COVID 19 AND OBSTETRIC ANAESTHESIA

Anesthesiology

Sindhu Sapru*

Trust Specialist Registrar, Northwick Park hospital London, United Kingdom
.*Corresponding Author

Nida N Farooqui

MICU, Intensivist, Niloufer Hospital for women and children Hyderabad, India

Amit Kulshreshtha

Principal Specialist, Sawai Man Singh Medical College Jaipur, Rajasthan, India

ABSTRACT

Covid 19 infection caused by the novel coronavirus Sars Cov-2 has become a global pandemic. Due to a high human to human transmission rate of the virus and the physiological changes of pregnancy, these patients may be at high risk. Obstetric anaesthesia including antenatal perioperative and postoperative care of pregnant patients and protection of health care workers from infection is an important area for anaesthetic management

KEYWORDS

Covid, pregnancy, perioperative anaesthetic management

INTRODUCTION

COVID 19 infection was first found in Wuhan, China on December 2019 [1] since then it has grown exponentially to be declared a pandemic on March 11 2020 by WHO. [2]

MODE OF TRANSMISSION

The virus replicates in the respiratory epithelium and spreads via:
-Droplets – Detectable in air for upto 3 hours upto a 1-2m radius [3]
-Aerosols (small particle nuclei, may penetrate standard surgical masks) remain suspended for hours in the air contaminating a wider dispersing radius and greater number of individuals.[4] -Fomites-Viable on surfaces for upto 72 hours, viral transmission from asymptomatic individuals possible. [5] Pregnant women do not appear more susceptible to the infection than the general population [6]. Emerging evidence suggests that vertical transmission of the virus from woman to her baby antenatally or intrapartum is possible [7] but further investigation is needed and ongoing. [8]

Clinical features

Most pregnant women experience mild/cold or flu like symptoms. Others include Cough, Fatigue ,Shortness of breath ,Myalgia ,

diarrhoea, anosmia, ageusia. [9]

Physiological changes in pregnancy to the immune system can cause severe symptoms in viral infections but there is currently no evidence that pregnant women with COVID 19 are more likely to be critically unwell.[10]

Current data do not suggest an increased risk of miscarriage ,early pregnancy loss or birth defects in pregnancies with COVID-19 [11] but Cases of preterm delivery have been seen [12],

Current treatment protocol for COVID 19 patients

Specific diagnostic tests approved by ICMR in practice now - RT-PCR (gold standard), CBNAAT, TRUENAT, Rapid antigen test and Antibody test (IgM and IgG)

Trial therapies- Inj. Remdesivir 200mg IV OD on Day 1 and 100 mg IV OD x 4d -Convalescent Plasma 200 ml slow IV Single Dose -Lopinavir 400 mg + Ritonavir 100 mg) Twice Daily x 14 Days+ Interferon Beta 8 Million IU on Alternate Days x 3 Doses [13]

Mild	MO	SEVERE	
Clinical Criteria			
SPO2	> 94 % in Room Air	90 - 94 % in Room Air	< 90 % in Room Air
RR	< 24 / min	24 – 30	> 30
No Pneumonia	Pneumonia +	Pneumonia ++	
Laboratory Findings (Expected)			
NLR	< 3.2	> 3.2	> 5.5
CRP	< 40	40 – 125	> 125
Ferritin	< 500	> 500	> 800
D-Dimer	< 0.5	> 0.5	> 1.0
LDH	< 300	300 – 400	> 400
IL6	< 4.8	5 – 50	> 80
LFT	Normal	Slight Derangement	Moderate Derangement
Treatment			
Routine	T. Paracetamol 500 mg TDS	T. Paracetamol 500 mg TDS	T. Paracetamol 500 mg TDS
Anti-tussives SOS	Anti-tussives SOS	Anti-tussives SOS	
T. Vitamin C 500 mg OD	T. Vitamin C 500 mg BD	T. Vitamin C 500 mg BD	
T. Zinc 50 mg BD	T. Zinc 50 mg BD	T. Zinc 50 mg BD	
C. Omeprazole 20 mg BD	C. Omeprazole 20 mg BD	Inj. Pantoprazole 40 mg IV OD	
Fluids	Adequate Hydration - Oral	Adequate Hydration - NS	Conservative Fluids
HCQ (Not prescribed routinely)	T. HCQ Day 1 - 400 mg BD Then 400 mg OD x 4 Days	T. HCQ Day 1 - 400 mg BD then 400 mg OD x 4 Days	-
Antibiotics	T. Azithromycin 500 mg OD x 5 Days (or) T. AmoxClav 625 BD if T. Azithromycin is contraindicated	T. Azithromycin 500 mg OD x 5 Days + Inj. Ceftriaxone 1 gm IV BD if secondary bacterial infection suspected	T. Azithromycin 500 mg OD x 5 Days + Inj. Piptaz 4.5 mg/ Inj meropenam 500mg IV TDS if secondary bacterial infection suspected

