Artículos de Revisión

Minimally invasive surgery in COVID-19 times, is it possible?

Cirugia de minima invasion en tiempos de COVID-19, es posible?

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Abstract: On March 10 the first two cases of coronavirus disease (COVID-19) are recorded in Bolivia, on March 11 it is declared a pandemic, affecting patient care at all levels, both in the public, private and insurance systems. Finding the entire health system devoid of protocols and management guidelines for this disease. Surgical services face the challenges of optimizing the care of patients with emergency pathologies, postponing elective surgeries. This delay in care will definitely have negative effects, and may even result in the late diagnosis of oncological pathologies. The surgical services adopted protocols that try to reduce the time in the operating room and the risk of postoperative complications. In this work we review the guidelines of the international associations for performing minimally invasive surgeries, making this a viable alternative to patients during the COVID-19 pandemic.

Keywords: COVID-19, general surgery, laparoscopy.

Resumen: El 10 marzo se registran los primeros dos casos de enfermedad por coronavirus (COVID-19) en Bolivia, el 11 marzo se declara como pandemia, afectando la atención de pacientes en todos sus niveles, tanto en el sistema público, privado y seguros. Encontrando a todo el sistema de salud desprovisto de protocolos, y guías de manejo ante esta enfermedad. Los servicios quirúrgicos enfrentan a los desafíos de optimizar la atención de pacientes con patologías de emergencia, posponiendo cirugías electivas. Este retraso en atención definitivamente tendrá efectos negativos, inclusive puede resultar en el diagnóstico tardío de patologías oncológicas. Los servicios quirúrgicos adoptaron protocolos que intentan reducir la cantidad de tiempo en quirófano y el riesgo de complicaciones postoperatorias, en este trabajo se realizó una revisión de las pautas de las asociaciones y guías internacionales para realizar cirugías de mínima invasión, siendo esta una alternativa viable para los pacientes durante la pandemia por COVID-19.

Palabras clave: COVID-19, cirugía general, laparoscopia.

Author notes

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Coronaviruses (CoVs) are a large family of viruses that can cause a range of conditions, from the common cold to more serious illnesses. A novel coronavirus is a new strain of coronavirus that has not previously been found in humans. These infections usually present with fever and respiratory symptoms (cough and dyspnea or shortness of breath). In severe cases, they can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death[1].

The Republic of China on 31 December 2019 reported a public health event of international concern, the outbreak in 27 patients with pneumonia of unknown etiology, with onset of symptoms on 8 December 2019 in Wuhan city. On 7 January, a virus of the coronaviridae group, a new coronavirus, was identified as the agent, and on 30 January the World Health Organisation (WHO) declared the outbreak and issued a public health emergency[1].

On 26 February, a first suspected case appeared in Bolivia, whose laboratory test was negative for coronavirus. On 10 March, the first two positive cases were registered, one in Santa Cruz and the other in Oruro, imported from Italy. Finally, on 11 March, the WHO declared COVID-19 a pandemic[1,2].

Through Decree 4196 of 17 March 2020, the national government declares a health emergency and quarantine throughout the state against the outbreak of the new coronavirus (COVID-19)[3].

Discussion

This pandemic has created an impact like no other on health systems around the world, affecting patient care at all levels, in the public, private and insurance systems. The entire health system in all countries has been deprived of protocols and management guidelines in the face of an emerging and unknown disease. All countries have adopted measures to reduce the risk of contagion, limiting health care to critical patients and true emergencies, but despite these measures, the virus continues to spread. This fact obliges health and governmental authorities to reallocate economic resources, build new infrastructure, purchase equipment and medical supplies, as well as the movement of doctors, all directed towards the care of COVID-19 patients, conditioned by these measures to the redistribution of activities in various medical areas that are not directly involved in the management and treatment of patients with COVID-19[4].

The recommendations for the prevention of infections transmitted by blood-borne pathogens are called "Universal (or Standard) Precautions" and were made by the Center for Diseases Control and Prevention in 1987 and remind us that these recommendations should be applied to all patients[5].

