Surgical and Clinical Reactivation for Elective Procedures during the COVID Era: A Global Perspective

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Introduction

The COVID-19 pandemic has certainly been an unprecedented time. We have had to halt and modify our lives on a local, national, and international level and cooperate to fight this “invisible enemy” in every sector (medical, governmental, industrial, economic, educational, and social). Our immediate action in AAGL has been to organize weekly webinars on subjects related to the pandemic and unite with 8 other professional women’s health care societies to provide joint statements that guide our membership and others to expand their knowledge and optimize patient care during the COVID-19 crisis. This international and multidisciplinary collaboration with surgeons and medical specialists at the leading edge of the pandemic course has been an invaluable resource for global health care providers who are at earlier points on the COVID curve.

COVID-19 preparedness has required flexibility due to lack of diagnostic tools to accurately detect all viral carriers and absence of effective viral therapy. Most
gynecologists have halted the majority of “non-essential” office and surgical procedures in an effort to protect and mitigate risk for all patients and caregivers, preserve personal protective equipment (PPE), and maintain facility capacity for a surge in COVID-19 cases. Joint statements from the American College of Surgeons and the consortium of 9 women’s health care societies have provided guidance for resuming surgical practice and reintroducing elective procedures [1-2]. This special article provides further detailed information necessary for successful surgical and clinical reactivation for elective procedures during the COVID Era while the SARS-CoV-2 virus remains a viable threat.

**Economic Impact of COVID-19 in Healthcare**

Financial issues impact the reopening of elective surgical services during the COVID-19 pandemic. Decreased surgical volume has led to a widespread and immediate revenue loss on physicians and surgeons in private practice. The loss of volume has a projected longer-term impact on physicians employed by larger groups or institutions and on the facilities themselves.

Disruption of the supply chain also limits return to normalcy. PPE is in high demand, and some small centers are unable to order supplies due to allocation of PPE to large hospitals and to areas with higher infection density. Long-term ventilator use has created a national shortage on medications such as opiates and paralytic agents. While hospitals and ambulatory surgical centers are slowly booking surgical cases, the limited supplies, longer room turnover times, and backlogs of cases are projected to lead to salary reductions, layoffs, and financial distress.
Timing for Reactivation of Non-essential Office and Surgical Procedures

Multiple factors influence the timing of reactivation for non-essential surgery. The burden on the healthcare system and reserve capacity limit reactivation of non-essential office and surgical procedures. Chinese data suggest that an appropriate level of hospital resources must be preserved to care for patients with COVID-19 related illness. The mortality of COVID-19 in Wuhan, where preparedness was not feasible for obvious reasons, was five times higher than in the rest of continental China, where advanced planning made resources more widely available and the hospital systems were not overwhelmed [3].

Social distancing of patients and health care workers to limit viral transmission is another factor in determining the timing of re-entry. Primary care consults increase the proximity and circulation of healthcare professionals and patients, which in turn facilitates viral spread. Such visits have, so far, been deferred for being seen as non-essential in the short term in order to decrease the dissemination of the virus[4]. Conversely, empty hospitals risk bankruptcy before demand comes; furloughed healthcare professionals are already the second most in need of unemployment insurance in some areas[4]. Therefore, a precise modelling method for the pandemic progression is urgently needed. Real time modelling of the COVID instantaneous reproduction rate [3] is essential to predict the curve in the short term and anticipate the need for healthcare resources, preparing for a likely second wave [5]. Adequate modeling and widespread testing allowed for Germany to minimize COVID-19 mortality rates and its impact on the economy [6]. Likewise, with good strategy, institutions have the ability to increase non-COVID care and reactivate elective surgical practice and office procedures. In that sense, timing for resuming elective surgical and clinical care should be determined and monitored by a committee of
local authorities, clinical leaders, and hospital administration to assess local viral prevalence, regional success of “flattening the curve,” testing capability, non-COVID care capacity, and PPE supply chain.

Experience in continental China shows that a second wave is almost inevitable [3,5]. Consequently, careful planning of healthcare resources should take into account a good safety margin for institutional functional reserve. Therefore, local medical and governmental authorities must collaborate to continuously monitor the pandemic’s local reproduction rate, determine the hospital’s reserve capacity, and develop modelling strategies to continually guide opening, closing, accelerating, or reducing elective clinical and surgical activity.