*NLR1- Neutrophil leucocyte ratio, CRP- C Reactive protein, LDH- Lactate dehydrogenase, IL6- Interleukin 6, LFT- Liver Function test, NRM- Non rebreathing mask, HFNC- High Flow Nasal Cannula, CPAP- Continuous Positive Airway Pressure, MV- Mechanical ventilation, ARDS- Acute respiratory distress syndrome.

Infection Prevention

Triage

Give suspect patient a triple layer surgical mask and direct patient to an isolation room if available. Keep at least 1meter distance between suspected patients and other patients.

Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow for others. Perform hand hygiene after contact with respiratory secretions

Anticoagulation	-	Inj. Enoxaparin 40 mg SC OD x 5 Days Inj. Dalteparin 2500 IU SC OD x 5 days In ESRD, UH – 5000U SC BD can be used	Inj. Enoxaparin 40 mg SC BD x 5 Days Inj. Dalteparin 5000 IU SC OD x 5 day In ESRD, UH – 5000U SC BD can be used
Steroids	-	Inj. Dexamethasone 0.1 – 0.2 mg /kg $\approx$ 6 mg IV OD x 5 Days or inj. Methyl Prednisolone 0.5 -1 mg/kg $\approx$ 60mg x 5 Days	Inj. Dexamethasone 0.2 – 0.4 mg /kg $\approx$ 6 mg IV BD x 10 Days or inj. Methyl Prednisolone 1.0 -2.0 mg/kg $\approx$ 80 mg x 10 Days
Oxygen Support	Not Required	Maintain Target SpO ₂ of 92 to 96 % Nasal Prongs (4 lit / min) ↓ Face Mask (5-10 lit / min) ↓ NRM (10 -15 lit / min) ↓ HFNC (10 - 40 lit / min) ↓ CPAP (TV 6ml/kg; PEEP 5-15 cm H ₂ O; Target PP 30 cm H ₂ O)	Maintain Target SpO ₂ > 90 % NRM (10 -15 lit / min) ↓ HFNC (10 - 60 lit / min) ↓ CPAP (TV 6ml/kg; PEEP 5-15 cm H ₂ O; Target PP 30 cm H ₂ O) ↓ MV (ARDS Protocol)
Proning	-	Awake Proning (if > 4 L / min)	Prone Ventilation 16 to 18 hrs / Day
Cytokine Storm	-	Inj. Tocilizumab 400 mg (max 800 mg) slow IV in 100 ml NS over 1 Hour	-

Non Contact precautions - No physical contact and >2 m away from patient Fluid-resistant surgical mask, eye protection.

Droplet precautions - During clinical care <2 m from patient Waterproof apron*, gloves**, fluid-resistant/triple layer surgical mask, eye protection/goggles Place patients in single rooms, or group together those with the same etiological diagnosis. If an etiological diagnosis is not possible, group patients with similar clinical diagnosis epidemiological risk factors, with a spatial separation. Limit patient movement within the institution and ensure that patients wear triple layer surgical masks outside their rooms.

Airborne Precautions- During AGPs (Aerosol Generating Procedures)- tracheal intubation non invasive ventilation NIV, high flow nasal oxygen (HFNO), bronchial suctioning, bronchoscopy, sputum induction (Fluid resistant long-sleeved gown, gloves, eye protection and fit tested FFP3 or N95 mask Use adequately ventilated single rooms when performing AGPs meaning negative pressure rooms with minimum of 12 air changes per hour or at least 160/litres/second per patient in facilities with natural ventilation. Limit number of individuals in room Care for the patient in the same type of room after mechanical ventilation commences. [14]

