Review Article

Scheduling elective surgeries following COVID-19: Challenges ahead

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Abstract

Evolving and conflicting information about pathophysiology, clinical course and impact of corona virus disease (COVID-19) on perioperative outcome of patients has brought in new challenges while restarting elective surgeries. A roadmap to resume elective surgeries should detail timings for reopening elective surgeries, COVID-19 testing facilities, adequate PPE supplies, conservation policies for PPE and case prioritization and scheduling. We suggest a six-pronged strategy of minimizing chances of exposure, adherence to standard protocols, perioperative patient care, precautions while performing aerosol generating procedures, limiting movement of personnel within operating room and monitoring and managing health care professionals while scheduling elective surgeries to overcome the challenges this COVID-19 pandemic has brought in.

Keywords: Aerosol generating procedures, COVID-19, elective surgical procedures, pandemic, personal protective equipment

Coronavirus disease (COVID-19) the new pandemic, caused by the highly contagious single stranded mRNA virus with an incubation period of up to 14 days, spreads by respiratory secretions, runs a mild course in 80% of patients, while 14% needing hospitalization and oxygen therapy, and 5% needing intensive care/ventilatory management. Quickly evolving, conflicting information about pathophysiology, impact and outcomes of COVID-19 on varied clinical profile of affected patients give little guidance in further management.[1-3]

Elective surgeries are not optional surgeries but non-urgent surgeries. A cancelled or delayed elective surgery has unintended consequences that may inflict significant harm in terms of morbidity and mortality in 50% of patients.[4] Varying degrees of complexity of diseases and urgency of surgeries, such as for malignancies following chemoradiation, impending obstruction of large hernias, poor perioperative outcomes when surgeries such as for hip are not operated upon are some considerations for restarting elective surgeries. Such patients may have been deprived of access to timely surgical care, because of uncertainty on predicted course of COVID-19 in them.[5]

Recommendations for starting elective surgical procedures should consider the local capacity of operating rooms (OR), disease burden of the pandemic, overflowing case demand, backlog of surgical procedures, normal surgical demand, nature of disease that necessitates surgery and national priorities after evaluating institutional resources, as the risk of elective surgeries outweigh benefits in hotspots and in places with limited resources.[6]

Associated thrombocytopenia,[7] venous thromboembolism, pulmonary endothelialitis,[8] post-operative unmasking of subclinical COVID -19 infection causing severe interstitial pneumonia and associated ARDS like picture, cardiac injury

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and kidney failure of covid-19 illness along with impaired immunity following surgeries will result in poor perioperative outcomes in patients undergoing elective surgeries if they are COVID-positive pre-operatively or if they contract COVID-19 illness postoperatively.[1]

The challenges that the anesthetic world faces will be complicated by risk of COVID-19 transmission among health care workers and beyond the hospital, hazards, challenges and complications of wearing personal protective equipment to the patient, anesthesiologist and other health care workers, 'new normal' perioperative disinfection and hygiene practices, burden on hospital administration (deficits in workforce, supply chain etc.,) and the financial constraints that it brings with, while keeping an eye on subsequent waves of COVID-19.[4,9]

A roadmap to resume elective surgeries should detail timings for reopening elective surgeries, COVID-19 testing facilities, adequate PPE supplies, conservation policies for PPE and case prioritization and scheduling.[4] A sustained reduction of new COVID-19 cases with an appropriate number of intensive care beds, personal protective equipment (PPE), and trained staff for non-elective patient care are needed to restart elective surgery list.[5,6]

To overcome the challenges we face, we advocate the following six-pronged strategy incorporating a systematic integrated approach to assess infection risk and provide standards of anesthesia care to patients during this pandemic.

1. Minimize chances of exposure
2. Adherence to standard protocols
3. Perioperative patient care
4. Precautions while performing aerosol generating procedures
5. Limiting movement of personnel within OR
6. Monitor and manage health care professionals.