**Case prioritization and scheduling**

Surgery is considered “elective” or “non-essential” in patients with chronic problems when the procedure can be delayed without significant harm to the patient and without significant change in the prognosis. Although the need for surgery is debatable when pain or functional impairment detracts from quality of life, the determining principle for non-essential surgery is that delay of treatment does not significantly impact clinical outcomes [7]. With this in mind, successful reactivation requires clear prioritization criteria aimed to ensure resource optimization and service to the most patients possible. Therefore, during re-entry, outpatient or same-day procedures should be favored over more complex cases in order to preserve hospital resources and decrease the risk of patient exposure. Table 1 summarizes our suggested prioritization scoring system, adapted from Prachand [8]. In this system, the lower the score the higher the priority.
Surgical expertise also contributes to mitigation of risk, with shorter operating times, fewer complications, and fewer readmissions observed in high volume centers [9,10,11]. Therefore, the ideal prioritization for allocation of operating room resources involves high volume surgical teams with limited learners performing primarily minimally invasive outpatient procedures [12]. Conservative management and postponement of surgery, when applicable, should be mandatory during the reactivation process, in order to allow for prioritized surgical treatment of those who have already failed non-surgical alternatives.

**Recommendations for Phases of Surgical Care**

All caregivers and healthcare systems will have to learn how to co-exist with COVID once the decision is made to resume clinical and surgical practice. Therefore, specific considerations apply to each phase of perioperative care.

**Preoperative Phase**

All patients who decide to proceed with surgery must be informed that there is a risk of contracting COVID-19 as a nosocomial infection, resulting in greater morbidity and mortality (see below). Advanced directives and post-surgery rehabilitation should be discussed virtually so that the appropriate forms, paperwork, and pre-authorizations are completed. Institutions can consider electronic signatures and verbal consents, and all details should be documented in the electronic medical record. In institutions that require signature by written paper consent, signatures should be obtained upon admission to avoid non-essential in-person visits.

Processes to minimize interpersonal contact are essential during preoperative care. Only strictly essential in-person interactions should be permitted in order to
mitigate risks for both patients and caregivers. Preoperative requirements should be streamlined so that the majority of steps are accomplished by physician extenders using distance healthcare or online tools. Preoperative education should not require face-to-face interaction. While local guidelines may vary, US federal guidelines allow the preoperative history to be performed virtually within 30 days of a procedure, and an updated physical examination can be performed at the time of pre-anesthesia care unit admission.

When in-person consultations are unavoidable, patient care areas should be disinfected immediately after use. Thorough disinfection is important because the SARS CoV-2 virus can be transmitted by respiratory aerosol droplets, close contact, and fecal-oral transmission. Therefore, extra time should be allotted per visit to allow for sanitizing work areas and patient rooms after each patient visit. The facility waiting rooms and examination rooms should be reorganized to optimize social distancing. Patient check-in should be done by smartphone, smart devices, or kiosks that are far from the person assisting at the front desk, and appropriate PPE and/or aerosolization barriers should be used to separate health care personnel and patients. Screening questions should be routinely utilized to identify COVID-19 symptoms.

If a patient screens positive for COVID-19 symptoms, she is directed to local COVID-specific clinics (see section on recommended testing below). Laboratory testing should be consolidated to decrease unnecessary patient exposure during lab visits, and preoperative laboratory tests can be drawn at the time of COVID-specific testing. If available, patient-administered tests to rule out COVID can be obtained at home so that the patient's COVID status is known prior to obtaining preoperative
A useful algorithm for preoperative decision making is demonstrated in Figure 1. [14]

**Immediate Preoperative and Intraoperative Phases**

After preoperative procedures have ruled out COVID just prior to surgery (see below), the patient may proceed to scheduled surgery. The number of support people accompanying the patient should be limited to one individual if institutional policy allows. This support individual is required to wear a mask and maintain social distancing etiquette. In certain hospitals where patient support people are forbidden, patient status updates are reported by phone or another telecommunication process.

Enhanced Recovery after Surgery (ERAS) [15] protocols should be utilized to optimize intraoperative and postoperative courses. Preoperative and intraoperative surgical checklists should be modified using COVID-19 precautions.

Providers should employ the equipment deemed appropriate by their respective institutions. It is recommended that anyone working in the operating room utilize full PPE, which includes shoe covers, impermeable gowns, surgical or N-95 masks, protective head covering, gloves, and eye protection. [16]

In the operating room and during surgery, considerations should include air flow and containment or reduction of personnel exposure to respiratory droplets during intubation and extubation. Considerations include using the “intubation box” originally designed by Dr. Hsien Yung Lai in Taiwan [17]; the design is now available in the US [18] and was recently been shown to be a viable solution for reduction of respiratory droplet exposure [19].

