



Evidence and Recommendations Regarding Urologic Laparoscopic and Robotic-Assisted Surgery in times of COVID-19

Evidencia y recomendaciones en cirugía urológica laparoscópica y robótica en tiempos de COVID-19

Eduardo Alberto González-Bonilla,¹ Jesús Emmanuel Rosas-Nava,¹ Juan Eduardo Sánchez-Núñez,¹ Mario Iván Doria-Lozano,¹ Víctor Enrique Corona-Montes,¹ Jorge Jaspersen-Gastélum.¹

Abstract

On March 11, 2020, coronavirus disease 2019 (COVID-19) was declared a pandemic and has created an impact like no other on health systems worldwide. A restructuring in the priority of patient care has currently taken place that is based on the patient's underlying pathology. Urology services are no exception, postponing all the elective surgeries that can be delayed without putting the patient at risk.

A surgical protocol has been adopted during the pandemic that attempts to reduce the amount of time the operating room is in use, as well as the risk for postoperative complications, so that hospital stay can be reduced. In such a setting, minimally invasive surgery, such as laparoscopic and robotic-assisted surgery, can play a beneficial role in treating oncologic pathologies that cannot be deferred.

Based on the best evidence that has currently been published and the guidelines of international associations, this paper summarizes the recommendations regarding urologic laparoscopic and robotic-assisted surgery in times of COVID-19.

Keywords:

COVID-19, Urology, Laparoscopy, Robotic

*Corresponding:

Eduardo Alberto González-Bonilla. Dr. Balmis 148, Doctores, Cuauhtémoc, 06720 Mexico City, Mexico. Email: eduardogb88@gmail.com

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¹ Secretaría de Salud, Hospital General de México "Dr. Eduardo Liceaga", Ciudad de México, México.

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Resumen

El 11 de Marzo del 2020, se declaró como pandemia la enfermedad de coronavirus (COVID-19), la cual ha generado un impacto como ninguno antes en los sistemas de salud de todo el mundo. Actualmente se ha realizado una reestructuración en la prioridad de atención de pacientes de acuerdo con su patología de base. Los servicios de urología no son la excepción interrumpiendo todas cirugías electivas que se puedan retrasar sin generar riesgos para el paciente.

Durante la pandemia se ha adoptado un protocolo quirúrgico en el que se busca disminuir el tiempo de uso de quirófano y el riesgo de complicaciones postoperatorias para disminuir estancias hospitalarias. Es en este escenario donde la cirugía mínimamente invasiva como cirugía laparoscópica y robótica puede tener un rol benéfico sobre todo para el tratamiento de patología oncológica que no puede ser diferida.

Basándonos en la mejor evidencia actual publicada y en los lineamientos de asociaciones internacionales, este trabajo resume las recomendaciones y precauciones para realizar procedimientos urológicos con abordaje laparoscópico o robótico en tiempos de COVID-19.

Palabras clave:

COVID-19, urología, laparoscopia, robótica

On March 11, 2020, coronavirus disease 2019 (COVID-19) was declared a pandemic and has created an impact like no other on health systems worldwide. Despite the measures that have been taken to reduce its contagion, the virus continues to appear across the globe, and with it, multiple new challenges.

The need to allocate considerable economic, infrastructural, and medical resources to the care of patients with COVID-19 has conditioned the redistribution of activities in several medical areas that are not directly involved with the treatment of patients with COVID-19.⁽¹⁾

A restructuring in the priority of patient care has currently taken place that is based on the patient's underlying pathology. Urology services are no exception, and they are dealing with the challenges of optimizing the care of patients with emergency pathologies, as well

as certain oncologic cases, postponing all the elective surgeries that can be delayed without putting the patient at risk. Nevertheless, it is very difficult to correctly stratify those priorities.⁽²⁻⁴⁾

The aim of said measure is also to minimize the use of the medical equipment that is needed to handle the COVID-19 emergency, such as respirators, surgical masks, and hand sanitizer, as well as to aid in the availability of hospital beds for patients with SARS-CoV-2 and ensure the normal course of emergency cases requiring operating rooms and intensive care units.⁽²⁻⁴⁾

