

SERGS Statement

Statement on the use of Robot Assisted Surgery (RAS) during the COVID-19 pandemic.

SUMMARY

All surgery during the COVID-19 pandemic should be regarded as high risk and protection of the surgical team at the bedside should be at the highest level.

Robot assisted surgery (RAS) potentially reduces both the contamination with body fluids and surgical gasses of the surgical area as well as the number of directly exposed medical staff if regular precautions with the addition of prevention of gas leakage are being taken:

- Use protection level III for bedside assistant, but level II for console surgeon
- Reduce the number of staff at the OR
- Ensure safe and effective gas evacuation
- Reduced the intra-abdominal pressure to 8 mm Hg or below
- Minimize electrocautery power and avoid use of ultrasonic sealing devices
- Surgeons should avoid contact outside theatre (both in and out of the hospital)

INTRODUCTION

Since and immediately at the onset of the Corona Virus Disease (COVID-19) pandemic, guidelines have been published on proper and safe surgery for both the health care providers and the patients.^{1,2,3} The major surgical societies have issued guidelines specifically or also addressing the place of minimal invasive surgery in these challenging times.^{4,5,6,7,8,9,10,11,12}

Changes in the existing policies around laparoscopic surgery are dictated on one hand by the extreme stress on the health care system in general and particularly on the facilities for surgery. Sudden and immense influx of COVID-19 patients requires prioritization of the use of means, operating rooms and intensive care beds for COVID-19 patients, resulting in suspension of any elective surgery in hospitals catering the affected areas.¹³ On the other hand a putative or proven infection with this virus poses hitherto unknown risks for both the surgical patients and the surgical teams.

Most of the recommendations that are being made are authority based and at best generated by panel review (e.g. ERUS).⁸ They may also be somewhat contradictory through different interpretations of data or opinions (e.g. RCGO/BSGE vs. RCS guidelines).^{10,14}

Next to various national societies, both the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES; <https://www.sages.org/author/aurora-pryor/>) and the European Society of Gynaecological Endoscopy (ESGE; <https://esge.org/wp-content/uploads/2020/03/Covid19StatementESGE.pdf>) have issued extensive recommendations on the use of laparoscopy in general.^{9,11} Therefore, this statement will specifically focus on robot assisted surgery (RAS).

This statement is written to guide surgeons under extreme circumstances within a hospital system where priority is first and for all given to patients needing immediate care, in particular to COVID-19 patients. However, it cannot replace the personal responsibility of each individual surgeon and institution. It is assumed that we follow the general recommendation to suspend all elective procedures,⁵ so consequently this statement regards only emergency surgeries that cannot be delayed or surgeries that if significantly delayed could cause significant harm. From the list of such cases that were identified by the American College of Surgeons (ACS) the following might be treated by RAS:⁶

Emergency surgeries

- Rupture tubal-ovarian abscess
- Tubal-ovarian abscess not responding to conservative therapy
- Emergency cerclage

Surgeries that cannot be significantly delayed

- Cancer or suspected cancer
- Cerclage of the cervix

PRO's and CON's of ROBOT ASSISTED SURGERY

There is consensus that laparoscopic operations are aerosol generating procedures (AGP). The British Intercollegiate General Surgery Guidance on COVID-19 specifically recommended that 'laparoscopy should generally not be used' because of aerosol contamination with the coronavirus (SARS-CoV-2).¹⁴ For the rationale of this recommendation, however, publications are cited that state that there are no data or actually question whether there would be contamination.^{11,15} These latter and other recommendations therefore just advise to carefully consider whether we should use or avoid laparoscopic surgery.^{9,10} As a matter of fact, laparoscopy might even protect against viral exposure through smoke, provided that CO₂ and smoke are filtered and extracted, preferably using an integrated flow system with a continuous smoke evacuation through an Ultra Low Penetrating Air (ULPA) filter meeting the Association of periOperative Registered Nurses (AORN) guidelines.^{8,16} As ultrasonic sealing devices produce large amounts of smoke containing non-deactivated viral particles their use should be avoided.¹⁷

Also, the added value of robot use to both the issue of gas leakage and of pulmonary stress is that CO₂ pressure can be minimized. Whereas pressure for optimal vision at conventional laparoscopy should be at between 10- 15 mmHg, robotic vision remains stable and optimal up to 5 mmHg.¹⁸

Against RAS could be held that pre- and postoperative decontamination of the platform - console and cart(s) - is troublesome and time consuming. On the other hand, less instruments are being used than at open surgery and these instruments will be less contaminated with blood so easier to clean.

During a robotic procedure less operating staff is needed in the direct vicinity of the patient, as usually the scrub nurse could also assist the console surgeon, even when performing radical surgery. In any case all other staff, including trainees, should clear the theatre before the intubation and operation is started.

A practical problem might arise if theatres suitable for and equipped with a robotic platform are requested as auxiliary intensive care units for COVID-19 patients.

Finally, a great advantage of using a robotic platform is the fact that in times of extreme shortage of hospital beds hospital stay can be minimized also for urgent patients that need (radical) procedures that might not or less be feasible with conventional laparoscopy.

In conclusion: RAS may help in minimizing the risk for contamination of healthcare providers and to make optimal use of residual resources.

