



Is Laparoscopic Surgery Safe During the Pandemic Period?

Pandemi Döneminde Laparoskopik Cerrahi Güvenli Mi?

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Abstract

Aim: The COVID-19 pandemic has significantly affected healthcare service systems worldwide. Important decisions have been made such as cancelling elective surgery, and shifting surgeons to other medical activities. However, following the collection of new data firstly elective cases and then laparoscopic operations were started again. While it was reported that the Covid-19 virus was detected in the abdominal cavity, there is no clear information about the virulence of this detected virus yet. We aimed in this study to show minimally invasive surgery is safe with all the precautions made preoperatively for both patients and surgical crew.

Material and Method: We retrospectively examined the laparoscopic cases included between August 2020 and December 2020 at the General Surgery Clinic of the Hitit University Erol Olçok Research and Training Hospital. We collected the demographic data, their preoperative Covid diagnostic tests, and their Covid Outpatient Clinic data in their postoperative follow-up. We also examined whether or not the surgical team involved in the surgeries of these patients was diagnosed with Covid-19 within 2 weeks following these surgeries.

Results: A total of 124 laparoscopic cases were performed between August 2020 and December 2020. The patients were followed up for a minimum of 1 month in the postoperative period. Nine patients applied to the Covid Outpatient Clinic with mild complaints in the postoperative period and the PCR test of 3 patients was positive. These 3 patients received Favipiravir treatment on an outpatient basis, the other patients were followed up on an outpatient basis with symptomatic treatment. No patient was hospitalized. Based on verbal questioning, it was determined that no personnel from the surgical team involved in these surgeries was infected with Covid-19.

Conclusion: We think that laparoscopic surgery can be performed safely with taking the necessary precautions during the Covid-19 pandemic period.

Keywords: Laparoscopy, COVID-19, pandemic, minimally invasive surgery

Öz

Amaç: Covid-19 pandemisi bütün dünyada sağlık sistemini önemli bir şekilde etkilemiştir. Pandemi başında küresel olarak önemli kararlar verilmiştir. Bu kararlar içinde elektif ameliyatların durdurulması ve cerrahların başka birimlerde görevlendirilmesi de vardır. Yeni bilgiler ışığında pandeminin birkaç yıl sürebileceği ve pandemi kısmen de olsa kontrol altına alındıkça önce elektif ameliyatlara sonra da laparoskopik vakalara tekrar başlanma kararı alınmıştır. Covid-19 virüsü abdominal kavitede tespit edilmiş olup bu tespit edilen virüsün virulansı ile ilgili bir bilgi henüz doğrulanmamıştır. Cerrahi birliklerin yayınladıkları kılavuzlar doğrultusunda gerekli önlemlerin alınması ile minimal invaziv cerrahilerin yapılabileceği ancak pozitif vakalarda açık/konvansiyonel cerrahinin tercih edilmesi gerektiği vurgulanmıştır. Biz de bu bilgiler ışığında gerekli önlemlerle birlikte laparoskopik ameliyatların hem hasta hem de cerrahi ekip açısından ek bir risk oluşturup oluşturmadığını bulmayı hedefledik

Gereç ve Yöntem: Ağustos 2020 ile Aralık 2020 tarihlerinde Hitit Üniversitesi Erol Olçok Eğitim ve Araştırma Hastanesi Genel Cerrahi Kliniği'nde gerçekleştirilen laparoskopik vakaları geriye yönelik olarak taradık. Hastaların demografik verileri, preoperatif Covid test sonuçları ve postoperatif 1 aylık dönemde Covid tanısı konulup konulmadıklarını inceledik. Aynı zamanda bu tarihler arasında laparoskopik cerrahiye katılmış cerrahi ekipleri de bu vakalar sonrasındaki 2 haftalık süreçte Covid tanısı açısından sorguladık.