But now we are facing a disquieting question for which there is not yet an answer: what will be the health impact on the patients whose treatments have been postponed? Currently, the long-term implications of this reduction in

urologic surgical activity is unknown, and unfortunately, it is difficult to know how long the present crisis will last. Not allowing patients to undergo opportune and necessary surgery will definitely have negative effects. For patients that require elective diagnostic studies due to important symptoms, such as hematuria, the delay can result in the late diagnosis of an oncologic pathology.⁽²⁾

A surgical protocol has been adopted during the pandemic that attempts to reduce the amount of time the operating room is in use, as well as the risk for postoperative complications, so that hospital stay can be reduced.⁽¹⁾ In such a setting, minimally invasive surgery, such as laparoscopic and robotic-assisted surgery, can play a beneficial role in treating oncologic pathologies that cannot be deferred.

So far, it is known that SARS-CoV-2 is an RNA virus that ranges in size from 0.06 to 0.14 microns, and has been found in the nasopharynx, upper respiratory tract, and the entire gastrointestinal tract, from the mouth to the rectum. It has also been found on nasal swabs, in saliva, on throat swabs, in blood, bile, and stool.⁽⁴⁾ Those findings have created safety and transmission risk concerns, regarding the manipulation of the airway to administer general anesthesia to the patient and the performance of laparoscopic and robotic procedures, given that many interventions require intestinal management or a transperitoneal approach.⁽¹⁾

Another concern is the risk for transmission through particles or aerosols generated by the instruments used in the surgeries, such as electric and ultrasound cauteries. Even though establishing and maintaining the artificial pneumoperitoneum is an essential principle in laparoscopic procedures, studies have shown that some viruses can be transmitted through

the carbon dioxide and aerosols during laparoscopic surgery. Examples are the human papillomavirus and HIV.⁽⁵⁻⁷⁾ An increased concentration of gases is released into the peritoneal cavity by those instruments due to the low mobility of gases in the pneumoperitoneum. When the trocar valves are removed, or the instruments are exchanged in or removed from non-hermetic trocars, aerosol leakage from the pneumoperitoneum can increase the risk for transmission to the healthcare personnel, making laparoscopic surgery riskier than an open procedure.⁽⁸⁾ No study has yet identified SARS-CoV-2 in surgical smoke, nor is it known if such viral particles would be infectious, even if they were found.⁽⁹⁾

Therefore, carrying out routine COVID-19 testing is recommended before an emergency or elective surgery, and regardless of the result, the access route that offers greater benefit to the patient is the one that should be utilized.⁽¹⁰⁾

Based on the best evidence that has currently been published and the guidelines of international associations, we suggest adhering to the following precautions when performing laparoscopic or robotic-assisted procedures:

- **Urologic procedure priority:**

All elective surgeries, whose delay does not put the health of the patient at undue risk, should be postponed. Only emergency surgeries should be performed, including procedures in patients with oncologic diseases that can progress or with active symptoms that require emergency care. Those decisions should be made locally, with respect to the COVID-19 burden, and in the context of medical, logistic, and organizational considerations of each hospital.^(3,4,10)

- **Protection for the surgical team:**

COVID-19 detection tests should be routinely carried out before an emergency or elective surgical intervention.⁽¹⁰⁾ In all surgeries during the COVID-19 pandemic, the entire surgical team (including surgeons, anesthesiologists, and nurses) should habitually wear adequate personal protective equipment (PPE); safety glasses, N95 or FFP2/3 masks, and protective garments are specifically recommended.

During general anesthesia administration, the American Society of Anesthesiologists (ASA) recommends taking the following measures to limit the potential aerosolization of droplets: The most experienced anesthesiologist should perform the intubation, whenever possible, with PPE that includes an N95 mask or air-purifying respirator, a face shield or safety glasses, a waterproof gown, and gloves,⁽¹¹⁾ and only the personnel necessary for the procedure should be in the operating room.