Table 1 pro's and con's of robot assisted surgery versus open surgery under COVID-19

Area of risk	Robot assisted surgery	Open surgery
Aerosol escape	Limited by filters or locks (no data on actual risk!)	Only present, but than unfiltered and with maximal exposure, when using electrical and especially ultrasonic devices. (no data on actual risk!)
Smoke	Confined, filtered and less than at open surgery	Maximal exposure to smoke.
Blood exposure	Hardly if any blood loss and exposure at limited intervals	More blood loss and constant exposure
Abdominal pressure	Minimal pressure (less than at conventional laparoscopy)	No abdominal pressure
Perioperative cleaning of instruments	Large surface of robot to disinfect, but limited number of instruments to clean of limited blood contamination	Only instruments to clean, but these in large numbers and heavily contaminated with blood.
Staff	typically 1 staff at the bedside, 1 away from the patient	typically 3 staff at the bedside.
Hospital stay	shorter	longer

PRECAUTIONS

Although some recommendations distinguish between patients tested positive or negative for SARS-CoV-2, others don't and refer only to patients 'possibly or positively diagnosed with COVID-19'. Depending on the resources available pre-operative testing may or may not be available. If patients are being tested, it should be noted that depending on the test used the false negative rate may vary between 15 and 25%, although in fact no hard data are currently available on this.¹⁹ Furthermore, there seems to be a delay in relation to symptoms associated with COVID-19. For this reason the FDA has advised that a negative result should 'not be used as the sole basis for patient management decisions'.²⁰ Additional criteria could be, asymptomatic for 7 days and not into contact with an COVID-19 patient within the last 14 days.²¹

For protective measures pre-operative SARS-CoV-2 testing is not necessary and perhaps not even available for asymptomatic patients, but testing could be beneficial to determine the treatment strategy for the patient. If tested positive, postponement of the operation and alternative treatment should seriously be considered. Additional CT of the chest could potentially rule out abnormalities suggestive for COVID-19 infection that would preclude any operation, but at the moment and especially in asymptomatic patients this examination is of limited value.²²

Personal protective management is quintessential in surgery under high risk circumstances. From the Chinese experience it is thus advised to use level III protection when the staff performs surgery for confirmed/suspected patients, because of the risk of

contact with body fluids/blood or respiratory secretions.²³ As surgeon and assistant(s) are divided between bedside and console at RAS not all need to have maximal protection. The console surgeon may use level II protection, equivalent to the protection recommended for those working in an isolation ward area (including intensive ICU).²³

Table II Personal Protective Equipment (PPE) (after Liang 2020 and ERUS 2020)

Surgical team member	Protection level	Protective Equipment
Bedside assistant	Level III	<ul style="list-style-type: none"> • Disposable surgical cap • Medical protective mask (FFP3 or equivalent) + goggles, but preferably: full face respiratory protective devices or powered air-purifying respirator (PAPR) • Work uniform • Disposable medical protective uniform • Disposable latex gloves
Console surgeon	Level II	<ul style="list-style-type: none"> • Disposable surgical cap • Medical protective mask (FFP3 or equivalent) • Work uniform • Disposable medical protective uniform • Disposable latex gloves • Goggles/visor

It should be noted that medical protective masks are apparently often ineffective because users have not received essential training and instruction about the proper use.²⁴ Notably, as splash proof protection is needed it can be considered to combine a non-splash proof respirator with a conventional splash-proof surgical mask, although this might not be to manufacturers' recommendations.²⁵

Fecal-oral contamination with SARS-CoV-2 has been reported.²⁶ Thus it is important to prevent dispersion and contamination with faeces. For this very reason it has been advised to perform bowel surgery as much as possible intra-abdominally.³ Although in gynaecological RAS opening of the bowel will be rare, even in oncologic surgery, this can be handled adequately and even more safely by RAS than in open surgery.

An important measure, also recommended by SAGES and intuitively effective to assure continuous availability of healthy staff is to keep surgical staff out of the hospital and to advise self-isolation at home when they are not needed.^{11,24} Surgical staff in these times should not participate in ward rounds or see out-patients.

Protective measures also include prevention of CO₂ and smoke escape freely from either trocars or body orifices by measures that are recommended in general for laparoscopy by the ESGE and modified for RAS:⁹

- All surgery during the COVID-19 pandemic should be regarded as high-risk.
- During laparoscopic surgery take steps to minimize CO₂ release.
- Close the taps of ports before inserting them to avoid escape of gas during insertion.
- Attach a CO₂ filter or water lock to one of the ports for smoke evacuation if needed, do not open the tap of any ports unless they are attached to a CO₂ filter or being used to deliver the gas.
- Minimize introduction and removal of instruments through the ports as much as possible. For introduction of material (such as bags, meshes) or specimen retrieval (such as biopsies), deflate the abdomen with a suction device before entering or removing the material into or from the abdomen. Re-insert the port before turning CO₂ on again.
- At the end of the procedure turn CO₂ off, deflate the abdomen with a suction device and via the port with CO₂ filter, before removal of the ports.
- Minimize use of ultrasonic and diathermy, If possible use electrothermal bipolar vessel sealing.
- Minimize sudden gas dispersal during total laparoscopic hysterectomy when the specimen is removed, deflate the abdomen with a suction device before removal the uterus through the vagina.

Evidently, if these pre-cautions cannot all be taken e.g. by lack of equipment it should be considered whether open surgery would not be safer or whether surgery would be feasible.

For full ESGE recommendations on laparoscopy in general:

<https://esge.org/wp-content/uploads/2020/03/Covid19StatementESGE.pdf>

These recommendations are subject to changes according to the developments of the pandemic and the measures that will be advised or required by national and international policy makers.

Prague, 30.03.20

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(SERGS acknowledges the work of all council members, in particular of Prof. R. Verheijen and Dr. M. Rudnicki, in preparation of this statement)

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