

## Review Article

# Regional anesthesia in the coronavirus disease (COVID-19) pandemic: Clinical guidelines by AORA, India

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## Abstract

Anesthesiologists are amongst the front line warriors in this COVID-19 pandemic. We need to change our preferences and practices to reduce the spread to healthcare workers and patients in the hospital. General anesthesia involves aerosol-generating procedures while ventilating and intubating the patients. Regional anesthesia maintains respiratory functions, circumvents airway instrumentation and helps to limit viral transmission. This makes a strong case to patronize regional anaesthesia practises whenever possible. Due to various limitations of diagnostic tests available, all patients can be treated as COVID-19 positive and necessary precautions are suggested to limit the transmission. The importance of a practise advisory is to clear the mist around the dos and don'ts to ensure clarity of thoughts leading to improved safety of both patient and health care professional. We propose clinical guidelines for regional anaesthesia practices in COVID-19 positive patient posted for surgery. Furthermore, current recommendations on confirming the COVID-19 negative status is referred. These features are subject to change further with time.

**Keywords:** COVID-19, Regional Anaesthesia, Recommendations, Practice guidelines

## Introduction

Regional anesthesia (RA) maintains respiratory function and circumvents airway instrumentation. Furthermore, aerosolization that may lead to harmful viral transmission is avoided by regional blocks. Consequently, RA should be considered whenever emergency, semi-elective, or elective surgery is planned. The sensitivity of the current gold standard reverse transcriptase-polymerase chain reaction (RT-PCR) test that detects nucleic acid of the viral RNA is 70%.<sup>[1]</sup> Moreover, non-availability of rapid antibody testing, coupled with limited testing in the vast Indian population, implies that all patients be treated as COVID-19 positive and necessary precautions taken to protect the patient, healthcare workers, and medical institutions.

We are in times where we need to establish that the patient is COVID-19 negative, rather than the reverse. This can be done when there are two negative RT-PCR results in 48 h and the absence of suspicious symptoms of virus infection. Alternatively, one negative RT-PCR and 24 h later a negative HRCT chest can save time.<sup>[2]</sup> If the patient is proven to be COVID-19 negative, then RA should be conducted as per the institutional protocol. As we go ahead in time of this pandemic, we will embark on elective surgeries.

We propose clinical guidelines for the COVID-19 positive surgical patients [Figure 1] which are subject to change with time.

### Preoperative assessment

- The patient should wear at least three-ply surgical face mask and anesthesiologist must don level III Personal Protective Equipment (PPE), both in PAC clinic and ward before initiating an evaluation. This includes, disposable surgical cap, medical protection mask (FFP3), surgical scrubs, gown, disposable surgical gloves, full face respiratory protective devices or powered air-purifying respirator if possible

- Anesthesiologist should preferably wear N<sub>95</sub> face mask or at least three-ply face mask while conducting pre-anesthetic evaluation<sup>[3,4]</sup>
- Avoid overcrowding in PAC clinic<sup>[3]</sup>
- History of international or domestic travel, residence in or transit through hotspot and containment zone<sup>[5]</sup> of the patient and that of family members is crucial
- Enquire about recent visit to another hospital for short-term treatment/refusal from another hospital and also basis for refusal
- The medical history should include fever, shortness of breath, loss of taste or smell, dry cough, sore throat, muscle weakness and body aches, diarrhoea, besides routine history otherwise elicited
- Room air oxygen saturation and temperature are recorded without fail
- Practice social distancing while assessing airway<sup>[3]</sup>
- If the history and preliminary examination are suggestive of influenza like illness (ILI), elective surgery may be deferred pending further investigations
- All equipment such as a stethoscope, sphygmomanometer, torchlight, and weighing scales should be frequently sanitized<sup>[3,5]</sup>
- All necessary consents (paper or digital) to be signed. Care to be taken to avoid paper contamination.<sup>[6]</sup>

### Investigations

#### Routine

- Complete blood picture with differential counts and platelet count
- Baseline ECG (Electrocardiogram); baseline chest X-ray; 2D-echocardiography (if associated comorbidities present)
- Prothrombin time (PT) and international normalized ratio (INR) (As these patients will be on anticoagulants).

