Cardiothoracic robotic assisted surgery in times of COVID-19

Jef Van den Eynde1 · Senne De Groote1 · Robin Van Lerberghe1 · Raf Van den Eynde2 · Wouter Oosterlinck1

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic poses an immense threat to healthcare systems worldwide. At a time when elective surgeries are being suspended and questions are being raised about how the remaining procedures on COVID-19 positive patients can be performed safely, it is important to consider the potential role of robotic assisted surgery within the current pandemic. Recently, several robotic assisted surgery societies have issued their recommendations. To date, however, no specific recommendations are available for cardiothoracic robotic assisted surgery in COVID-19 positive patients. Here, we discuss the potential risks, benefits, and preventive measures that need to be taken into account when considering robotic assisted surgery for cardiothoracic indications in patients with confirmed COVID-19. It is suggested that robotic assisted surgery might have various advantages such as early recovery after surgery, shorter hospital stay, and reduced loss of blood and fluids as well as smaller incisions. However, electrocautery and ultrasonic devices, as well as CO2 insufflation should be managed with caution to prevent the risk of aerosolization of viral particles.

Keywords Cardiac surgery · COVID-19 · Robotic surgical procedures · SARS-CoV-2 · Thoracic surgery

The coronavirus disease 2019 (COVID-19) pandemic poses an immense threat to healthcare systems worldwide. Its repercussions are also felt in multiple branches of surgery, with the majority of elective surgeries being suspended to prioritize the use of means, operating rooms, and intensive care beds for COVID-19 positive patients. Questions have been raised as to which surgical procedures can still take place and if they do, how they can be performed safely. In response to this situation, various surgical societies have already issued their recommendations on adequate patient selection and preparation, as well as measures that can be taken to minimize the spread of viral particles. More recently, the European Society of Urology—Robotic Urology Section (ERUS) [1], the American Association of Gynecologic Laparoscopists (AAGL) [2], and the Society of European Robotic Gynaecological Surgery (SERGS) [3] have published their statements on robotic assisted surgery (RAS) in response to the current pandemic. However, to date no specific recommendations are available for cardiothoracic RAS in COVID-19 positive patients.

It has to be noted that most guidelines recommend to suspend all elective procedures, first to create capacity for the care of victims of the pandemic but second to prevent exacerbation of the cytokine storm associated with COVID-19 infection. As all surgical procedures induce a considerable amount of inflammation, this should always be weighed against the benefits of timely intervention. Once a decision has been made after a thorough selection, several measures need to be taken into account during RAS, as summarized in Table 1.

As pointed out by ERUS and AAGL, electrocautery and ultrasonic devices can produce large amounts of smoke. The low-temperature aerosol from ultrasonic scalpels seems to be ineffective in deactivating the molecular components of viruses and other microbial agents [4]. Among others, activated Corynebacterium, papillomavirus, and HIV have been detected in surgical smoke. Gloster et al. [5] reported the transmission of a rare papillomavirus to several healthcare workers after exposure to surgical smoke. To decrease the production of surgical smoke, the power setting of the electrocautery should, therefore, be as low as possible and long dissecting times at the same spot should be avoided.
All surgery during the COVID-19 pandemic should be regarded as high-risk, and, therefore, adequate preventive measures should be taken even in patients who tested negative or who have not been tested for COVID-19. During cardiothoracic robotic assisted 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 (ULPA or similar) or water lock to one of the ports for smoke evacuation. 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 thorax with a suction device before entering or removing the material into or from the thorax or use an air-lock system. Re-insert the port before turning CO2 on again. At the end of the procedure turn CO2 off, deflate the thorax with a suction device and via the port with CO2 filter, before removal of the ports. Avoid the use of ultrasonic sealing and use lowest possible electrocautery power. If possible use electrothermal bipolar vessel sealing. One-lung ventilation should not be used in patients with COVID-19 diseased lungs and PEEP should not be lowered in an attempt to improve surgical visualisation.

For further detail, please refer to the original document.
is advised with the use of electrosurgical and ultrasonic devices, CO2 insufflation, and the use of trocar valves, all of which carry a potential risk of aerosolization into the operating theatre. Adequate measures including filtration systems should, therefore, at any time be respected when performing RAS in COVID-19 positive patients. Furthermore, one-lung ventilation should not be used in COVID-19 diseased lungs. Finally, general measures recommended by surgical societies such as personal protective equipment, optimal patient selection, and limitation of operating room staff evidently remain applicable in RAS and should be adhered to strictly.

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Compliance with ethical standards

Conflicts of interest WO is proctor for minimally invasive multivessel MIDCAB at Medtronic. JVDE, SDG, RVL, and RVDE declare that they have no conflict of interest.

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