1. Minimize chances of exposure:
   Basic understanding of pathophysiology of COVID-19 infection will help minimize chances of exposure to corona virus disease. Mandatory wearing of 3-ply mask (if possible an N95 mask) for all patients and their relatives, proper hand hygiene techniques,[10] mock drills and simulation training in donning and doffing of personal protective equipment, social distancing policy for staff, patients and visitors in operating room complex including waiting area, designated ORs for COVID and non-COVID patients and restricted visitor policy inside OR complex will reduce risk of transmission. Ideally, all elective surgeries should be deferred awaiting a 14-day period free of COVID-19 cases in the community, to minimize risk of in-hospital transmission.[6]

2. Adherence to standard protocols:
   - Patient Prioritization protocol for elective surgery should be made based upon indication for surgery (malignancies, organ transplants, cardiac, trauma etc.), need for perioperative blood transfusion, postoperative ICU care, post-operative in-patient rehabilitation (e.g., total hip/knee replacements), associated comorbidities such as cardiopulmonary ailments (bronchial asthma, COPD, CCF etc.) and other patient needs. Elective surgery should be deferred if any of the above factors will negatively impact outcome of the procedure and result in undue prolongation of hospital stay.[4] Day care procedures with post-operative telemedicine consultation is preferable as a start to minimize risks. A pragmatic guide-based risk stratification using a scoring system (such as medically necessary, time-sensitive (MeNTS) instrument) could be utilized in ethical and efficient prioritization of patient care.[11]
   - Preoperative COVID-19 screening/testing for all surgical patients must be considered. If patients are positive asymptomatic carriers, surgery is deferred and they are admitted in COVID wards. Since 30% of false negative test occurs with reverse transcriptase polymerase chain reaction (RT-PCR), a lung ultrasound using CLUE protocol (COVID-19 Lung Ultrasound in Emergency department – using Lung Ultrasound Scoring System (LUSS)) can be considered to ascertain the presence of COVID-19 features in addition to chest x-ray.[12] Local COVID-19 diagnostic testing capabilities and turn-around times of COVID-19 might limit elective surgeries as availability might decrease when testing demands increase. Routine computed tomography of chest is not warranted for radiological diagnosis of COVID-19 for pre-operative screening.[13]
   - COVID -19 risk stratification – Patients are classified as high-risk, low risk and suspected/ confirmed patients for COVID -19.[4]
     High risk patients have travel history to high risk area and/or contact with confirmed or suspected patients, or they are in the clinically extremely vulnerable group of patients. The clinically vulnerable patients include solid organ transplant recipients, people with severe respiratory ailments like severe asthma, severe chronic obstructive pulmonary disease COPD, with cancers undergoing active chemotherapy, radiotherapy, and immunotherapy, parturient and other immunocompromised patients. Such patients are advised 7 to 14 days self-isolation (shielding).

If they test negative for COVID-19, surgery can be done in clean theatres and sent for postoperative care in ward or non-covid ICU.

Low risk patients have no contact history, symptoms and signs of COVID-19 disease and without CT manifestations of COVID-19 (if CT has been taken as part of pre-operative work up for surgery – as in oncology patients for staging, thoracic or abdominal surgeries) within the past 14 days can undergo elective surgeries if warranted.

Confirmed patients have COVID-19 confirmed by RT-PCR or serological tests. Suspected patients show clinical manifestations of COVID-19 such as fever, acute respiratory symptoms who must be tested for COVID-19. In suspected patients, who are tested COVID-19 positive, and for those confirmed patients, the elective surgeries must be rescheduled while they are admitted in the COVID ward.

