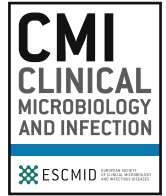




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Commentary

What is the 'new normal' in surgical procedures in the era of COVID-19?

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Background

The coronavirus 19 (COVID-19) pandemic has forced healthcare workers (HCWs) into the front line. They have faced many unknowns and confusion. At the beginning, elective surgeries were usually postponed, and only high-priority and urgent operations were continued [1]. But, as time progresses, surgical interventions and preoperative screening have become clinical problems to be solved, particularly for asymptomatic cases [2]. We review the preoperative preparations for elective surgical procedures during the pandemic.

Resumption of surgical procedures

The American College of Surgery established the 'Elective Surgery Acuity Scale' to define the priority for interventions, in which they recommend that only cancer and high-acuity cases be

performed [3]. Resumption of the surgical procedures should be considered if a significant reduction in the incidence of COVID-19 cases and hospitalizations occurred within the previous 14 days [4]. This became an established approach in order to ensure an appropriate healthcare service, including enough intensive care units (ICUs), non-ICU beds, personal protective equipment (PPE), ventilators, and trained staff [2].

Preoperative evaluation

Patient evaluation for COVID-19 symptoms—sometimes with the support of telemedicine rather than laboratory testing and radiological imaging procedures—is encouraged by the joint statement of American College of Surgeons, American Society of Anesthesiologists, Association of periOperative Registered Nurses American Hospital Association and Royal Australasian College of Surgeons [2,5]. What is more, the symptom questionnaire is evaluated as a very important tool in the future for diagnosing COVID-19m and even for determining whether PCR screening should be performed [6]. Assessment of patients before surgery includes the questionnaire concerning exposure to a COVID-19 patient in the past 14 days or having COVID-19-related symptoms within the prior 2 weeks [7].

Screening tests

Testing patients for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a crucial component of patient evaluation for protecting both HCWs and patients [8]. As the prevalence of asymptomatic and presymptomatic patients is unknown, the common opinion is to test every case with RT-PCR before surgery by following the local recommendations [1,4,7,9–11]. However, it is also recommended that testing should be determined according to the indication for surgery and the type of procedure [2]. According to the guideline by the Royal Australasian College of Surgeons, preoperative testing for COVID-19 is not needed in patients with no risk factors regarding the evaluation of the symptoms and history of the patient [5]. Retesting is not recommended, however; considering the false-negative test rates, the need for retesting should be considered in

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terms of the institutional and local settings [2,4,5]. There is not a given time when patients should be tested before surgery, but the common approach is to perform the test 1 or 2 days prior to surgery. It is recommended to consider testing according to the availability, accuracy, and turnaround time for test results [2,11]. Self-quarantine after being tested until the day of surgery is also recommended [9].

SARS-CoV-2 is probably associated with increased postoperative mortality and pulmonary complications [12]. In the case where a patient has a positive result for SARS-CoV-2 before elective surgery, it is recommended to delay the operation until the patient is not infectious and has demonstrated recovery from COVID-19 [7].

Antibody testing is primarily used for screening of the population to detect the development of immunity [13]. Antibodies against SARS-CoV-2 develop as early as 5 days and have the potential to cross-react with other coronaviruses, therefore they have a limited role in preoperative screening [1].

The European Association of Urology presents the joint testing of PCR and chest computerized tomography (CT) as a practical approach [10]. According to the report of the Royal College of Radiologists, routine preoperative chest CT screening for COVID-19 is not indicated because there is a 20% false-negative rate in symptomatic patients, making it of limited value. This method is also not recommended for the detection of COVID-19 in asymptomatic, isolated and tested patients before surgery [14,15]. Because of the low sensitivity of chest CT scanning, it is recommended only in patients whose preoperative assessment and status indicate that they will need level II/III critical care after the surgeries (such as thoracic and upper gastrointestinal surgeries) [16]. Another approach is to use CT screening or chest x-rays where PCR testing is not available [17,18].

Peroperative screening

In PCR testing, the positive rate of lower respiratory samples such as sputum could be higher than that of nasopharyngeal samples. Tracheal aspiration to collect lower respiratory tract specimens of intubated patients in the operating room might be a good option to increase the detection of SARS CoV-2 [19]. Thus, postsurgical management of the patients' and HCWs' compliance with isolation precautions might improve; however, we need more data to define the right place for this technique in clinical practice.