#### Specific for COVID-19

- If lymphopenia, look for neutrophil/lymphocyte ratio (NLR), >3.3 in COVID-19 patients is a reliable indicator<sup>[7]</sup>

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Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/joacp.JOACP_277_20

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**How to cite this article:** Ponde VC, Diwan S, Gopal TV, Subramanian JB, Danish MA. Regional anesthesia in the coronavirus disease (COVID-19) pandemic: Clinical guidelines by AORA, India. *J Anaesthesiol Clin Pharmacol* 2020;36:S109-15.  
**Submitted:** 21-May-2020 **Revised:** 19-Jun-2020 **Accepted:** 27-Jun-2020  
**Published:** 31-Jul-2020

- Limited sequence, plain HRCT of the chest to rule out peripheral, ground-glass opacities, affecting lower lobes in highly suspicious patients
- In only sick patients with SARI (Severe Acute Respiratory Infection), assessment of additional investigations such as D-dimer, ferritin, Lactate dehydrogenase (LDH), troponin I, C-reactive protein (CRP), Interleukin 6 (IL6) is indicated<sup>[8]</sup>
- Liver function tests (LFT) with focus on LDH.

### Intra-hospital transfer

- The transfer of COVID-19 patients should be systematically done, along a designated path to minimize contact with others. An infection prevention nurse should monitor the transport of the patient and ensure the infection control measures are followed<sup>[6,9]</sup>
- Healthcare workers (HCW) must don maximal level PPE during transfer
- Patients are monitored with a finger probe for heart rate and oxygen saturation (SpO<sub>2</sub>) throughout the procedure.

### Pre-transfer

- Antiemetics/antibiotics/three-ply surgical face mask.