Bulgular: Belirtilen tarihler arasında toplamda 124 laparoskopik vaka yapıldığı ve bu vakaların büyük çoğunluğunu (%68,5) kolesistektomilerin oluşturduğunu tespit ettik. Hastalar postoperative dönemde minimum 1 ay takip edilmiştir. Dokuz hasta postoperative dönemde hafif şikayetlerle Covid Polikliniğine başvurmuş ve 3 hastanın PCR testi pozitif gelmiştir. Bu 3 hasta ayaktan Favipiravir tedavisi almıştır, diğer hastalar semptomatik tedavi ile ayaktan takip edilmişlerdir. Hiçbir hastanın hastane yatışı olmamıştır. Ayrıca, ameliyat ekibi için yapılan sorgulamada bu ameliyatlara dahil olan ekipten hiç kimsede Covid-19 enfeksiyonu olmadığı saptanmıştır.

Sonuç: Covid 19 virüsünün laparoskopik cerrahi ile sağlık personeline kontaminyasyonu gösterilmemiş olmakla beraber bu konuda yeterli çalışma yapılmamıştır. Çalışmamız sonucunda Covid 19 pandemisi döneminde gerekli önlemler alınması durumunda laparoskopik cerrahinin güvenle yapılabileceğini düşünmekteyiz.

Anahtar Kelimeler: Laparoskopi, Covid-19, pandemik, minimal invaziv cerrahi



INTRODUCTION

After its definition in December 2019, the coronavirus disease 2019 (COVID-19) rapidly became a global emergency. The novel human coronavirus causing COVID-19 has since been named the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^[1] The COVID-19 pandemic has significantly affected healthcare service systems and personnel worldwide. Important decisions have been made, such as surgical activity changes, recommendations to cancel elective surgery, and shifting surgeons to other medical activities.^[2] Besides this, indications were going on for the surgical treatment of emergency cases and oncology patients. The laparoscopic procedure that had been previously applied in these surgeries led to prejudiced concerns in some people due to the respiratory spread of the COVID-19 virus. While there is no official evidence that the aerosols of the coronavirus that occur during laparoscopic procedures may be dangerous, it is recommended protective preventions must be applied for patients and surgical teams.^[3]

The first case in Turkey was seen in March 2020, and cases continue to be prevalently observed. The effect of the SARS-CoV-2 pandemic on surgical branches started between the end of March and June where elective surgical operations were reduced in numbers, and only emergency and malignancy operations were carried out due to the lack of sufficient data and existing uncertainties. However, following the collection of new data and acceptance that this pandemic would last for at least a few years, firstly elective cases and then laparoscopic operations were started again. While it was reported that the COVID-19 virus was detected in the abdominal cavity in studies published in the form of series of a few cases, there is no clear information about the virulence of this detected virus yet. Therefore, the place of laparoscopy in this disease, where aerosolization is especially highly effective in infection, has not gained clarity yet. The benefit of this method that may put especially the surgical team at risk for the postoperative period of the patient is an undeniable fact. Additionally, as it provides immune suppression during the recovery period of the surgical process, it was speculated that SARS-CoV-2 infection would progress more severely in the postoperative period. In guidelines published as recommendations by surgical associations, it is stated that it could be performed by taking the necessary precautions, but open surgery needs to be preferred in positive cases. At the General Surgery Clinic of the Hitit University Erol Olçok Research and Training Hospital, all cases are questioned regarding contact, and preoperative COVID PCR tests are conducted on all elective cases. This test is taken from emergency cases postoperatively, and it is taken before the surgery if semi-emergency cases such as appendicitis visited the hospital in the daytime. Elective patients whose tests come out positive are taken in for treatment by the COVID unit and then discharged, while emergency cases are taken into surgery in a particular operating room allocated for COVID-positive patients by using the required personal protective equipment. Positive

cases do not receive laparoscopic procedures. We also started laparoscopic cases again in August, where the pandemic numbers been relatively lower, and aimed to share our experience of 4 months. Additionally, the COVID infection statuses of these patients in the postoperative period were assessed. Moreover, by evaluating the COVID-19 virus infection rates of the surgical personnel in a 2-week process following these laparoscopic cases and examining their status of catching the COVID-19 virus during laparoscopy, we aimed to assess the safety of laparoscopic surgeries.