Antenatal Care

Low risk pregnancy- Minimise antenatal visits to 12, 20, 28 and 36 weeks of gestation and replace by phone or web consultation [15] Symptomatic women- Defer appointments to 7 days after the start of symptoms, unless severe symptoms or urgent maternal and/or fetal reasons. Patients should be educated regarding monitoring symptoms and indications for seeking urgent care. Closer fetal monitoring with monthly ultrasound for fetal growth, amniotic fluid, and fetal anatomy. [15]

Anaesthetic Considerations in Labour & Delivery Suite Labour Analgesia

Entonox- It is not an AGP hence PPE for AGPs not required for the staff caring for the patient on Entonox. Use only with a single-patient <0.05 μ m pore size hydrophobic filter. [16]

Remifentanyl PCA- Risk of respiratory depression so use with caution in labor. Avoid in women with SPO₂<95%

Neuraxial analgesia- There is no current evidence that its use in COVID 19 patients is contraindicated. Early epidural placement is recommended-

- (1) Helps avoid exacerbation of respiratory status by labor pain relief
- (2) Reduces the need for GA if cesarian delivery is planned intrapartum

Check platelet counts before block and before removal of catheter-Mild thrombocytopenia common in non-pregnant patients with COVID-19. [17] Pregnancy is associated with an increase in platelet aggregation and decrease in circulating platelets.[18]. All standard contraindications to neuraxial block apply.

Droplet precautions for all health care workers in the room (Labor ventilation and neuraxial block placement -not an aerosol-generating procedure) [19]

The patient should wear a surgical mask at all times. A dedicated anaesthesia cart and machine is recommended due to difficulty in disinfecting anaesthesia workspaces. If not the non dedicated cart should be left outside the room. [20]

All PPE donning and paperwork outside the labour room. The most senior provider should perform the procedure with one nurse to assist. Positioning table for position support for patient instead of a health care worker.

An assistant- available outside the room to hand over equipment.

After careful doffing, dispose of equipment, drugs, and PPE and complete paperwork.

Temperature monitoring during labour and appropriate management of fever [21]

Anaesthesia for Cesarean delivery

Pre-operative preparation

Avoid auscultation with a stethoscope to reduce cross-infection. Document vitals.

If patient in respiratory distress or hypoxaemic, involve the intensive care team, before commencing anaesthesia for surgery for post operative critical care management.

Intraoperative care

Dedicated operation theatres should be prepared for COVID 19 patients during the pandemic with essential equipment only inside and disposable monitors and equipment. Elective cesarians should be scheduled at the end of the operating list. And emergency cesarians in a second obstetric theatre, where available, allowing time for a full postoperative theatre deep cleaning. Assistant outside theatre to supply emergency drugs and equipment. The chance of requiring conversion to a GA during a caesarean birth commenced under regional anaesthesia is small, but increases with the urgency of caesarean birth. If there is significant risk or if GA is planned from the outset, all staff in theatre should don PPE prior to commencing the GA. The time delays due to donning of PPE which can affect decision-delivery time should be explained to all women presenting in labour. [16]. Maintain proper clean intra-operative record of care Neuraxial anaesthesia (epidural extension of labour analgesia, spinal or CSE anaesthesia) is preferred. Consider measures to avoid conversion to general anaesthesia – denovo Spinal anaesthesia rather than prolonging a poorly functioning labour epidural analgesia, or use CSE anaesthesia. There is a likelihood of excessive hypotension in a patient with COVID-19 and an increased requirement for vasopressors so prophylactic intravenous infusion of a vasopressor recommended. [22] Give uterotonics by slow bolus or infusion.

General anaesthesia

Tracheal intubation and extubation are AGPs thus increasing the risk of viral transmission to healthcare workers. The effect of tracheal intubation on a patient with acute respiratory compromise is another concern. Intubation checklists developed for intubation of COVID 19 patients should be used. [23] Antacid prophylaxis as routine Use checklists for closed loop communication because the PPEs can impair verbal communication. [24] Preoxygenation mandatory due to risk of

rapid desaturation following induction -impaired respiratory function and pregnancy-related reduction in lung capacity. Connect a HEPA or HMEF filter to the Y piece on the patient's side before pre-oxygenation. [25] Avoid high flow nasal oxygen or facemask oxygen due to risk of aerosolization. Gentle, low-pressure manual ventilation with two hand technique and a tight seal on the face mask or a supraglottic airway device may be required.

