

# Surgeries in COVID-19 by Taking Safety First

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## SHORT COMMUNICATION

Premium non nocere: First, do no harm. This is a professional and ethical imperative with which we as physicians are very familiar. Can we expand this principle to include the patient and the health care team? As minimally invasive surgeons and ambassadors, the authors could never have imagined penning a document that argues the merits of traditional open surgery. We are all ardent supporters of minimally invasive techniques and the myriad benefits they afford. However, we now find ourselves in the midst of a global crisis from the coronavirus disease (COVID-19) pandemic; a time when the word 'unprecedented' has taken on new meaning. As of early March, it has been reported that over 3,300 health care workers in China were infected with COVID-19, while in Italy upwards of 20% of health-care workers have been infected with news reports of more than 50 deaths among physicians (1). Significant and realistic concerns have been raised regarding the risk of severe acute respiratory syndrome coronavirus (SARS-CoV)-2 (the virus responsible for COVID-19 disease) dissemination during minimally invasive surgery due to pneumoperitoneum associated aerosolization of particles, as well as presence of the virus in blood and stool [1].

It is important to recognize that our understanding of viral aerosolization by electrosurgical or ultrasonic tools comes from work with other viral diseases, such as hepatitis B. Particles in surgical smoke have been demonstrated to contain a variety of toxic and virulent materials thought to be potentially capable of infecting those who inhale them, with case reports of doctors contracting a rare papillomavirus when surgical smoke exposure was suspected to be the source. The plausibility of aerosol and fomite transmission of SARS-CoV-2 has been established, with similar findings to that of SARS-CoV-1 (the virus responsible for a multinational disease outbreak in 2002-2003), which was associated with nosocomial transmission and super spreading events. There have been particular concerns raised about laparoscopic surgery due to the higher concentrations of particulate matter that occur compared with open surgery, which may be due to the electrosurgical devices employed, the low gas motility of pneumoperitoneum and gas expulsion via ports or trocars. Regarding COVID-19 specifically, we emphasize that there is no data on surgical exposures translating into a definitive risk to the operating room team. With a dearth of

scientific evidence to guide us, the health care community is left with two solutions. The first involves continuing on with normal practice unless it becomes clear that these practices are definitively harmful. Proponents of maintaining the status quo will no doubt highlight the fact that the scientific community is too early in our understanding of COVID-19 to have proven a causal link between surgical exposures and infection of health-care workers.

Surgeons may argue that there is no evidence specific to laparoscopic plume containing SARS-CoV-2 resulting in infection. The rebuttal to this stance is that neither is there evidence of safety. The authors suggest championing an alternative solution whereby we as a medical community become proactive rather than reactive, adopting a conservative yet balanced plan to protect both the patient and the health-care team. When faced with a biologically plausible concern that could infer serious harm, we are obligated to act with an abundance of caution, examining and questioning our standard practices. Certainly, it is uncomfortable to consider changing practice in the absence of definitive evidence, but let us consider whether it will be possible to obtain such evidence either now or in the foreseeable future.

The necessary studies on this subject would require lengthy follow-up, be difficult to conduct and expose a vast number of staff to potential risk in the process. Equipose concerns may preclude such work taking place in the in vivo setting. Reliable information on this subject is not likely forthcoming anytime soon, and yet we are required to act now to alter practice if we wish to avoid exposure risks. We must bear in mind that the absence of data is not data in and of itself, or taken another way: just because surgical exposures haven't been proven to be harmful, doesn't mean that it is safe to proceed with usual practice. The reality is that decision-making and guideline-development in this arena will be based on the limited available data and information inferred from other viruses and similar epidemics. Taking the above discussion into account, we propose the following management algorithm.

In patients who are COVID-19 positive, unless they have a life-threatening emergency that requires surgery, we advocate for non-operative treatment and delay of surgery until recovered. If surgery cannot be delayed for a COVID-19 positive patient, a laparotomy operation should be performed. In patients with unknown COVID-19 status, preoperative testing is ideal when available,

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although it is important to also consider the test sensitivity/specificity and underlying degree of suspicion based on symptoms and local disease prevalence. Laparoscopy can be performed in a COVID-19 unknown status patient if the entire operating room team has access to necessary personal protective equipment and extreme care is taken to prevent release of pneumoperitoneum into the operating theatre. If these measures are not in place, an open operation is the alternative. The many advantages of laparoscopy are well-known, and it is important to stress that there will be cases and patients for whom the risks of a laparotomy far outweigh the risks of laparoscopy, even when taking into account utilitarian concerns for the health-care team regarding potential exposure issues.

Outside of these unique situations, however, the use of laparoscopy should be reserved for the COVID-19 negative patient; or in the absence of testing, in symptom- and exposure-screened negative patients with full deployment of personal protective equipment. We must also keep an open mind to alternatives to traditional minimally invasive surgery which may be appropriate in a majority of cases during this pandemic. With the suspension of nonessential procedures, many of the emergent benign gynaecologic cases we will be approaching in COVID-19 positive or unknown patients (such as ovarian torsion, ectopic pregnancy) could be accomplished via minilaparotomy with little to no use of electro surgery and same day discharge. This approach could prove to optimize benefits to both the patient and health-care team.

Additionally, regional anaesthesia is feasible with this technique, which could allow for further limitation of health-care team exposures related to the aerosol-generating procedures of intubation and exudation. Whether operating via minimally invasive or open techniques, effective mechanisms exist for the removal of smoke and particulate matter that can significantly reduce the surgical team exposure. Whenever possible, electro-surgical/ultrasonic device use should be coupled with a smoke evacuation/filtration system. It is our fervent hope that as more data comes to light, the arguments made in this piece may no longer be applicable. With more accurate, rapid and available testing for COVID-19, including serum tests of markers of acute infection and immunity, the decision-making will become more streamlined. Additionally, if future evidence demonstrates lack of infectivity of the aerosolized, blood or fluid-borne viral particles, then the discussions above may become moot. Until such time, however, let us not allow blind allegiance to one approach to be the primary factor determining surgical route. The best outcomes for all can be achieved when individual patient and local circumstances are taken into account, along with surgical experience and judgement.