MATERIAL AND METHOD

This study has obtained approval from the Hitit University Ethics Committee (Application number: 2021-76, Decision No: 2021-66, Date: April 2021). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

We retrospectively examined the laparoscopic cases included between August 2020 and December 2020 at the General Surgery Clinic of the Hitit University Erol Olçok Research and Training Hospital from the hospital's information system. We collected the ages of the found cases, their preoperative COVID diagnostic tests, and their COVID outpatient hospital visit data in their postoperative follow-up. All surgical team (surgeons, anesthesiologists, nurses, and other operating room personnel) had received an educational briefing about recommended precautions about COVID-19 according to the up-to-date guidelines. We also examined whether or not the surgical team involved in these patients' surgeries was diagnosed with COVID-19 within two weeks following these surgeries. Precautions applied according to the guidelines; Each patient received surgery under pneumoperitoneum at a pressure of 12 mmHg. Electrocauterization usage kept at a minimum level. At the end of the operation, the gas was evacuated from the abdomen with the help of a closed exhaust system, and it was aimed to minimize its spread inside the operating room. The entire surgical team involved in the surgery wore FFP2 N95 facemasks over a surgical mask and wore one additional surgical mask over these. Using surgical protective goggles and protective face shields varied from person to person, and their usage was decreased in time. Routinely, all patients who planned to undergo surgery were tested with COVID-19 PCR (polymerase chain reaction) test, and if its result is positive, the operation was canceled and postponed to another date.

RESULTS

A total of 124 laparoscopic cases were included at our clinic between August 2020 and December 2020. Most of these cases (68.5%) were laparoscopic cholecystectomy cases. Other cases are presented in detail in **Table 1**. The ages of the patients varied between 18 and 87, and their median age was 49. A total of 124 laparoscopic cases were included at our clinic between August 2020 and December 2020. Most of these cases (68.5%) were laparoscopic cholecystectomy cases.

Table 1. List of laparoscopic operations

Operation	Frequency	Percent (%)
Appendectomy	4	3.2
Bridectomy	1	0.8
Anterior resection	1	0.8
Right hemicolectomy	1	0.8
Inguinal hernia repairs (TEP*/TAPP**)	28	22.6
Cholecystectomy	85	68.5
Diagnostic	2	1.6
Low anterior resection	2	1.6

*: Totally extraperitoneal, **: Transabdominal pre-peritoneal)

The surgical team comprised the surgical nurse and operating room personnel under the leadership of the surgeon. Based on verbal questioning, it was determined that no person from the team involved in these surgeries was infected with SARS-CoV-2.

DISCUSSION

In December 2019, in the city of Wuhan in the Hubei province of China, a viral pneumonia epidemic connected to a new coronavirus (2019-nCoV / SARS-CoV-2) occurred.^[4] The virus quickly took the entire world under its effect especially as it is transmitted through respiratory airways. Because of this reason, the virus poses a high risk for healthcare workers who work in environments where aerosols are produced. Environments that are at risk of aerosol contamination involve intubation, extubation, chest tube placement, bronchoscopy, gastrointestinal endoscopy, laparoscopy, and the use of energy devices like electrocautery. Pneumoperitoneum is an indispensable component of laparoscopic surgery; however, it brings about the risk of the surgical team being exposed to aerosols.^[5] Aerosol exposure mostly occurs during entry and removal of trocars, tool entries and removals, and evacuation of the gas during and after the operation. Due to the leaking of pneumoperitoneum gas that may contain high concentrations of suspended viruses, the contamination risk of the operating room personnel may be increased by laparoscopy.^[6] On the other hand, a closed surgical site (abdomen, thorax, etc.) reduces the risk of contamination, and there is no certain evidence yet in the literature on the viral infection of COVID-19 during laparoscopy.^[5] Although there is evidence on the detection of SARS-CoV-2 in peritoneal fluid, the information on the virulence and infection capacity of this virus is not yet clear.^[7]