Double gloves and in some places even triple gloves are used when intubating the patient.[25]its an extra layer of protection and the outer glove can be used as a sheath for the laryngoscope blade after use. Rapid sequence induction to minimize the risk of aspiration and avoid manual mask ventilation[26] Ensure satisfactory depth of anaesthesia and paralysis on induction to avoid coughing during intubation. Increased risk of difficult and failed airway management in obstetric practice [27] hence the most skilled anaesthetist should intubate the patient and use videolaryngoscope for intubation.

Maintain a reasonable distance between the provider and patient's faces and decrease procedure time. Cardiovascular collapse following induction of anaesthesia has been reported in the non-obstetric population with severe COVID-19 so vasopressors should be immediately available for managing hypotension. Avoid unnecessary disconnections of circuit. If needed clamp between the HMEF and the circuit /endotracheal tube before disconnection. Attach extensions before intubation Decontaminate the work surfaces around the patient's head and the anaesthetic machine after intubation to reduce fomite transmission. Extubation is a more critical event than intubation due to the higher chances of coughing and spreading the virus. Routine prophylactic antiemetics minimize environmental contamination from vomiting. A recent analysis has evaluated pharmacological methods to minimise emergence coughing after general anaesthesia with tracheal intubation. [28] (dexmedetomidine, remifentanyl, fentanyl, intra-cuff or intravenous lidocaine and lidocaine via tracheal or topical application) and found to be better than placebo or no medication. Immediate and proper disposal of the endotracheal, suction and oro-gastric tubes to decrease contamination. During transport, intubated patients should have an HMEF filter between the self-inflating bag and the patient. Non-intubated patients should wear a surgical mask.

Postpartum

Judicious fluid management, surveillance for respiratory decompensation, and early involvement of subspecialty care as needed should be done Precautionary separation of neonate from the mother until she tests negative for COVID-19.[8,16] Asymptomatic or mild symptoms- breastfeeding and rooming-in can be considered with strict adherence to hand hygiene and droplet precautions. The benefits of breastfeeding outweigh any potential risks of transmission of the virus through breastmilk.[16] Severe or critically ill mother- separation of neonate with attempts to express breastmilk. Use a dedicated breast pump which must be thoroughly washed after each feed[29] Oxytocin and methylergonovine recommended for post partum hemorrhage. Avoid carboprost due to the potential for bronchospasm and risk of aerosolization during bronchospasm management. [30] Asymptomatic or mild pain- Acetaminophen and NSAIDs safe [31] as the alternative of opioids likely poses more clinical risks.

CONCLUSION

Obstetric anaesthesia in the times of COVID 19 pandemic comes with its own set of challenges. Strict and judicious use of the standard operating protocols is necessary for the safety of the mother and health care worker.

REFERENCES

- [1] Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020
- [2] World Health Organization. Who director-general's opening remarks at the media briefing on covid-19-11 march 2020 [Media Briefing]. 2020. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-oncovid-19>.
- [3] Gralton J, Tovey E, McLaws M-L, Rawlinson WD. The role of particle size in aerosolised pathogen transmission: a review. *J Infect* 2011;62:1-13.
- [4] Garner JS. Guideline for Isolation Precautions in Hospitals. *Infect Control Hosp Epidemiol* 1996;17:53-80.
- [5] Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med* 2020;382:970-1.
- [6] Smith V, Seo D, Warty R, et al. Maternal and neonatal outcomes associated with COVID-19 infection: A systematic review. *PLOS ONE* 2020;15(6):e0234187. doi: 10.1371/journal.pone.0234187
- [7] Lamouroux A, Attie-Bitach T, Martinovic J, et al. Evidence for and against vertical transmission for SARS-CoV-2 (COVID-19). *American journal of obstetrics and*