In addition, movement of personnel in and out of the operating room should be strictly limited, with efforts made to limit staff breaks mid-case when possible.
Trainee participation should be limited and include only personnel essential to the safe performance of the operation in order to avoid exposure and preserve PPE resources [12].

Theoretical concerns pertain to operative technique and relate to viral contamination in the operative field from the smoke plume generated by electrosurgery. Viral particles have been reported in the aerosolized smoke plume created in electrosurgery and the tools and techniques used in surgery can create particles of various sizes [20-23]. While smoke filtration and evacuation are highly recommended during surgery as part of risk mitigation technique, most smoke evacuators remove up to 88% of small particles. To further reduce the aerosolization risk of viral particles (20-360nm), use of active suction is recommended prior to tissue removal, port exchange, and for desufflation at the conclusion of laparoscopic surgery. In addition, electrostatic charging of the peritoneal cavity can precipitate over 99% of particulate matter ranging from 7nm-10um in diameter. Such systems deliver a negative electrostatic charge from an ion wand to generate precipitation (e.g. Ultravision®, Alesi Surgical®). This combination of techniques may be considered for maximum risk mitigation.

Postoperative and Post-discharge Phases

Optimal facility design incorporates separation of recovery areas for COVID-positive and COVID-negative patients. ERAS protocols should be carried out to optimize same day discharge. A follow up plan should include standardized surveillance and use of distance health, or telemedicine. Patients should not require a face to face visit unless there are complications that require physical examination. COVID home monitoring programs should be used as deemed appropriate; these include:
automated thermometers, blood pressure monitors, oximeters, and/or smart device innovations [24]. Patients who have COVID-positive family members should quarantine themselves in local facilities. Some institutions provide such housing opportunities for patients and/or caregivers.

**Recommended COVID 19 testing within various facilities based on timing of procedures**

Data from apparent COVID-negative patients after elective surgery suggests that advanced age, comorbidities, surgical time, and surgical complexity may be risk factors for poor prognosis in the event of postoperative development of SARS-CoV2. Such patients are at greater risk of ICU admission (44% vs 26%) than paired patients who did not undergo surgery [25]. Therefore, adequate preoperative screening and diagnosis of COVID-19 infection is essential for the success of any surgical reactivation program.

In areas with more than 40 active cases / 100 thousand inhabitants * (see observation at the end of chapter), we suggest that all patients planning to undergo surgery should have a diagnostic test for COVID-19 up to 72 hours before surgery and be quarantined until the time of hospital admission.

The RT-PCR test is considered the gold standard for the diagnosis of COVID-19. In clinical practice its specificity varies between 93% and 98%, but sensitivity can vary significantly from 63% to almost 100%, depending on the prevalence, onset of symptoms, viral dynamics, collection method of the clinical specimen, and transport media [26, 27]. Therefore, the positive and negative predictive value of RT-PCR is high for symptomatic patients, but its accuracy may be limited in asymptomatic patients.
Other methods that can be used for the diagnosis of COVID-19 include detection of IgA, IgG, and IgM antibodies by enzyme-linked immunosorbent assay (ELISA) and immunochromatography. Initial validation demonstrates a high positive predictive value. The presence of IgG antibodies confirms previous COVID-19 disease [28], suggesting that serological IgG testing may be useful for screening, but not triage for surgery. To date, no data exist that positive IgG antibodies confer lasting immunity to SARS CoV-2.

There is no formal indication for chest tomography (CT) as a screening method in asymptomatic patients. However, some COVID-free institutions in Europe and China recommend its use in exceptional situations in high prevalence areas, based on the capability for diagnosis in 54% of asymptomatic cases [29]. Chest CT performed up to 24 hours prior to hospitalization is therefore considered an option when more accurate tests are not available.

If surgery is considered mandatory and diagnostic tests are neither available nor reliable, the patient may be quarantined for 14 days prior to surgery (if possible). This recommendation is based on the CDC statement that the incubation period of SARS-CoV-2 and other coronaviruses ranges from 2–14 days[30]. For this strategy to work, patients need to comply with self-isolation and be instructed regarding development of symptoms.