- Patient readiness evaluation – Patient readiness for elective surgery in high risk patients, after risk stratification and shielding of patients for 2 weeks, is evaluated by pre-identified patient-specific screening questionnaire. If needed, a COVID-19 screening test can be done 72 hours prior to surgical procedure.[5]
- Consent with a mention of risk of contracting and transmitting corona virus disease in all patients who are planned for elective surgeries may be needed for future medicolegal implications.[14]
- Disinfection protocols for equipment related to anesthesia and surgery and Infection control policy:

  The unprecedented nature of the pandemic necessitates changes in infection control policy, disinfection protocols and OR management strategies from preoperative assessment clinic to post-operative care such as

  - Covering the anesthesia workstation, monitors, OR tables, trolleys with plastic sheets and changing them at the end of surgery with proper disposal.
  - Alcohol based hand-rubs inside OR for disinfection whenever needed.
  - Sealable plastic bags to place contaminated equipment (such as laryngoscope blades, stylets etc.,) after use.
  - Top down cleaning sequence to reduce bioburden by wiping all equipment and surfaces with disinfectant wipes post-induction.
  - Decolonizing patients using pre-procedural chlorhexidine wipes, 2 doses of nasal povidone iodine within one hour of incision, and chlorhexidine mouth rinse.
  - Closed lumen intravenous system and hub disinfection.
  - Active scavenging of anesthetic gases
  - Cleaning and disinfection of electromedical equipment with alcohol based disinfectant (with more than 70% alcohol) solution with contact time more than 1 minute.
  - Deep cleaning with surface disinfectants and ultraviolet-C for attenuation of residual environmental contamination after every surgical procedure in OR.
  - Waste disposal policy to dispose hazardous medical wastes and PPEs.[3,6,9,15-19]
- PPE for airborne, droplet and contact precautions: The use of PPE is recommended and must be made available for all healthcare professionals for every surgery performed when there is suspicion of COVID infection.[3,4]
  - Powered air purifier respirators (PAPRs) or N95 respirators with face shield/eye protection goggles along with cap, shoe covers, coverall gown and double gloves must be used when aerosol generating procedures are performed on all patients irrespective of their COVID status.
  - Fit testing of masks and respirators to ensure proper protection from aerosols and droplet infections.
  - Proper donning and doffing check list with a "buddy check" to ensure every health care worker is properly donned and doffed.[16,20-23]

3. Perioperative patient care:

The already complicated process of clinical judgment and shared decision making with added COVID risk will increase the vulnerability of patients to complications necessitating crisis management. Simulation of intraoperative events and code blue performance while wearing PPE should be practiced. The following steps are advocated to enhance patient care while restarting elective surgeries.[3,16,20-23]

Patient communication:

Proper communication with patients regarding the need for advancing or deferring surgical care facilitates planning the elective list and provides psychological safety. Discretionary, time insensitive, equivocal non-essential surgical procedures can be planned later, on a case-by-case basis with proper communication to patients.

Preoperative care:

A detailed pre-anesthetic check-up is done to rule out COVID-19 illness by a detailed history of recent

high-risk travel or presence of COVID-like symptoms such as fever >38°C, cough, shortness of breath, loss of taste or smell etc., followed by physical examination and routine laboratory investigations. Pre-operative assessment and remote instructions using telemedicine facilities can be utilized whenever feasible.[16,23]

Associated lymphopenia, prolonged prothrombin time, elevated C-reactive protein, lactate dehydrogenase and procalcitonin, chest computed tomography abnormalities like interstitial changes, ground glass abnormalities, bilateral location with lower lobe predominance, consolidation etc., may suggest COVID illness that warrants appropriate medical care and COVID-19 specific cancellation of surgery.[24]

Discussion with surgeon, especially for high risk procedures and in-patients who are older adults, frail or post COVID-19 will help in advanced planning for patient care.