The surgical and clinical services of health systems face the difficulties of providing the best possible treatment for patients with emergency pathologies, including certain oncological cases, postponing in all cases elective surgeries, without putting the patient or medical staff at risk, these measures aim to minimise the use of equipment and medical supplies that will be needed to deal with COVID-19, such as respirators, surgical masks, hand disinfectant, gloves and other supplies, as well as to assist in the availability of hospital beds for the care of SARS CoV-2 patients and to ensure the normal course of emergency cases requiring operating theatres and intensive care units. However, this task is very difficult, as these priorities must be correctly stratified[6-9].

During this triage, it must be borne in mind that the delay in care, both in outpatient and delayed surgery programmes will have an impact on the health of patients, unfortunately, it is difficult to know how long the current crisis will last and how much it will affect the health of the general population. It is clear to note that this delay in timely care will definitely have negative effects, and may even lead to a late diagnosis of oncological diseases[6].

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There are a number of factors that require consideration. Regimens with a clear survival advantage should be prioritised, with curative treatments being mandatory and others requiring consideration of the risk/benefit ratio. Treatments that have only demonstrated a palliative effect for symptomatic patients require careful discussion. Delaying the initiation of therapy during periods of uncertainty or difficulty is an appropriate measure for many therapies[7].

In all countries, including Bolivia, surgical protocols have been adopted that attempt to reduce the amount of time in the operating theatre, as well as the risk of postoperative complications, with the main objective that hospital stay can be minimised and recovery is immediate, avoiding repetitive physical assistance of the patient in the hospital[4]. In such a situation, minimally invasive surgery, such as laparoscopic and endoscopic surgery, can play a beneficial role in the treatment of pathologies that cannot be deferred.

So far, SARS-CoV-2 has been known to be found in the nasopharynx, upper respiratory tract, gastrointestinal tract, nasal swabs, saliva, throat swabs, blood, bile and faeces9. These findings have created safety and transmission risk concerns with respect to airway manipulation for administering general anaesthesia to the patient and performing laparoscopic and endoscopic procedures to a lesser extent, given that many interventions require bowel management[4]. Another concern is the risk of transmission through particles or aerosols generated by instruments used in surgery, such as electrical and ultrasound batteries. Although establishing and maintaining pneumoperitoneum is an essential principle in laparoscopic procedures, studies have shown that some viruses can be transmitted through carbon dioxide and aerosols during laparoscopic surgery. Examples include human papillomavirus and HIV[10-12]. These instruments release a higher concentration of gases into the peritoneal cavity due to the low gas mobility in the pneumoperitoneum. When trocar valves are removed, or unsealed trocar instruments are exchanged or removed, aerosol leakage from the pneumoperitoneum may increase the risk of transmission to healthcare personnel, making laparoscopic surgery riskier than an open procedure[13]. No study so far has identified SARS-CoV-2 in surgical smoke, nor is it known whether such viral particles would be infectious, or even if they were found in this smoke[14]. Therefore, routine COVID-19 testing is recommended prior to an emergency and regardless of the result, the most beneficial approach for the patient should be offered[15]. There is insufficient data to recommend for or against an open or laparoscopic surgical procedure[21, 22]. Evidence suggests that cancer patients have an increased risk of death from COVID-19[23]. Therefore, the risk/benefit ratio of various palliative and (neo)adjuvant treatments should be reconsidered during this pandemic. Several factors such as age and comorbidities will also influence this risk, as will the additional hospital visits associated with specific treatment[24,25]. According to the recommendations of the Spanish Association of Surgeons, hospital occupancy for COVID-19 patients should be a maximum of 5% in order to resume elective surgical activity[26].