If the patient is asymptomatic and tests negative for COVID-19, surgery can be performed with the use of conventional PPE by the surgical team[31]. Guidelines for protection should follow individual institutional standards developed in conjunction with the infection control team. If the patient is symptomatic or has a positive RT-PCR, IgM antibody, or chest CT findings consistent with COVID, the procedure must be postponed, and the patient should be referred based on institutional COVID
diagnostic and treatment protocols. Surgical rescheduling should require clinical improvement, normalization of chest CT scan, and two negative RT-PCR tests to confirm resolution[32]. Finally, if RT-PCR, rapid serological testing, or chest CT are not available, elective surgery should only be considered if regional prevalence is less than 40 active cases / 100 thousand inhabitants. In this case, guidelines for the use of PPE should be the same as for COVID-19 positive patients.

Regarding concerns about a resurgence of COVID-19, it is imperative that a centralized monitoring system collects data on the number of COVID-positive, asymptomatic patients in a large healthcare system or defined geographical area. Any rise in the number of asymptomatic COVID-positive individuals among elective surgery patients could be a sign of an impending second wave of COVID-19. It is well known that asymptomatic and pre-symptomatic patients are a major source of community transmission. [34,35] According to Robert Redfield, the director of the Centers for Disease Control and Prevention, 25 percent of people infected with SARS CoV-2 are asymptomatic; however, they can still transmit the illness to others.[36]

Control of COVID-19 is a dynamic and fluid process. Institutions must be flexible in responding and implementing changes in strategies based on the most current assessment of disease prevalence in the community. As we resume non-essential surgeries, we must be cognizant of the need to adjust and adapt according to the disease burden in the community. As prevalence of COVID-19 decreases in the community, a standardized epidemiological screening questionnaire should be conducted at a minimum. If the epidemiological questionnaire is positive, a RT-PCR and a chest CT can be performed.[29,31] Some countries are employing novel
population-based techniques, such as QR code scanning, to facilitate detection of patient exposure to COVID and contact tracing [37].

**Financial support to mitigate the impact of reduced surgical volumes**

Despite the strategies summarized above, the revenue generated by healthcare systems is anticipated to remain at much lower levels than usual due to the mandated halting of non-essential procedures. While reactivation will achieve some normalcy, a second or third wave of viral infection may further decrease revenue generation. Therefore, knowledge of available financial support programs is paramount to ensuring the survival of surgical services.

In the United States, the Coronavirus Aid, Relief, and Economic Securities (CARES) Act includes multiple lending programs for physicians and businesses treating patients. These lending programs include the Small Business Association (SBA) Payroll Protection Plan (PPP), Economic Injury Disaster Loans (EIDL), and Department of Health and Human Services (HHS) relief. These programs are summarized on the American Medical Association’s website[38]. Businesses with under 500 employees can apply for relief in a forgivable interest-free loan when the funds are used per SBA guidelines. Many physicians in private practice, small group settings, and large group settings qualify for such relief [39].

As surgeons and facilities move toward the “new normal” of pandemic recovery, the number of unemployed workers in the US and abroad will undoubtedly have an impact on insurance coverage. Insurance companies and hospitals will be looking for relief and will be forced to find ways to offset the profound economic implications brought on by the costs associated with COVID-19. It is imperative for
physicians everywhere to gain an awareness of these issues and prepare for potential impact on revenue, salary, and job security.

**Conclusion**

In our lifetime, the practice of medicine has never been altered to the extent imposed by the COVID-19 pandemic. We, as surgeons, have had to rise up to many challenges in order to meet the needs of our patients while mitigating risk to all those involved in their care. The postponement of non-essential surgical procedures in order to preserve resources has created back logs in our practices that we must address as we co-exist with COVID. The AAGL has forged important collaborations among national and international experts and societies to educate caregivers worldwide during this unprecedented time. This article should serve as a supplemental guide for effective reactivation to clinical and surgical practice to optimize care for the women whom we serve.

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Table 1 - Suggested prioritization criteria (adapted from Prachand et al, 2020)
Figure 1 – COVID-19 Preoperative Surgery Decision Tree (Courtesy of Cleveland Clinic[14])
Figure 1

Screening for Symptoms

Symptomatic?

- Neg.

- No Test / Results Unknown / Expired Results *

Endoscopy Procedure Type

- Notify Surgeon & Anesthesia

- Go / No-go **

- Yes

- Aerosolizing?