COVID specific modifications in transfer of patients directly to OR, allocating same person to single patient for different phases, fixed shortest possible route away from public, dedicated trolleys and bare necessities inside OR, specific team time out, guidelines for PPE use, psychological and physical safety of patients, perioperative anesthetic plan and postoperative pain management strategies should be decided in preoperative period for smooth anesthetic outcome.[15,16,20-23]

Intra-operative care:

Performance retarding anxiety, ever-changing guidelines and information overload can result in poor intraoperative care which can be reduced by maintaining cognitive bandwidth among team members, contextualizing patient related information, standard communication protocols[25] (Signages outside OR, writing names over PPE, use of accepted sign language, Bluetooth ear buds to speak over, closed loop communication) that aids in communicating with team members and weeding out extraneous information.[16,26]

Regional anesthetic techniques preserve respiratory function, avoids aerosolization, and hence viral transmission and must be preferred over general anesthesia whenever possible. Following procedure specific guidelines inside OR and reviewing specimen pick up protocols will aid smooth intraoperative care.[25,27,28]

Specific operative risk issues:

- Tracheostomy should be done only when there is absolute indication as in head and neck surgeries.[22]
- Limit laparoscopy whenever possible to reduce aerosolization.[29]

Use smoke evacuator when electrocautery is used.[29]Use of HEPA filters attached to suction, use of ultra-low particulate air filtration (ULPA) while desufflation of pneumoperitoneum to prevent surgical plume aerosolizing virus into OR environment.[29]

Post-operative care:

- Enhanced recovery protocols with fast-tracking of patients inside OR can be done to avoid patient stay in post anesthesia care unit (PACU). Patients can be shifted to ward by bypassing PACU stay. This also helps reduce length of stay and unwanted post-anesthesia complications.
- Post-discharge care and follow up can be done by telemedicine for minor/day care procedures to reduce risk of infection.
- Guidelines for COVID-19 testing in postoperative period for symptomatic patients or who develop influenza like illness (ILI) must be established.[5,6]

4. Precautions while performing aerosol generating procedures (AGPs):
   - AGPs are important hazards for anesthesiologists as there is risk of COVID virus transmission by aerosolization and droplet transmission.
   - The details regarding aerosol generating procedures and precautions to be taken while performing them are described in other articles in this issue. We advocate a proper knowledge of AGPs, precautions such as limited personnel inside OR during AGPs, use of negative pressure OR if possible, treatment of exhaust air by high efficiency particulate air filtration, or exhausting it more than 3 meters above tallest point of hospital building, modifications of anesthetic techniques, use of barrier devices, and use of total intravenous anesthesia while performing AGPs to help prevent covid-19 transmission.[16,20-23,26,30-43]
5. Limiting movement of personnel within OR

   Limited number and movement of personnel inside OR is critical, especially when AGP is taking place, as it reduces the exposure risk and preserves PPE supply. This might require overnight or out of hours activities to optimise resource utilisation. Role identification of team members, strategies for phased opening of operating rooms, increasing OR availability time, grouping of similar cases organised during different shifts will help limit movement of personnel within OR.[6,9,26,43]
6. Monitor and manage health care professionals:

   Social distancing, providing adequate scrubs and PPEs, strict and frequent hand hygiene, self-policing, mask protocols, chemoprophylaxis with hydroxychloroquine for at risk professionals, diagnostic screening/testing policy, post-exposure quarantine policy, taking a shower before going home, advice on nutritious and electrolyte rich

diet are some of the measures that can be done aiming at providing physical and psychological safety to health care professionals.

Teaching the professionals on what should be done to keep their families safe will also help them achieve psychological safety. Prolonged working hours with PPEs may lead to electrolyte imbalance, heat stroke, fatigue, exhaustion and post-traumatic stress and may need psychological support for them. Debriefing the team at frequent intervals to evaluate how the plan is working and what needs to be improved, continued frequent transparent communication among team members will help running theatres smoothly for elective work.[22,44]

Returning safely is as important as opening up theatres for elective surgeries after this pandemic. The key parameters that help overcome challenges of scheduling elective surgeries, prevent perioperative COVID-19 transmission and that aid successful anesthetic and surgical outcome in patients will be resolving the human factors and overcoming the technical obstacles that COVID-19 has brought to us.[45]

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Conflicts of interest

There are no conflicts of interest.

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