A review of the recommendations and guidelines of international associations and guidelines on care during surgery, to which we suggest adherence when performing minimally invasive procedures, carried out, of all these recommendations we can mention:

- Priority of the procedure: all elective surgeries, whose delay doesn't put the patient's health at risk, should be postponed. Only emergency surgeries should be performed, including procedures in patients with oncological diseases that may progress or with active symptoms requiring emergency care. Such decisions should be made locally, with respect to COVID-19 burden, and in the context of medical, logistical and organisational considerations for each hospital. Taking into account the risk/benefit of the procedure[8,9,15].
- In the case of the COVID-positive patient, the procedure should be postponed if it is not an emergency, until negative. In case of a negative result, taking into account false negatives, all necessary protective guidelines and the general recommendation to reduce transmission need to be followed

appropriately[15]. Surgery in a patient who meets criteria for a suspected case should be re-evaluated with a PCR result because of a tendency to increase postoperative complications. According to the study by Lei et al, the post-surgical morbidity and mortality of COVID-19 positive patients is higher: of 34 surgical patients with confirmed COVID-19 (asymptomatic),[15] (44.1%) patients required ICU care, and the mortality rate was 20.5%[16-18].

- Protection for the surgical team: Minimising personnel present[19,20], COVID-19 screening should be routinely performed before elective or emergency surgery[15]. In all surgeries during the COVID-19 pandemic, the entire surgical team (including surgeons, anaesthesiologists and nurses) should wear appropriate personal protective equipment (PPE); safety goggles, N95 or FFP2/3 masks and protective clothing are specifically recommended. During the administration of general anaesthesia, the American Society of Anaesthesiologists (ASA) recommends the following measures to limit potential droplet aerosolization: the most experienced anaesthesiologist should perform intubation, whenever possible, with PPE that includes an N95 mask or air-purifying respirator, a face shield or goggles, an impermeable gown and gloves[27], and only personnel necessary for the procedure should be in the operating room
- Surgeons should avoid contact with droplets and secretions by wearing full-body protection28. When dealing with a patient with suspected or confirmed COVID-19, a stricter dress code should be applied according to protocols and PPE should include: an N95 or FFP2/3 mask, a waterproof gown, full face shield, long nitrile gloves, a cap and footwear exclusively for the area or activity, without perforations[13,15].The protocol should also include improving ventilation and installing air purification equipment[13].
- Pneumoperitoneum management and prevention of aerosol dispersion: Port incisions should be as small as possible, allowing trocars to pass through but not leak around them[4] . Intra-abdominal pressure should be kept as low as possible[9,13,14,28,29]. The pneumoperitoneum should be evacuated safely, using an ultrafiltration system (smoke evacuation or filtration system), if available, to reduce viral release from the pressure of the pneumoperitoneum release[9,13,14,28,29]
- Surgical technique: the amount of OR time, risk of complications and optimisation of resource use should be reduced. Procedures should preferably be performed by experienced surgeons who have mastered the learning curve[28]. Power settings should be as low as possible, to avoid long dissection times with electric or ultrasound batteries and to reduce surgical smoke[13, 28,29]. Care should be taken to avoid damage to PPE, especially gloves and body protection[13]. Trocars should preferably have cannulae that prevent sliding in or out, to avoid leakage of the pneumoperitoneum[29].
- If a surgical specimen is to be removed, all pneumoperitoneum gas should first be ventilated with the smoke evacuator, to avoid leakage of the pneumoperitoneum[29]. Similarly, a fascial closure device, such as the Carter-Thomason, should not be used because gas may escape from the closure. Incisions should be closed with subcutaneous absorbable sutures so that the patient does not have to physically return for stitch removal, and be monitored by video call or other available means[29].

In summary, minimally invasive procedures remain a viable alternative for patients during the COVID-19 pandemic, provided that appropriate precautions are taken and the above recommendations are followed. The risk of SARS-CoV-2 transmission via aerosols from pneumoperitoneum has not been demonstrated nor have studies been performed to show whether there is greater transmission of the virus in laparoscopic surgery than in laparotomy[14]. In addition, open procedures may result in other complications, as well as prolonged hospital stay and use of beds that could be designated for patients with COVID-19.