- Yes

- No

- PROCED

- PROCED

- PROCED

- PROCED

+ Pos.

Covid Results?

- No Test / Results Unknown / Expired Results /

- Pos.

- Isolate / Home Monitoring Prog.

- Notify Surgeon & Anesthesia

- Go / No-go **

- Yes

- Aerosolizing?

- Yes

- PROCED

- PROCED

- PROCED

- PROCED

+ Pos.

Covid Results?

- No Test / Results Unknown / Expired Results /

- Pos.

- PUI Process Isolate / call hotline

- Notify Surgeon & Anesthesia

- Notify Surgeon & Anesthesia

- Notify Surgeon & Anesthesia

- Notify Surgeon & Anesthesia

- PROCED

- PROCED

- PROCED

- PROCED

* Consider switching case order (last case of the day); Consider rapid testing

** Consult local Surgical Operations Covid-19 Governance Committee
| Procedure Factors | Score | 1 | 2 | 3 | 4 | 5 |
|------------------|-------|---|---|---|---|---|
| OR time (min)    |       | <30 | 31-30 | 61-120 | 121-180 | ≥180 |
| Estimated LOS    |       | Outpatient | <24h | 24-48h | 2-3d | ≥4d |
| Risk of Postoperative ICU |       | Very unlikely | <5% | 5%-10% | >10%-25% | >25% |
| Anticipated blood loss (mL) |       | <100 | 100-250 | 250-500 | 500-750 | >750 |
| Surgical team size (n) |       | 1 | 2 | 3 | 4 | >4 |
| Intubation probability (%) |       | < | 1-5 | 6-10 | 11-25 | >25 |
| Surgical site/access |       | None of the following | Abdominopelvic MIS | Abdominopelvic open surgery, infraumbilical | Abdominopelvic open surgery, supraumbilical | OHNS/upper GI/thoracic |

| Disease Factors | | | | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Nonoperative option effectiveness | None available | Available, <40% as effective as surgery | Available, 40% to 60% as effective as surgery | Available, 61% to 95% as effective as surgery | Available, 96% to 99% as effective as surgery |
| Nonoperative treatment option resource/ exposure risk | Significantly worse/not applicable | Somewhat worse | Equivalent | Somewhat better | Significantly better |
| Impact of 2-wk delay in treatment outcome | Significantly worse | Worse | Moderately worse | Slightly worse | No worse |
| Impact of 2-wk delay in surgical difficulty/risk | Significantly worse | Worse | Moderately worse | Slightly worse | No worse |
| Impact of 6-wk delay in treatment outcome | Significantly worse | Worse | Moderately worse | Slightly worse | No worse |
| Impact of 6-wk delay in surgical difficulty/risk | Significantly worse | Worse | Moderately worse | Slightly worse | No worse |

| Patient Factors | | | | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Age (yrs)      | ≤20 | 21-40 | 41-50 | 51-65 | >65 |
| Lung disease (asthma, COPD, CF) | None | – | – | Minimal (rare inhaler) | > Minimal |
| Obstructive sleep apnea | Not present | – | – | Mild/Moderate (no CPAP) | On CPAP |
| CV Disease (HTN, CHF, CAD) | None | Minimal (no meds) | Mild (1 med) | Moderate (2 meds) | Severe (≥3 meds) |
| Diabetes | None | – | Mild (no meds) | Moderate (PO meds only) | > Moderate (insulin) |
| Immunocompromised* | No | – | – | Moderate | Severe |
| ILL symptoms (fever, cough, sore throat, body aches, diarrhea) | None (Asymptomatic) | – | – | – | Yes |
| Exposure to known COVID-19 positive person in past 14 days | No | Probably not | Possibly | Probably | Yes |

*Hematologic malignancy, stem cell transplant, solid organ transplant, active/recent cytotoxic chemotherapy, anti-TNFα or other immunosuppressants, >20 mg prednisone equivalent/day, congenital immunodeficiency, hypogammaglobulinemia on intravenous immunoglobulin, AIDS. CAD, coronary artery disease; CF, cystic fibrosis; CHF, congestive heart failure; COVID-19, novel coronavirus; CPAP, continuous positive airway pressure; CV, cardiovascular; HTN, hypertension; ILL, influenza-like illness; med, medication; PO, by mouth; GI, gastrointestinal; LOS, length of stay; MIS, minimally invasive surgery; OHNS, otorhinolaryngology, head & neck surgery; OR, operating room