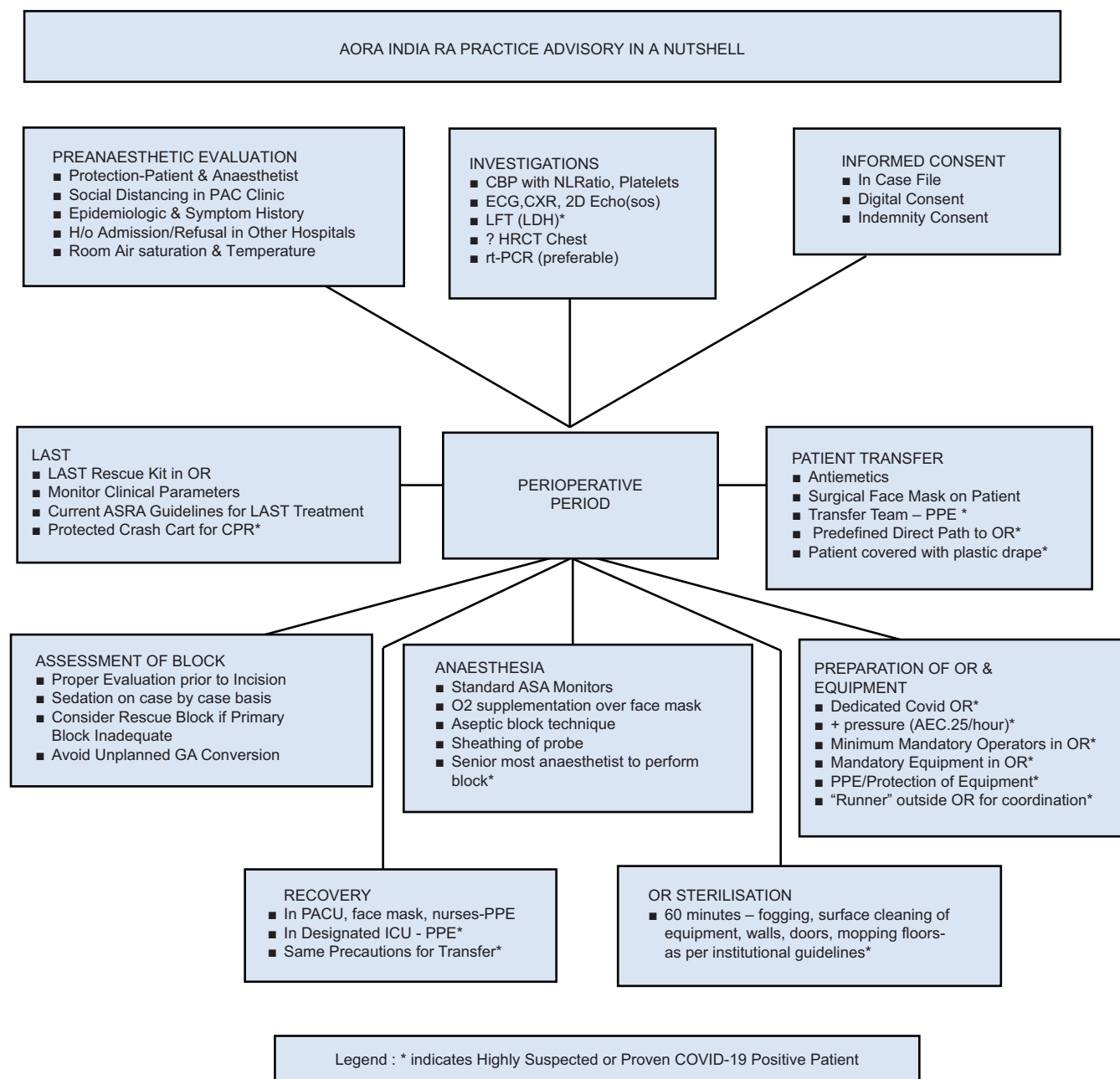


Figure 1: AORA india ra guidelines for COVID 19 positive patient in a nutshell

## Preparation of operating theatre & equipment

- All surgical COVID-19 patients should have designated operating theatre (COVID-19 operating area). Although negative pressure chambers are most suited, currently, the present operating theatres are not designed accordingly
- The number of personnel within the operation theatre (OT) should be kept to a minimum with one runner outside the OT. The senior most anesthesiologist must perform procedures to ensure all-round safety
- Only necessary equipment and drugs required should be in the OT to prevent contamination and wastage of resources<sup>[6]</sup>
- Additional equipment required that was initially unanticipated can be obtained through the runner<sup>[6]</sup>
- Single-use plastic cover to be used for covering screen and controls of the ultrasound machine and to be discarded after block<sup>[6]</sup>
- Additional ultrasound probes that are not needed for the block should be detached from the machine to minimize potential contamination<sup>[6]</sup>
- The ultrasound probe that comes into contact with the patient should be covered along its entire length with a disposable probe sheath and the patient end of transducer covered with sterile biofilm<sup>[6]</sup>
- Ultrasound probe cleaning is done as per manufacturer's guidelines for disinfection (e.g., Soap water, Non-alcohol based benzalkonium wipes). ypo1%
- Scanning with an unprotected ultrasound probe should be avoided to prevent probe contamination<sup>[6]</sup>

## Perioperative period

- Standard ASA monitoring to be used<sup>[3]</sup>
- Operators performing RA [Figure 2] on a COVID-19 patient should be suitably protected with maximal level PPE, eye goggles, and N<sub>95</sub> face mask<sup>[3]</sup>
- Oxygen therapy is identified as an independent risk factor for the spread of aerosol<sup>[6]</sup>
- To decrease aerosolization, oxygen mask to be placed over a three-layered surgical mask<sup>[3]</sup>
- Oxygen supplementation should be used only if required, and when used, minimum oxygen flow that maintains the saturation should be used. Also, nasal cannula under the surgical mask can be used
- Prophylactic administration of an anti-emetic drug is preferred to reduce the risk of vomiting and viral spread<sup>[3]</sup>
- The virus has been isolated from cerebrospinal fluid (CSF) in patients with COVID-19 encephalitis, an attempt should be made to avoid contamination by not allowing the CSF to trickle after lumbar puncture<sup>[10]</sup>
- Examine all patients for a history of lower limb weakness/upper limb weakness/tingling and numbness before a

block to exclude possibilities of COVID-19 related polyradiculopathy (to be documented)

