

BAUS Guidance on Urological Laparoscopy and Robotic-Assisted Laparoscopic Surgery During the COVID-19 Pandemic

It has, without doubt, been a hugely confusing and, at times, contentious week as the arguments have circulated about the safety of laparoscopic surgery in the COVID-19 era. BAUS trustees felt it would be useful for members to understand the evidence on which these arguments and discussions are based. These are set out below.

PRINCIPLES AND SUMMARY POINTS

Caution should be exercised with regard to decisions to operate in **ALL** urgent but non-emergency cases. Aerosolisation happens in all types of surgery and carries a theoretical risk to staff. If the safety measures outlined below are used, then laparoscopic or robotic surgery should not carry any excess risk to staff and will have advantages for patients.

A decision to use robotic-assisted or laparoscopic surgery must involve a patient-level assessment of the risk versus benefits of a minimally invasive approach, on a case-by-case basis. Teams should work to optimise their approach within their local governance structures. As with most COVID-19 related discussions, this is a rapidly changing field and we will update members as necessary.

EVIDENCE

- Laparoscopic surgery is potentially an aerosol-generating procedure AGP (like electrocautery of any blood/tissue/fluid). If operating on a COVID-positive or COVID-suspected patient, wear full PPE with FFP2/3 masks and visors.
- It is possible, but not definite, that laparoscopy can cause viral aerosolization. Other viruses (e.g. hepatitis-B, HIV & HPV) have all been found in surgical smoke
 - Hepatitis B detectable in surgical smoke:
<https://oem.bmj.com/content/73/12/857>

- Viral exposure via surgical smoke that actually causes infection to the provider is rare. There are case reports of HPV viral infection associated with inhaled viral smoke particles (i.e. HPV causing laryngeal papillomatosis after laser surgery to warts)
<https://www.ncbi.nlm.nih.gov/pubmed/1660719>
 - Laparoscopic surgery can cause a higher concentration of surgical smoke in the abdomen than open surgery, and this can be inadvertently released. Rapid release of trocar valves, laparoscopic ports, or rapid removal of a specimen from a small extraction site can expose the provider to a burst of a higher concentration surgical smoke than they would be normally exposed to in open surgery.
 - There is, currently, not enough evidence to either recommend or prohibit the use of laparoscopy. However, it is known that minimising operating time, maximising patient safety & promoting expedited patient recovery are key considerations to weigh against possible risk of viral aerosolisation. Minimisation of chest complications (atelectasis / pneumonia) may be very important in reducing the overall risk to the patient from surgery.
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STEPS TO MITIGATE RISK DURING LAPAROSCOPIC & ROBOTIC SURGERY

- The following are strongly advised when considering and/or performing laparoscopy / robotic surgery, to reduce risk to providers and patients:
 - Only operate on time-critical cases which have been discussed by local MDT, hospital Covid-19 tactical team.
 - Minimise theatre personnel & use experienced surgeons with no training during cases.
 - Use an anaesthetist familiar with laparoscopic surgery to minimise the risks of intra-operative patient coughing and straining.
 - Use continuous circulation of insufflation (i.e. AirSeal system™ by CONMED USA) to decrease the accumulation of higher concentration surgical smoke in the abdomen.

- Minimise gas leakage around the ports by matching skin incision with port size.
- Use a low-pressure pneumoperitoneum throughout the procedure to decrease the force of expulsion of gas if there is a rapid release of a trocar valve, minimising the exposure to higher concentration surgical smoke.
- Gradually reduce the pneumoperitoneum on insufflation device at the end of the case to zero, before port removal.
- Carefully evacuate residual CO₂ through the laparoscopic suction or smoke evacuator. A slow rate of suction minimizes the risk of abdominal viscera being drawn into the trocar
- ULPA (ultra-low particulate air) filters are recommended for surgical smoke in all settings.
- Use a suction-enabled laparoscopic smoke evacuator (e.g. Valleylab™, Medtronic USA or PlumePort ActiV, or CONMED USA) to reduce venting of abdominal smoke directly into the operating room
- Use a reducer if placing 5mm or 8mm instruments through a 12mm DaVinci™ trocar
- Reduce time in Trendelenberg position (or the degree of tilt) to minimize lung compression and reduce post-op pulmonary compromise
- Where possible, avoid low temperature ultrasonic cautery devices, which contribute to aerosolisation by releasing a plume of smoke into the abdomen.

GUIDANCE FROM THE RECOMMENDATIONS OF AUTHORITATIVE SURGICAL BODIES

The guidance from the American College of Surgeons (below) highlights the balance between a number of factors influencing patient and operating team safety.

The guidance from the Association of Surgeons of Great Britain & Ireland advises against the use of laparoscopy if possible.

There has been no statement on this issue from either the American Urological Association (AUA) or the American College of Obstetrics and Gynecology.

Individual recommendations are summarized below:

American College of Surgeons recommendations

<https://www.facs.org/covid-19/clinical-guidance/elective-case>

“Aerosol generating procedures (AGPs) increase risk to the health care worker but may not be avoidable. For patients who are or may be infected, AGPs should only be performed **while wearing full PPE including an N95 mask or powered, air-purifying respirator (PAPR) that has been designed for the OR.** Examples of known and possible AGPs include:

- a. Intubation, extubation, bag masking, bronchoscopy, chest tubes;
- b. Electrocautery of blood, gastrointestinal tissue, any body fluids;
- c. Laparoscopy/endoscopy.