Conclusion

The picture will change as the risk of infection changes and more is known about COVID-19 prevention and treatment. In addition, treatments for COVID-19, such as antiviral agents, may improve outcomes. We hope that this evidence and opinion can provide a starting point for discussions at the local level and that all surgical services can use these recommendations as a framework for creating their own specialty-specific recommendations.

References

1. Organización Mundial de la Salud. (2020). Un reporte sobre la salud. Recuperado de: https://www.who.int/es/health-topics/coronavirus
2. Organización Mundial de la Salud. (12 de enero de 2020). Preparación y respuesta ante emergencias. Recuperado de: https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/es/
3. Bolivia, Ministerio de salud, Decreto Supremo Nº 4196, 17 de marzo de 2020. Recuperado de: https://www.lexivox.org/norms/BO-DS-N4196.html?dcmi_identifier=BO-DS-N4196&format=html
4. Ficarra V, Novara G, Abrate A, Bartoletti R, Crestani A, De Nunzio C, et al. Urology practice during COVID-19 pandemic. Minerva Urologica e Nefrologica= The Italian Journal of Urology and Nephrology. 2020; Available from: https://doi.org/10.23736/S0393-2249.20.03846-1
5. CDC Centers for disease control. Recommendations for the prevention of HIV transmission in healthcare settings. MMWR 1987; 36 (Suppl. No. 2S)
6. Naspro R, Da Pozzo LF. Urology in the time of corona. Nat Rev Urol. 2020 May;17(5):251–3. doi: https://doi.org/10.1038/s41585-020- 0312-1
7. Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. ¿Cómo influirán las medidas de mitigación basadas en el país en el curso de la epidemia de COVID-19? Lanceta. En prensa. Available from: https://doi.org/10.1016/S0140-6736(20)30567-5
8. American College of Surgeons. COVID-19: recommendations for management of elective surgical procedures. 2020. https://www.who.int/es/emergencies/diseases/novel-coronavirus-2019?gclid=Cj0KCQjwvIT5BRCqARIsAAwwD-Sh2bM-NJYaXQnmrbQSzuOdOtHPl8DztFQp9qr62n7drNnltXTZKh4aAmq_EALw_wcB
9. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). SAGES and EAES Recommendations Regarding Surgical Response to COVID-19 Crisis. SAGES. 2020. [accessed 13 May 2020] Available from: https:// www.sages.org/recommendations-surgicalresponse-covid-19/
10. Alp E, Bijl D, Bleichrodt RP, Hansson B, Voss A. Surgical smoke and infection control. J Hosp Infect. 2006 Jan;62(1):1–5. doi: https://doi.org/10.1016/j.jhin.2005.01.014
11. Gloster HM, Roenigk RK. Risk of acquiring human papillomavirus from the plume produced by the carbon dioxide laser in the treatment of warts. Journal of the American Academy of Dermatology. 1995 Mar 1;32(3):436–41. doi: https://doi.org/10.1016/0190-9622(95)90065-9
12. Johnson GK, Robinson WS. Human immunodeficiency virus-1 (HIV-1) in the vapors of surgical power instruments. Journal of Medical Virology. 1991;33(1):47–50. doi: https://doi.org/10.1002/jmv.1890330110
13. Zheng MH, Boni L, Fingerhut A. Minimally Invasive Surgery and the Novel Coronavirus Outbreak: Lessons Learned in China and Italy. Annals of Surgery. 2020 Mar;1. doi: https://doi.org/10.1097/sla.0000000000003924
14. Morris SN, Fader AN, Milad MP, Dionisi HJ. Understanding the "Scope" of the Problem: Why Laparoscopy Is Considered Safe during the COVID-19 Pandemic. Journal of Minimally Invasive Gynecology. 2020 May 1;27(4):789–91. doi: https://doi.org/10.1016/j. jmig.2020.04.002