Reorganizing surgical practices

Providing specific spaces for invasive/surgical treatments for all patients with COVID-19 is recommended if available [1]. Reducing the number of staff in operating rooms (ORs) and entering and exiting the OR is strongly recommended to avoid transmission [1,8,18]. High-risk aerosol-generating procedures usually take place in laparoscopic operations and in otolaryngological, maxillofacial and thoracic surgeries [20]. All suspected and confirmed cases should be operated in negative-pressure rooms, at least during the intubation and extubation procedures [1,8]. If this is not available, in order to be sure that 99% of the air in the OR has been exchanged with regard to air circulation cycling time, OR members are recommended to wait outside the room (with the exception of the anaesthesia provider and assistant) [4,8]. Ultraviolet light is recommended for air-column disinfection as it is known to be effective against healthcare-associated viral infections [21]. Because of the possibility of leakage of gas during the removal of the trocar in laparoscopies, laparotomy with extensive fluid drainage is thought to be a safer option [1]. Surgical smoke still remains a concern. Minimizing energy use from electrocautery devices, use of insufflation systems with ultra-low particulate air (ULPA) filters, and two-

Table 1

Five rules for elective surgical procedures during the COVID-19 outbreak

1. Test asymptomatic patients before elective surgery with the knowledge of the sensitivity and availability of PCR at your institute
2. Do not use chest CT as a screening method except for certain types of surgery such as thoracic surgery
3. Do not rely on antibody tests for screening and implementation of infection control measures
4. Reduce the number of OR staff and entering and exiting the OR
5. Be sure that HCWs have the appropriate and optimum PPE during the operations

CT, computed tomography; OR, operating room; HCW, healthcare worker; PPE, personal protective equipment.

way pneumoperitoneum insufflators are recommended to reduce the risk of aerosolization [1,8].

Management of PPE: be simple but efficient!

Standard precautions, droplet precautions and contact precautions are mandatory for every patient [7,10,22,23]. Whether to use a surgical mask or a respirator during the operation may be a major dilemma among HCWs. Because patients may be asymptomatic, and false negatives may occur on testing, droplet precautions should be taken in the OR and, at a minimum, for intubation and extubation; respirators are recommended regardless of the result of the preoperative screening [2,7,8,23,24].

Conclusion

The decision about resuming elective surgeries should be updated according to the incidence of COVID-19 cases and their hospitalization (Table 1). The symptom questionnaire plus PCR testing are important tools for screening preoperative patients, and possibly the symptom questionnaire will be more directive in the future. The sensitivity of PCR is estimated to be around 66–80%, and positive predictive values range from 47.3% to 84.3% in low endemic areas (<10%) [25]. Thus, it should be reconsidered by the authorities according to the institutional and local settings before it is defined as a screening method on its own. Routine CT scanning has no added value.

Author contributions

All authors have made substantial contributions to this work and have approved the final manuscript. Concept and design: CC, SK, OE. Resources: CC, SK. Writing original draft: CC, SK, OE. Writing review and editing: CC, SK, OE. Supervision: OE.

Transparency declaration

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References

- [1] Hojaji C, Chinelatto ILA, Gustavo II, Pereira H. Surgical practice in the current COVID-19 pandemic : a rapid systematic review. *Clinics (Sao Paulo)* 2020;75:e1923. <https://doi.org/10.6061/clinics/2020/e1923>.
- [2] Joint Statement. Roadmap for resuming elective surgery after COVID-19 pandemic. <https://www.asahq.org/about-asa/newsroom/news-releases/2020/04/joint-statement-on-elective-surgery-after-covid-19-pandemic>. [Accessed 1 September 2020].
- [3] American College of Surgeons. COVID-19: guidance for triage of non-emergent surgical procedures. *Am Coll Surg* 2020. <https://www.facs.org/COVID-19/clinical-guidance/triage%0Ainternal-pdf//0.0.6.158/triage.html>. [Accessed 1 June 2020].