- gynecology* 2020 doi: 10.1016/j.ajog.2020.04.039
- [8] Wang C, Zhou YH, Yang HX, et al. Intrauterine vertical transmission of SARS-CoV-2: what we know so far. *Ultrasound Obstet Gynecol* 2020;n/a(n/a)doi: 10.1002/uog.22045
- [9] Public Health England. COVID-19: investigation and initial clinical management of possible cases 2020 <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-initialinvestigation-of-possible-cases/investigation-and-initial-clinical-management-of-possible-cases-of-wuhan-novel-coronavirus-wn-cov-infection>
- [10] Mor G, Cardenas I. The immune system in pregnancy: a unique complexity. *Am J Reprod Immunol* 2010;63(6):425-33. doi: 10.1111/j.1600-0897.2010.00836.x
- [11] Yan J, Guo J, Fan C, Juan J, Yu X, Li J, et al. Coronavirus disease 2019 (COVID-19) in pregnant women: a report based on 116 cases. *Am J Obstet Gynecol*. doi: 10.1016/j.ajog.2020.04.014
- [12] Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, et al. Outcome of Coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. *Am J Obstet Gynecol MFM*. 2020 Mar:100107.
- [13] Clinical management protocol, Covid 19 – MOHFW GOI dt 03.07.20
- [14] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879107/T1_poster_Recommended_PPE_for_healthcare_workers_by_secondary_care_clinical_context.pdf
- [15] Favre G, Pomar L, Qi X, Nielsen-Saines K, Musso D, Baud D. Guidelines for pregnant women with suspected SARS-CoV-2 infection. *Lancet Infectious Diseases* 2020 pii: S1473-3099(20)30157-2. [Online] March 3, 2020.
- [16] Coronavirus (COVID-19) infection in pregnancy 2020. <https://www.rcog.org.uk/coronavirus-pregnancy>. Version 10.1:19 June 2020
- [17] Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*.<https://doi.org/10.1056/NEJMoa2002032>.
- [18] Juan P, Stefano G, Antonella S, Albana C. Platelets in pregnancy. *J Prenat Med* 2011;5:90-2.
- [19] England PH. COVID-19: infection prevention and control (IPC). Available at: <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control>.
- [20] The Anaesthesia Patient Safety Foundation. Faq on anaesthesia machine use, protection, and decontamination during the COVID-19 pandemic 2020. Available from: <https://www.apsf.org/faq-on-anaesthesia-machine-use-protection-and-decontamination-during-the-covid-19-pandemic/>.
- [21] Greenwell EA, Wyshak G, Ringer SA, Johnson LC, Rivkin MJ, Lieberman E. Intrapartum temperature elevation, epidural use, and adverse outcome in term infants. *Pediatrics* 2012;129:e447-54.
- [22] Kinsella SM, Carvalho B, Dyer RA, et al. International consensus statement on the management of hypotension with vasopressors during caesarean section under spinal anaesthesia. *Anaesthesia* 2018;73:71-92.
- [23] Faculty of Intensive Care Medicine ICS, Association of Anaesthetists of Great Britain and Ireland, Royal College of Anaesthetists. COVID-19 Airway Management Principles 2020 Available at: <https://icmanaesthesiaicovid-19.org/airway-management>.
- [24] Royal College of Anaesthetists. Obstetric Anaesthesia Guidance 2020 [Available from: <https://icmanaesthesiaicovid-19.org/obstetric-anaesthesia-guidance>
- [25] Bowdle A, Munoz-Price LS. Preventing infection of patients and healthcare workers should be the new normal in the era of novel coronavirus epidemics. *Anesthesiology* 2020. doi: 10.1097/ALN.0000000000003295.
- [26] Kim HJ, Ko JS, Kim TY. Recommendations for anesthesia in patients suspected of COVID-19 coronavirus infection. *Korean J Anesthesiol* 2020;73:89-91.
- [27] Kinsella SM, Winton AL, Mushambi MC, et al. Failed tracheal intubation during obstetric general anaesthesia: a literature review. *Int J Obstet Anesth* 2015;24:356-74.
- [28] Tung A, Fergusson NA, Ng N, Hu V, Dormuth C, Griesdale DEG. Medications to reduce emergence coughing after general anaesthesia with tracheal intubation: a systematic review and network meta-analysis. *Br J Anaesth* 2020;124:480-95
- [29] Centers for Disease Control and Prevention. Coronavirus disease (COVID-19) and breastfeeding. <https://www.cdc.gov/breastfeeding-special-circumstances/maternal-or-infant-illnesses/covid-19-and-breastfeed-ing.html>.
- [30] Landau R, Bernstein K, Mhyre J. Lessons learned from first COVID-19 cases in the United States. *Anesth Analg*. 2020.
- [31] EMA gives advice on the use of non-steroidal anti-inflammatory for COVID-19. Available at: https://www.ema.europa.eu/en/documents/press-release/ema-gives-advice-use-non-steroidal-antiinflammatories-covid-19_en.pdf.