During laparoscopic surgery, especially for hemostasis and dissection, electrocautery, ultrasonic dissectors, and laser ablation devices are used. Ultrasonic dissector use produces bio-aerosol-containing surgical smoke besides living and inanimate cellular material. This surgical smoke poses a risk of viral infection and leads to lung irritation, causing acute and chronic inflammatory changes.^[8] While the aerosolization of viruses with electrocautery devices is a danger for human health, whether or not the COVID-19 virus is aerosolized in the abdomen is not known so far. Additionally, as these electrocautery devices used in laparoscopy are also used

in open operations, it is more difficult to control aerosol distribution in open operations. Therefore, in terms of virus infection, we think open operations are riskier compared to laparoscopic and robotic surgeries.

In both conventional and laparoscopic surgery, minimizing the use of electrocautery and avoiding certain devices like ultrasonic dissectors may reduce the aerosolization of particles and this way reduce the potential viral emission risk.^[9] In our operations, we also tried to use devices like electrocautery devices to a minimum extent by performing dissections with laparoscopic surgical scissors as much as possible.

Aerosolization of viruses that are transmitted through blood like the Hepatitis B virus, HIV (Human Immunodeficiency Virus), and HPV (Human Papilloma Virus) was previously detected in surgical smoke during laparoscopy.^[10] However, infection with surgical smoke was shown only with HPV. Until now, the COVID-19 virus has not been detected in surgical smoke, and infection with laparoscopy has not been shown. As a result of our study, too, no contamination of the surgical team was observed in any of the 124 laparoscopic surgical interventions.

Contamination of healthcare workers with SARS-CoV-2 during laparoscopy has not been reported yet, but researchers recommend careful precautions for healthcare workers to avoid the risk of contamination during the pandemic process.^[9] At our hospital, we had also stopped elective surgeries and laparoscopic operations at the first stage when the pandemic started. However, with the extension of the process and continuation of the pandemic, we started to provide services again for patients who had regular healthcare needs. As soon as we started surgeries again, the entire surgical team used the recommended personal protective equipment to protect themselves during surgeries. Upon the fact that there was no case of infection related to laparoscopy in the literature concerning this particular virus, laparoscopic operations were also started by using protective equipment, and considering all 124 laparoscopic cases, COVID-19 infection was not observed in any healthcare personnel within the 2 weeks following the surgeries. When the hospitalization, preoperative and postoperative periods of the 124 patients were examined, no patients displayed COVID-19 symptoms within the 2 weeks following the surgeries. Only 9 patients showed symptoms after 6 weeks after surgery, visited the hospital for COVID-19 PCR tests, and only 3 of these patients turned out positive. These 3 patients experienced the disease mildly by receiving outpatient treatment.

The benefits of laparoscopy compared to open operations have been known for a certain time. Some publications argued that, during the COVID-19 pandemic, open surgeries last shorter.^[11] However, studies have also revealed that there is no significant duration difference between the two techniques of the operations are performed by laparoscopic surgical experts.^[12] In our study, too, all surgeries were performed by surgeons with laparoscopy experience, and there was no duration difference.