15. Balibrea JMose, Badia JMose, Rubio Pérez I, Martín Antona E, Álvarez Peña E, García Botella S, et al. Manejo quirúrgico de pacientes con infección por COVID-19. Recomendaciones de la Asociación Española de Cirujanos. Cirugía Española. 2020 May;98(5):251–9. doi: https://doi.org/10.1016/j.ciresp.2020.03.001
16. Forrester JD, Nassar AK, Maggio PM, et al.Precautions for Operating Room Team Members During the COVID-19 Pandemic. Forrester, Joseph D. et al.Journal of the American College of Surgeons, Volume 0, Issue J Am Coll Surg. 2020 2 de abril. Pii: S1072-7515 (20) 30303-3. https://doi:10.1016/j.jamcollsurg.2020.03.030
17. Leia S, Jiang F,Su W et al. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. The Lancet Volume 21, April 2020, 100331 https://doi.org/10.10 16/j.eclinm.2020.100331
18. Coimbra, R., Edwards, S., Kurihara, H. et al. European Society of Trauma and Emergency Surgery (ESTES) recommendations for trauma and emergency surgery preparation during times of COVID19 infection. Eur J Trauma Emerg Surg (2020). Available from: https://doi.org/10.1007/s00068-020-01364-7
19. Balibrea JM, Badia JM, Rubio Pérez I, et al. Manejo quirúrgico de pacientes con infección por COVID-19. Recomendaciones de la Asociación Española de Cirujanos CIRESP 2020;98(5). 251 – 259. Available from:ht tps://doi.org/10.1016/j.ciresp.2020.03.001
20. Francis, N., Dort, J., Cho, E. et al. SAGES and EAES recommendations for minimally invasive surgery during COVID-19 pandemic. Surg Endosc (2020). Available from: https://doi.org/10.1007/s00464-020-07565-w
21. COVID-19: Elective Case Triage Guidelines for Surgical Care. Online March 24, 2020. Availablr from: https:// www.facs.org/covid-19/clinical-guidance/elective-case
22. SAGES and EAES Recommendations regarding surgical responde to COVID-19 crisisI. Available from: https:// www.sages.org/recommendations-surgical-response-covid-19/
23. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol. 2020;21(3):335-337. Available from: https://doi:10.1016/S1470-2045(20)30096-6
24. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study [published correction appears in Lancet. 2020 Mar 28;395(10229):1038] [published correction appears in Lancet. 2020 Mar 28;395(10229):1038]. Lancet. 2020;395(10229):1054-1062. https://doi:10.1016/S0140-6736(20)30566-3
25. Guan WJ, Ni ZY, Hu Y, et al. Características clínicas de la enfermedad por coronavirus 2019 en China. N Engl J Med. 30 de abril de 2020 N Engl J Med 2020; 382: 1708-1720 https://doi:10.1056/NEJMoa2002032
26. ESCALA DINÁMICA DE FASES DE ALERTA/ESCENARIOS DURANTE LA PANDEMIA COVID19, asociación Española de Cirujanos, [accessed 15 Jun 2020] Available from https://www.aecirujanos.es/files/ noticias/152/documentos/Fases_de_alerta___v_3.pdf [Links]
27. American Society of Anesthesiologists. Coronavirus Resources – COVID – 19 FAQs. 2020. [accessed 13 May 2020] Available from: https://www.asahq.org/about-asa/governanceand-committees/asa-committees/commit tee-onoccupational-health/coronavirus/clinical-faqs
28. Mottrie A. ERUS (EAU Robotic Urology Section) guidelines during COVID-19 emergency. 2020;6. [accessed 30 July 2020] Available from: https://uroweb.org/wp-content/uploads/ERUS-guidelines-for-COVID-def.pdf
29. University of Nebraska Medical Center. Laparoscopy Adjustments During COVID-19. 2020. [accessed 13 May 2020] Available from: https://www.nebraskamed.com/sites/default/files/documents/covid-19/laparoscopyco vid-19.pdf

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