Surgeons must also avoid contact with droplets and secretions, wearing full-body protection if necessary. Surgeons at consoles should wear a mask with a sealed visor and thoroughly clean the head support of the console between surgeries.⁽¹²⁾ When a patient with suspected or confirmed COVID-19 is involved, a stricter dress code should be applied according to the protocols and the PPE should include: an N95 or FFP2/3 mask, a waterproof gown, full face shield, long nitrile gloves, a cap, and exclusive footwear for the zone or activity, with no perforations.^(8,10) Once the PPE is in place, preoperative cleansing should be done with an alcohol-based gel over nitrile-based gloves. The sterile garments necessary for the

surgery should then be put on.⁽¹⁰⁾ The protocol should also include improving ventilation and installing air purifying equipment.⁽⁸⁾

- **Pneumoperitoneum management and prevention of aerosol dispersion:**

Port incisions should be as small as possible, allowing the passage of the trocars but no leakage around them.⁽⁴⁾ Minimum CO2 insufflation pressure should be maintained so that the procedures can be performed with the lowest possible intra-abdominal pressure.^(4,8,9,12,13) Every pneumoperitoneum should be evacuated safely, utilizing an ultrafiltration system (smoke evacuation system or filtration), if available, to reduce viral release from the pressure of pneumoperitoneum release.^(4,8,9,12,13) Two-way pneumoperitoneum insufflators should be avoided to prevent pathogen colonization of the circulating aerosol in the pneumoperitoneum circuit or the insufflator.^(8,12)

- **Aspects of surgical technique:**

Standardized surgical techniques are recommended for reducing the amount of time in the operating room, the risk for complications, and for optimizing resource use. The procedures should preferably be performed by experienced surgeons that have mastered the learning curve.⁽¹²⁾

Energy configuration should be as low as possible, to prevent long dissection times with electric or ultrasound cauteries and to reduce surgical smoke.^(8,12,13) Care should be taken to avoid damage to the PPE, especially gloves and body protection.⁽⁸⁾ Trocars should preferably have cannulas that prevent slippage in or out, to avoid leakage from the pneumoperitoneum.⁽¹³⁾

The time in the Trendelenburg position should be reduced because it can cause pulmonary function compromise and mobilization of the virus.^(8,13)

If a surgical specimen must be extracted, first vent all the gas from the pneumoperitoneum, with the smoke evacuator. Once the specimen is extracted, it might be necessary to fix the trocar with a stitch, so it does not slip, or to prevent a leak from the pneumoperitoneum.⁽¹³⁾ Likewise, do not use a fascial closure device, such as the Carter-Thomason system, because gas can escape from the closure.⁽¹³⁾

Incisions should be closed with subcuticular absorbable sutures so the patient does not have to physically return for follow-up but can have the visit via Telehealth technology, if available.⁽¹³⁾

In summary, urologic procedures with the laparoscopic and robotic-assisted approach continue to be a viable alternative for patients during the COVID-19 pandemic, as long as the proper precautions are carried out and the abovementioned recommendations followed. The risk for SARS-CoV-2 transmission through aerosols coming from the pneumoperitoneum has not been proven nor have studies been conducted that demonstrate whether there is greater transmission of the virus in laparoscopic surgery than in laparotomy.⁽⁹⁾ Given the lack of transmission evidence in the minimally invasive approaches, the conversion of laparoscopic or robotic-assisted procedures to laparotomies is not justified. In addition, open procedures can result in other complications, as well as prolonged hospital stay and the use of beds that could be designated for COVID-19 patients.

Finally, we understand the need to optimize costs and resources in the face of the COVID-19 pandemic and we are aware that robotic surgery is very expensive. In that context, laparoscopic surgery could be more extensively used. Nevertheless, everything must be adjusted to the circumstances of each country or region and the availability of equipment and materials, offering each patient the best therapeutic option at hand.

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