While the debate on laparoscopic surgery in the COVID-19 pandemic period is going on, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommends laparoscopic and robotic surgery to be performed with CO₂ filtration devices.^[13] Moreover, the Association of Laparoscopic Surgeons of Great Britain and Ireland (ALSGBI) supports the use of laparoscopy, while the American College of Surgeons (ACS) argues that there are not enough data to recommend one of open or laparoscopic surgery over the other, and surgeons need to apply the approach that minimizes the duration of the operation and maximizes safety.^[14,15]

CONCLUSION

While contamination of healthcare personnel with the COVID-19 virus through laparoscopic surgery has not been shown, there have not been enough studies on this topic. However, studies in the literature argue that laparoscopic surgery may be performed safely with recommendations such as using protective equipment, using electrocautery less, and working at lower pressures. In our study, as a result of our application of all these recommendations in the literature, we did not encounter any contamination in the 124 laparoscopic surgery cases we examined. In conclusion, we think that laparoscopic surgery may be performed safely by taking the necessary precautions during the COVID-19 pandemic period.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study has obtained approval from the Hitit University Ethics Committee (Application number: 2021-76, Decision No: 2021-66, Date: April 2021).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

- Gorbalenya AE, Baker SC, Baric RS, et al. The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol* 2020;5(4):536–44.
- Kurihara H, Bisagni P, Faccincani R, Zago M. COVID-19 outbreak in Northern Italy: Viewpoint of the Milan area surgical community. *J Trauma Acute Care Surg*. 2020;88(6):719–24.
- Royal College of Surgeons of Edinburgh (RCSEd). Updated General Surgery Guidance on COVID-19, 2nd Revision, 7th April 2020. 2020;56000. Available from: <https://www.rcsed.ac.uk/news-public-affairs/news/2020/april/updated-general-surgery-guidance-on-Covid-19-2nd-revision-7th-april-2020>
- Chan JF-W, Yuan S, Kok K-H, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* (London, England). 2020;395(10223):514–23.
- European Society Gynecologist Endoscopics. ESGE Recommendations on Gynaecological Laparoscopic Surgery during Covid-19 Outbreak. ESGE site. 2020;
- Zheng MH, Boni L, Fingerhut A. Minimally Invasive Surgery and the Novel Coronavirus Outbreak: Lessons Learned in China and Italy. *Ann Surg*. 2020;272(1):e5–6.
- Barberis A, Rutigliani M, Belli F, Ciferri E, Mori M, Filauro M. SARS-Cov-2 in peritoneal fluid: an important finding in the Covid-19 pandemic. *BJS (British J Surgery)* [Internet]. 2020;107(10):e376–e376.
- Alp E, Bijl D, Bleichrodt RP, Hansson B, Voss A. Surgical smoke and infection control. *J Hosp Infect*. 2006;62(1):1–5.
- El Boghdady M, Ewalds-Kvist BM. Laparoscopic Surgery and the debate on its safety during COVID-19 pandemic: A systematic review of recommendations. *Surgeon*. 2021;19(2):e29–e39.
- Kwak HD, Kim S-H, Seo YS, Song K-J. Detecting hepatitis B virus in surgical smoke emitted during laparoscopic surgery. *Occup Environ Med*. 2016;73(12):857–63.
- Cohen SL, Liu G, Abrao M, Smart N, Heniford T. Perspectives on Surgery in the Time of COVID-19: Safety First. *J Minim Invasive Gynecol*. 2020;27(4):792–3.
- Emken JL, Mcdougall EM, Clayman R V. Training and assessment of laparoscopic skills. *JSL S J Soc Laparoendosc Surg*. 2004;8(2):195–9.
- Francis N, Dort J, Cho E, et al. SAGES and EAES recommendations for minimally invasive surgery during COVID-19 pandemic. *Surg Endosc*. 2020;34(6):2327–31.
- Laparoscopy in The Covid-19 Environment - ALSGBI Position Statement - ALSGBI [Internet]. [cited 2020 Dec 23]. Available from: <https://www.alsgbi.org/2020/04/22/laparoscopy-in-the-Covid-19-environment-alsgbi-position-statement/#comments>
- COVID-19: Elective Case Triage Guidelines for Surgical Care [Internet]. [cited 2020 Dec 24]. Available from: <https://www.facs.org/Covid-19/clinical-guidance/elective-case>