia is contraindicated in presence of COVID-19. All the contraindications to neuraxial anaesthesia are applied same as normal patient. In a case series from Wuhan, one third patient developed thrombocytopenia, so platelet count should be checked before neuraxial block and before removal of epidural catheter. Early epidural analgesia may reduce the need for general anaesthesia for emergent cesarean delivery. Most experienced anaesthesia provider should be assigned for anaesthetic procedures like neuraxial anaesthesia, intubation.

Preanaesthetic checkup must be done in the isolation room where the patient is kept. Personal Protective Equipment (PPE) should be used for

preventing transmission from patient to the anaesthesiologist. A preanaesthetic checkup should include history of fever, cough, dyspnoea, and other comorbidities. All women should be screened for a history of travel, occupation, contact and cluster. If patient is symptomatic, radiographic investigations should be performed as for the non-pregnant adult; this includes chest X-ray and CT of the chest¹. Reasonable efforts to protect the fetus from radioactive exposure should be made, as per usual protocols¹. The radiological findings reported in these cases range from diffuse segmental or sub-segmental ground-glass opacities signifying interstitial oedema seemingly like “paving- stone” with extensive exudation into alveolar cavities leading to patchy areas of consolidation⁹. After taking due consent for the procedure, it is important to counsel the patient’s relatives regarding need for strict isolation.

Dedicated operation theatres should be used for all confirmed or suspected COVID- 19 infected patients. COVID- 19 infected patients should be wheeled through separate/isolated corridors to the operation theatre. Operation theatre should have preferably be negative pressure system with at least 160 litres/second/patient in facilities with natural ventilation¹⁰. In case of positive pressure system air conditioner should be switch off. The patients should be wheeled directly in to the OT. They should not stay in pre-medication room at all. All operation theatre staff should wear PPE including anaesthesiologists, surgeons, nurses, technician, bearer, sweeper, etc. PPE included one piece special gown, properly fitted N95/N99 mask, eye shield, shoe cover and double gloves. Prefer regional anaesthesia, where ever possible. A surgical mask or N95 mask must be applied to the patient throughout the length of stay in the operating room. In case supplementary oxygen is needed, the oxygen mask is applied over the surgical mask or N95 mask. If general anaesthesia and intubation is required tracheal intubation should be done by experienced anaesthesiologists to limit the number of intubation attempts. Limit the number of anaesthesia team personnel

(maximum three) inside the OT. Second clinician with PPE can be available outside the OT for immediate assistance. Roles should be allocated as 1st & 2nd intubators, drug administrator, team leader, and runner. The ability to communicate is limited by PPE. Clinicians can use sign language or paper and pen to communicate with each other. Place all equipments and drugs required for the anaesthetic management in a tray and avoid handling of the drug trolley during the case. Equipments should include standard airway equipment, prefer disposable devices. Difficult airway trolley, crash trolley/ defibrillator can be kept outside and at handy position. Their position should be identified before starting the procedure. Second doctor should be available with donned PPE outside the chamber. Prefer disposable monitoring equipment, if possible a dedicated ultrasound machine can be used. Ultrasound machine may play a vital role in invasive procedures, regional anesthesia, assessment of cardiovascular function and fluid responsiveness. Place two high quality Heat and Moisture Exchange Filters (HMEFs). First, between tracheal tube and breathing circuit; and the second between expiratory limb and anaesthesia machine¹¹. For general anaesthesia, pre-oxygenate for five minutes with 100% oxygen. Avoid high flow oxygen to prevent aerosolization. Rapid sequence induction (RSI) and tracheal intubation should be done ideally in the first attempt and confirmed using capnography. Avoid manual ventilation to prevent aerosolization of virus from airways. In cases of severely decreased PO₂/FiO₂ ratio, modified RSI can be done. If manual ventilation is required, apply small tidal volumes. Ensure adequate neuromuscular blockade to avoid bucking that can increase aerosolization. Immediately inflate the tracheal tube cuff, connect to the ventilator before starting ventilation. Confirm the position of ETT by capnography. The choice of induction drugs is dictated by haemodynamic considerations. Ensure adequate analgesia, injection fentanyl can be given after the delivery of the baby. Avoid awake fiberoptic

intubation, nebulization with local anesthetic will aerosolize the virus. Videolaryngoscope can be used to improve intubation success and it may increase the distance between the patient's airway and intubating anaesthesiologist¹¹. Use low gas flows and closed circuits. Limit the ventilatory disconnections. Use a closed airway suction system preferably. Supraglottic airway devices should be used only in 'cannot ventilate' situations. Since most of these patient may require high sealing pressure, so a securing the airway with endotracheal tube should be preferred. Prophylactic administration of anti-emetic drug is preferred to reduce the risk of vomiting and viral spread. The depth of anaesthesia should be maintained at all times to prevent any bucking in between the procedure. The setting of ventilatory parameters should be in accordance with the lung protective strategies with optimal PEEP and Pplat <35 mmHg to achieve SpO₂ >90% and admissible hypercapnia¹². As COVID-19 is associated with acute respiratory distress syndrome. In order to avoid the risk of fluid overload, women with moderate-severe symptoms should be monitored using hourly fluid input-output charting. Separate isolation of the infected mother and her baby is advised for 14 days⁸. WHO support breast feeding of the child while taking precautions like hand hygiene and respiratory hygiene. Oxytocin infusion should be started as per the institution protocol after the delivery of the baby.

Tracheal extubation should be done on table, as far as possible. Antitussive drugs such as remifentanyl, lidocaine and dexmedetomidine reduce the risk of coughing and minimize agitation on extubation. "Mask over tube" technique can be used during extubation as explained by David.F et al¹³.

Postoperative management

After tracheal extubation, patient should be transferred to the isolation ward. If tracheal extubation is not feasible, then shift the patient to designated Intensive Care Unit (ICU). During

transfer, the team should wear proper PPE outside the operating room. The patient should be covered with one disposable operating sheet and then transferred through a dedicated lobby and elevator. The patient must wear a surgical mask or N95 mask during transfer. The surfaces of passage ways and the elevator should be cleaned. If the patient is kept intubated, a single patient use Ambu bag with HME filter attached must be used during transfer. Do not use a ventilator during transfer. Discard breathing circuit, mask, tracheal tube, HME filters, gas sampling line and soda lime after every patient. Water trap to be changed if it becomes potentially contaminated. Seal all used airway equipment in a double zip locked plastic bag¹⁴. It must then be removed for decontamination and disinfection. Decontamination of all surfaces, screens, keyboard, cables, monitors and anaesthesia machine with 2 to 3% hydrogen peroxide spray disinfection, 2- 5 g/l chlorine disinfectant, or 75% alcohol wiping of solid surfaces of the equipment and floor should be done at the end of the procedure. The hydrogen peroxide vaporizer is an added precaution to decontaminate the OT.

All unused items on the drug tray and airway trolley should be assumed to be contaminated and discarded. All staff should take shower before resuming their regular duties.

Summary

All women despite the COVID-19 pandemic have a right to have a safe childbirth experience. Principles of perioperative management of obstetric patients remain same except infection prevention and control measures should be arranged. New research and guidelines are underway in different phases of completion till the writing of this article. New therapeutic agents and vaccine may provide a hope along with general precaution to contain this pandemic.

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