- Risk-benefit of peripheral nerve blocks and fascial plane blocks should be evaluated for each case. If a concomitant GA is given, repositioning of the patient may increase the chances of tracheal tube disconnection and increase contamination<sup>5</sup>. Furthermore, it is an additional burden on limited operation room personnel. Hence blocks that do not require patient repositioning may be considered when appropriate
- For surgery on the upper limb, it is preferable to employ surgically congruent blocks that interfere least with respiratory function
- Though both peripheral nerve stimulator and ultrasound guided blocks may be practiced, however ultrasound guidance ensures better block success and lessens unanticipated conversion to GA, which is hazardous in the positive or suspect patient
- Spread a sterile plastic drape over the patient to minimize aerosols
- There is a definite role of anticoagulants in the treatment of COVID-19 patients. This could be in the form of low molecular weight heparin. This may interfere with the decision regarding RA choices. Spinal or epidural can be administered depending upon the risk-benefit ratio. Additional investigations such as thromboelastography can be considered apart from the recommended routine coagulation profile<sup>[11]</sup>
- Simulation sessions should be conducted for training staff in donning and doffing of PPE.

## Continuous catheters

- The decision on perineural catheters should be made on the invasiveness of the surgery<sup>[9]</sup>
- Continuous catheter techniques are beneficial but require frequent follow-up with the patient, however, the benefit of opioid sparing effect in patients with respiratory morbidity cannot be overlooked<sup>[9]</sup>
- Further, postoperative catheter management in COVID-19 patient includes frequent handling of the infusion pump, laboratory investigations, neurological examinations and the need for maximal level PPE
- The catheters used should be discarded in a biohazard bag and sealed.<sup>[12]</sup>

## Assessment of adequacy of RA & managing failed block

- Before the start of surgery, the block should be tested to ensure optimal operating conditions to avoid urgent conversion to GA when surgery is already underway
- Should the need to convert to GA arise, the anesthesiologist should follow maximal level PPE guidelines and use an



**Figure 2:** Illustrates a block in progress; Note the equipment preparations

induction technique that reduces aerosol generation to the minimum<sup>[13]</sup>

- Reconsider giving rescue block if feasible.

### Local anesthetic systemic toxicity (LAST)

- A safe dose of local anesthetic (LA) should be calculated and used; the blocks should be performed with ultrasound guidance to reduce the risk of local anesthetic systemic toxicity (LAST)<sup>[6,14,15]</sup>
- In the case of LAST, additional personnel called for help should be protected with maximal level PPE before resuscitation<sup>[14,15]</sup>
- Follow the current guidelines for the management of LAST<sup>[14,15]</sup>
- Identify one person responsible to adequately restock the drugs and equipment if and when required.<sup>[5,14,15]</sup>

### A word of caution for brachial plexus block

- The most experienced operator should perform the block
- Even for an expert, if in doubt, ultrasound visualization that offers the best possible image should be chosen for a brachial block<sup>[6]</sup>
- In patients with demonstrable saturation of less than 95%, options for proximal humerus surgery would be as follows:
  1. Ultrasound-guided superior trunk block (12-15 ml)
  2. It is advisable to administer an ultrasound guided incremental interscalene brachial plexus block (ISB) through a catheter at C5-6, followed by a graded increase in LA volume in an aliquot of 3 ml at each time. This should be done under continuous monitoring of saturation and diaphragmatic excursions
  3. Supraclavicular block: With ultrasound-guided LA volume should not exceed more than 20 ml. However, with neurostimulation guided block the volume should not exceed not more than 25 ml.

### Obstetric anesthesia

- Pregnant patients from the containment zone will undergo RT-PCR test as per ICMR guidelines
- Consider neuraxial block as it minimizes the need for general anesthesia in case of emergency cesarean section<sup>[13]</sup>
- As the incidence of hypotension is likely to be higher, anesthesiologist must be aware of the same<sup>[16]</sup>
- The lower limit of platelet count for performing neuraxial procedures is  $70,000 \times 10^6/L$ <sup>17</sup>, to avoid spinal/epidural hematoma. However, respiratory compromise with general anesthesia is much higher and hence neuraxial procedures at even lower platelet counts should be considered<sup>[17]</sup>
- Though the risk of epidural or subarachnoid space seeding with viraemic blood, causing encephalitis or meningitis, is exceedingly rare, it remains a theoretical possibility<sup>[16,18]</sup>
- To prevent the contamination of the Entonox circuit, a hygrosopic filter should be added<sup>[19]</sup>
- Currently, there is no evidence to suggest vertical transmission, although transmission after birth due to contact with infectious respiratory secretions is possible.<sup>[20]</sup> It is advisable to separate the mother from the baby while diagnostic testing is being performed. Involve pediatricians early for caring for neonates born to COVID-19 mothers<sup>[20]</sup>
- A recent report of a neonate born to a COVID-19 infected mother shows a possibility of in-utero infection<sup>[20]</sup>
- Meanwhile, ensure maximal level PPE (gown, gloves, facemask, and eye protection) for feeding and care
- It is suggested, the elevated immunoglobulin M (IgM) are not transferred to the fetus via the placenta, during 23 days between maternal infection and delivery.<sup>[21-24]</sup>