“There are insufficient data to recommend for or against an open versus laparoscopic approach; however, the surgical team should choose an approach that minimizes time and maximizes safety for both patient and healthcare staff.

Refer to Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) guidelines (below) for these patients.”

Society for American Gastrointestinal & Endoscopic Surgeons (SAGES) recommendations

<https://www.sages.org/recommendations-surgical-response-covid-19/>

“For procedures deemed urgent and necessary, it is strongly recommended that consideration be given to the possibility of viral contamination during laparoscopy. Such risk should be individually weighted against the benefit of laparoscopy for a patient’s health and recovery.

While it is unknown whether coronavirus shares these properties, it has been established that other viruses can be released during laparoscopy with carbon dioxide. Erring on the side of safety would warrant treating the coronavirus as exhibiting a similar property. For laparoscopic procedures, use of devices to filter released CO₂ for aerosolized particles should be strongly considered.”

Royal College of Surgeons (England) recommendations

<https://www.rcseng.ac.uk/coronavirus/joint-guidance-for-surgeons-v2/>

“Laparoscopy should generally not be used** as it risks aerosol formation and infection. Chinese (1) and Italian (2) experience reflects this. SAGES have also offered guidance. Advocated safety mechanisms (filters, traps, careful deflating) are difficult to implement.

“Consider laparoscopy **only** in extremely selected cases where the mortality benefit is substantially beyond doubt in the current situation.”

The ERUS guidelines (European Association of Urology Robotic Urology Section)

<https://uroweb.org/eau-robotic-urology-section-erus-guidelines-during-covid-19-emergency/>

“ERUS emphasise the use of preoperative testing for Covid19 and the postponement of surgery, if at all possible. They emphasise the importance of the use of the lowest possible insufflation pressures and integrated gas flow systems configured in a continuous smoke evacuation and filtration mode through a ULPA filter. They advise against the use of low temperature ultrasonic scalpels/scissors. They do not comment on the relative risks of open surgery versus robotic surgery.

“The surgeons at the console should wear visor masks and clean the console eye piece with virucidal antiseptic. All staff should wear FFP2/3 masks and visors.

The published work in this area highlights the challenges involved but does not conclude that laparoscopic / robotic surgery should be discontinued. In fact, Spinelli et al (2) comment that intra-operative exposure of teams may be reduced with the use of laparoscopy instead of open surgery.

REFERENCES

- 1. Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: lessons learned in China and Italy. *Annals of Surgery*. 2020 [Accepted for publication]**

“In laparoscopic surgery, an essential part of the technique is the establishment and maintenance of an artificial pneumoperitoneum; with this comes the risk of aerosol exposure for the operation team.

“Ultrasonic scalpels or electrical equipment commonly used in laparoscopic surgery can easily produce large amounts of surgical smoke and, in particular, the low-temperature aerosol from ultrasonic scalpels cannot effectively deactivate the cellular components of virus in patients. In previous studies, activated corynebacterium, papillomavirus and HIV. have been detected in surgical smoke and several doctors contracted a rare papillomavirus suspected to be connected to surgical smoke exposure. The risk of 2019-ncov infection aerosol should not be any exception. One study found that after using electrical or ultrasonic equipment for 10 minutes, the particle concentration of the smoke in laparoscopic surgery was significantly higher than that in traditional open surgery.

“The reason for this may be that, due to the low gas mobility in the pneumoperitoneum, the aerosol formed during the operation tends to concentrate in the abdominal cavity. Sudden release of trocar valves, non-air-tight exchange of instruments or even small abdominal extraction incisions can potentially expose the health care team to the pneumoperitoneum aerosol; the risk is definitely higher in laparoscopic than in traditional open surgery. This outbreak thus poses a great challenge to the clinical work of surgeons who practice MIS.”

2. Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. BJS. 19 March 2020.

<https://bjssjournals.onlinelibrary.wiley.com/doi/10.1002/bjs.11627>

“It is not clear whether the virus can be found in circulating CO₂ used for laparoscopic surgery or aerosol generating procedures. Some allow the use of laparoscopy but question transanal minimally-invasive procedures, due to the increased risk of exposure to aerosolised biological fluids with the latter (3). Laparoscopy may reduce intra-operative exposure to smoke, compared with open surgery, and devices for smoke evacuation and cleansing are recommended where feasible.

“Some suggested using the closed circuit of the pressurized intraperitoneal aerosol chemotherapy (PIPAC) if available, but cheaper and more readily available alternatives to reduce the contamination from aerosol from CO₂ during laparoscopy have been proposed, such as connecting one of the laparoscopic ports to a water seal created with a sealed container by means of extension lines (<https://www.escp.eu.com/covid19escp>).

“Special attention should be paid to evacuating residual CO₂ from the container and the abdominal cavity before removing the trocars.”

- 3. Yu GY, Lou Z, Zhang W. Several suggestions of operation for colorectal cancer under the outbreak of Corona Virus Disease 19 in China. Zhonghua Wei Chang Wai Ke Za Zhi 2020; 23:9-11. <https://doi.org/10.3760/cma.j.issn.1671-0274.2020.03.002>. [Epub ahead of print - click the “English Abstract” button to translate the abstract]**

“Laparoscopic-assisted surgery is recommended for radical surgery for patients with colorectal cancer; strict aerosol management must be made during the operation.”