- [4] American College of Surgeons. Local resumption of elective surgery guidance. <https://www.facs.org/covid-19/clinical-guidance/resuming-elective-surgery>. [Accessed 1 September 2020].
- [5] Guidelines on the preoperative diagnostic workup for COVID-19. A rapid review commissioned by royal australasian College of Surgeons. <https://www.surgeons.org/-/media/Project/RACS/surgeons-org/files/news/covid19-information-hub/Guidelines-on-the-Preoperative-Diagnostic-Workup-for-COVID-19.pdf>. [Accessed 25 August 2020].
- [6] Huybens EM, Bus MPA, Massaad RA, Wijers L, van der Voet JA, Delfos NM, et al. What is the preferred screening tool for COVID-19 in asymptomatic patients undergoing a surgical or diagnostic procedure? *World J Surg* 2020. <https://doi.org/10.1007/s00268-020-05722-9>.
- [7] ASA and APSF joint statement on perioperative testing for the COVID-19 virus. 2020. p. 13–5. <https://www.asahq.org/about-asa/newsroom/news-releases/2020/04/asa-and-apsf-joint-statement-on-perioperative-testing-for-the-covid-19-virus>. [Accessed 1 September 2020].
- [8] Steward J, Kitley WR, Schmidt CM, Sundaram CP. Urologic surgery and COVID-19: how the pandemic is changing the way we operate. *J Endourol* 2020;34:541–9. <https://doi.org/10.1089/end.2020.0342>.
- [9] Illinois Department of Public Health. COVID-19—elective surgical procedure guidance. 2020. <https://www.dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/coronavirus/health-care-providers/elective-procedures-guidance>. [Accessed 25 August 2020].
- [10] Ribal MJ, Cornford P. EAU Guidelines Office Rapid Reaction Group: an organisation-wide collaborative effort to adapt the EAU guidelines recommendations to the COVID-19 era. *Eur Urol* 2020;78:21–8.
- [11] Hanson KE, Caliendo AM, Arias CA, Englund JA, Lee MJ, Loeb M, et al. Infectious diseases society of America guidelines on the diagnosis of COVID-19. *IDSA*; 2020. <https://www.idsociety.org/practice-guideline/covid-19-guideline-diagnostics/>. [Accessed 25 August 2020].
- [12] Archer JE, Odeh A, Ereidge S, Salem HK, Jones GP, Gardner A, et al. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet* 2020;6736:1–12. [https://doi.org/10.1016/S0140-6736\(20\)31182-X](https://doi.org/10.1016/S0140-6736(20)31182-X).
- [13] CDC Interim Guidelines for COVID-19 antibody testing. 2020. p. 1–6. <https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html>. [Accessed 30 May 2020].
- [14] The Royal College of Radiologists. The role of CT in screening elective preoperative patients 2020. <https://www.rcr.ac.uk/college/coronavirus-covid-19-what-rcr-doing/clinical-information/role-ct-chest/role-ct-screening>. [Accessed 1 September 2020].
- [15] Callaway M, Harden S, Ramsden W, Beavon M, Drinkwater K, Vanburen T, et al. A national UK audit for diagnostic accuracy of preoperative CT chest in emergency and elective surgery during COVID-19 pandemic. *Clin Radiol* 2020;75:705–8. <https://doi.org/10.1016/j.crad.2020.06.010>.
- [16] The Royal College of Surgeons of Edinburgh. Intercollegiate guidance for preoperative chest CT imaging for elective cancer surgery during the COVID-19 pandemic. <https://www.rcsed.ac.uk/news-public-affairs/news/2020/april/intercollegiate-guidance-for-pre-operative-chest-ct-imaging-for-elective-cancer-surgery-during-the-covid-19-pandemic>. [Accessed 26 August 2020].
- [17] Tang G, Kam A, Chan M. Perioperative management of suspected/confirmed cases of COVID-19. *Anaesth Tutor Week* 2020;19:1–13.
- [18] Royal College of Surgeons of England. Covid-19: good practice for surgeons and surgical teams. 2020. p. 1–19. <https://www.rcseng.ac.uk/standards-and-research/standards-and-guidance/good-practice-guides/coronavirus/>. [Accessed 26 August 2020].
- [19] Wenling W, Yanli X, Ruqin G, Roujian L, Kai H, Guizhen W, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA* 2020;323:143–1844. <https://doi.org/10.1001/jama.2020.3786>.
- [20] Howard BE. High-risk aerosol-generating procedures in COVID-19: respiratory protective equipment considerations. *Otolaryngol Head Neck Surg* 2020. <https://doi.org/10.1177/0194599820927335>. 194599820927335.
- [21] Dexter F, Parra MC, Brown JR, Loftus RW. Perioperative COVID-19 defense: an evidence-based approach for optimization of infection control and operating room management. *Anesth Analg* 2020;1–6. <https://doi.org/10.1213/ANE.0000000000004829>. XXX.
- [22] Clinical guide to surgical prioritisation during the coronavirus pandemic. 2020. accessed, <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C0221-specialty-guide-surgical-prioritisation-v1.pdf>. [Accessed 1 June 2020].
- [23] CDC. Strategies to optimize the supply of PPE and equipment 2020. 2019. p. 1–5. accessed, <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html>. [Accessed 25 May 2020].
- [24] Forrester JD, Nassar AK, Maggio PM, Hawn MT. Precautions for operating room team members during the COVID-19 pandemic. *J Am Coll Surg* 2020;230:1098–101.
- [25] Zhong L, Gong P, Biging GS. Diagnostic performance of CT and reverse transcriptase-polymerase chain reaction for Coronavirus Disease 2019: a meta-analysis 2012;78:1–15.