### Management of postdural puncture headache

- Accidental post-dural puncture headache (PDPH) is yet to be reported in pregnant patients with COVID-19 infection. No guidelines have been provided on the same<sup>[21]</sup>
- Untreated PDPH versus viral seeding in epidural space requiring blood patch remains a concern. This decision should be taken on a case-to-case bases, to avoid serious neurological complications
- Postponing the epidural blood patch is recommended in patients who are critically ill.

### Paediatric regional anesthesia

- The scope and play of regional anesthesia including its benefits remain the same and should be encouraged. The personnel, equipment, and operating room care are on the same principles as in adults
- Consider a good premedication unless contraindicated<sup>[25]</sup>



This will minimize the agitation and crying that otherwise would contribute to more aerosolization

- The face mask is not indicated in neonates and children in less than 2 years for the possibility of suffocation
- The accepted practise to giving concomitant general anesthesia shall hold sway for obvious reasons. Certainly, general anesthesia with intubation and closed circuits with appropriately sized filters would be preferred over face mask or LMA to minimize aerosol generation
- Practices of continuous epidural catheters and perineural catheters should be encouraged because of their opioid-sparing effects.

### Recovery

- COVID-19 positive patients must be monitored in the OT till such time the patient is stable for transfer directly to COVID-19 designated ward/ICU, based on patients condition with the same precautions that apply for transfer to the OT, as per institutional guidelines.

### Cardio-pulmonary resuscitation

- “Protected Code Blue” - Resuscitation to be done after adequate protection with N<sub>95</sub>/N<sub>99</sub> mask and maximal level PPE, due to high risk of airborne transmission<sup>[3]</sup>
- All the team members should wear maximal level PPEs and then enter the isolation ward/ICU cubicle along with defibrillator and resuscitation packages.

### Cleaning of the operating room after surgery

- Adequate time should be allotted for patient shifting followed by cleaning and preparation of the OT (Approximately one hour)<sup>[3]</sup>
- This consist of fogging and decontamination of all the equipment in the operation theatre. This can be done safely using 2–3% hydrogen peroxide spray or 2–5 g/l chlorine disinfectant. 75% alcohol whips could be used for cleaning of solid surfaces and OT floors. The addition of hydrogen peroxide vaporizer is added advantage<sup>[3]</sup>
- The presence of an observer during the donning and doffing procedure is highly recommended.

As the world comes to terms with the new “normal” and the search for an effective vaccine gains frenzied momentum, institutions must adopt safe, clinical practices to deal with medical and surgical exigencies. For anaesthesiologists, patient safety has always been the pillar upon which the speciality built itself. The COVID-19 pandemic is yet another disaster that challenges us, as a community, to adapt and innovate in our endeavour to the ensure well-being of patients, healthcare workers, medical institutions and society at large. Regional anesthesia is a useful component in the armamentarium of

anaesthesiologists while catering to patients presenting for surgery during the COVID-19 pandemic.

### Conclusion

- RA should be well planned and executed with precision to ensure the best possible outcome in COVID-19 pandemic. This will benefit patient outcome and perioperative management team<sup>[6]</sup>
- Treat all patients as COVID-19 positive unless proven otherwise
- Most of the considerations surrounding the management of the parturient with suspicion of or known COVID-19 infection include not only the best strategies to ensure safe care for the parturient but also those to prevent health care worker exposure to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and contracting COVID-19
- Early neuraxial labor analgesia is strongly recommended to ensure the adequacy of analgesia, and thereby, comfort to the parturient
- Spinal anesthesia is the preferred technique of choice for cesarean section
- Ultrasound guided peripheral/plexus blocks ensure block success
- Role of regional anaesthesia remains unchanged in the paediatric population.

### Financial support and sponsorship

None.

### Conflicts of interest

There are no conflicts of interest.

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