

Colorectal Surgery During the First Wave of Covid-19 Pandemic: How the Coronavirus Affected Our Practice

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ABSTRACT

Objective: The COVID-19 has quickly climbed to a global pandemic and hospitals had to adjust in order to manage the resources available. The aim of this article was to expose our experience and the means used to avoid delay in treating oncologic patients.

Methods: Collection of data from all patient who underwent elective colorectal surgery for neoplasia during the state of emergency (between March 16th and May 16th 2020) and compared the surgical outcomes with the outcomes of the previous year.

Results: A total of 28 patients received colorectal surgery from March 16th and May 16th 2020. Laparoscopy using the Air-Seal® was the most practiced approach (Pearson Chi-Square 0.014; p value 0.905). The complication rate was not statistically different from the previous year (Pearson Chi-Square 2.640; p value 0.104) as well as the rate of major complications (Pearson Chi-Square 0.754; p value 0.385). During the peak of infections, there was no increase in the number of days of hospitalization comparing to the previous year (p value 0.279). There was no delay in the oncologic surgical treatment (p value 0.010).

Conclusion: We were able to demonstrate that it is possible to treat cancer patients during pandemic without compromising its possibility of cure.

Key words: colorectal surgery, coronavirus, colorectal cancer, COVID-19

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) that was first reported in Wuhan, Hubei, China. Although Wuhan was the early epicenter of the COVID-19 outbreak, the virus subsequently spread around the world, with hot spots developing in Italy, Spain, and the United States. Early in the pandemic, the first cases were linked to the seafood market in Wuhan suggesting animal to human transmission. However, transmission from human to human was later confirmed, since only a small percentage of cases has had contact with the market (1). Human to human transmission can occur through droplets, contact and aerosols produced in the hospital environment (anesthesia

Received: 09.04.2022

Accepted: 11.06.2022

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procedures, surgery). It is possible that SARS-CoV-2 could also be transmitted via fecal-oral route (2,3,4). Because of that, the healthcare workers can have a greater risk of getting infected if protective measures are not imposed. This unprecedented situation requires special considerations for surgeons dealing with abdominal surgery and in order to optimize the protection of healthcare from contagious coronavirus some guidelines has been proposed to guide the treatment of surgical patients. Despite the risk and the overload of the healthcare systems around the world, chronic and acute diseases continue to affect the population. Some of these diseases include cancers that require timely surgical and medical intervention. In order to optimize hospital capacity the centers for disease control and prevention has recommended rescheduling some elective procedures and many surgical societies published guidelines to prioritize surgical procedures (5,6). The Director-General of the World Health Organization declared, on January 30, 2020, the disease due to a new coronavirus as an International Public Health Emergency (7). In Portugal, a state of emergency was declared between 19 March and 2 May and subsequently moved to a calamity situation throughout the national territory, with the beginning of a gradual reopening of closed activities and establishments (8). The aim of this article was to report how coronavirus affected the way we treated colorectal cancer patients during the first wave of the pandemic and the impact on surgical outcomes.

METHODS

For this study, we evaluated all patients who underwent elective colorectal surgery for neoplasia during the state of emergency (between March and May 2020) and compared the surgical outcomes with the outcomes of the previous year. We also describe the patient's circuit before, during and after surgery as well as the SARS-CoV-2 infection prevalence of patients admitted to surgery and healthcare workers. The data were collected and processed using the SPSS® Statistics, version 24 (IBM corp.®) software.

Recommendations for surgical procedures

The COVID-19 has quickly climbed to a global pandemic and hospitals had to coordinate to avoid collapse. As a result politicians and surgical societies proposed to postpone elective procedures. In order not to compromise the treatment of patients with other pathologies, namely cancer patients whose post-

ponement may compromise their survival, circuits were created and resources were reorganized. The hospitals had to take the following measures in order to guarantee the treatment of urgent surgical patients (whether oncologic patients or patients with acute surgical pathology): prioritization of surgical interventions; testing every patient before surgery; establishment of a surgical SARS-CoV-2 operating area; revision of certain surgical techniques and establishment inpatient areas for patients with SARS-CoV-2 (ward, intensive and intermediate care). Hospitals organization strategies have changing according to the needs and latest guidelines.

In the early-stage cancer patients with colorectal cancer (CRC), surgery is the therapeutic approach that might have major benefits in terms of survival and in some cases is the only therapeutic option due to CRC complications like bleeding, perforation or obstruction (9).

The American College of Surgeons (ACS) and Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommended that each hospital should review all scheduled elective procedures and postpone non-urgent surgery and minimize the use of ICU beds, personal protective equipment and ventilators. According to ACS guidelines, patients with colorectal cancer should be treated electively, but according to the pandemic phase, some patients may be rescheduled or have an alternative therapeutic approach in order to delay surgery. The society divided the course of the pandemic into three phases. In the phase I, the hospital resources are not exhausted and the patient, if he has a surgical indication, can be operated. Malignant polyps, either with or without prior endoscopic resection, prophylactic indications for hereditary conditions, benign appearing asymptomatic polyps, small and asymptomatic colon carcinoids and asymptomatic rectal carcinoids can be deferred. In the phase II, the hospital capacity is limited, so almost colorectal procedures typically scheduled as routine should be deferred, and only the nearly obstructing or with local complications (perforation and sepsis) colorectal cancers should be done as soon as feasible. In the phase III the hospital has no resources available and only the patients with an obstructed, perforated or bleeding neoplasia should be submitted to surgery. In this cases, alternative guidance should be considered, such as transfer to another hospital, radiotherapy or chemotherapy (10).

According to European Society for Medical Oncology (ESMO), the patients should be treated taking into account the stage of CRC. The postponement of

the beginning of treatment should not jeopardize the possibility of cure. The surgery for early CRC should not be postponed for more than 6 weeks. The administration of neoadjuvant treatment for early stage is the standard care for stage II and III of rectal cancer but not validated in colon cancer. In this way, stage II and III rectal cancer patients completing neoadjuvant treatment should receive curative surgery without major delays. When healthcare resources are scarce because of the pandemic, patients who cannot be scheduled for surgery can do another cycle of neoadjuvant therapy (in those patients responding well to therapy). In contrast, patients who are not responding to treatment, surgery should be performed as soon as possible, since the risk of losing the chance of getting a curative treatment might be higher than the risk of being infected. A watch and wait approach might be considered for early stage rectal tumour that obtain a complete radiological response after neoadjuvant treatment. Patients with probably resectable metastatic lesions (liver only, lung only, CRC only) should be discussed in a multidisciplinary consultation to define the benefit of offering an immediate radical surgery (9).

Cancer patients are more susceptible to infection than people without cancer, due to the malignant process itself and the state of immunosuppression caused by treatments received, such as chemotherapy or surgery. Therefore, these patients may have a higher risk of COVID-19 and a worse prognosis (11,12). Despite the increased risk of complications associated with COVID-19 they also might be at high risk of cancer progression if they are not treated early. The Spanish Association of Surgeons (SAS) suggested to avoid primary colorectal anastomosis in patients at risk (ultra-low anastomoses, diabetics, preoperative radiation therapy or elderly patients) to minimize the risk of complications and the possible evolution to a septic shock and consequently the use of necessary health resources (6).

As usual, the discussion about surgical indications must be individualized and in the context of the COVID-19 pandemic, all decisions and risks need to be properly explained.

All patients admitted electively for surgery are recommended to perform a swab for the diagnosis of COVID-19. In patients positive for the disease, the risk/benefit of undergoing surgery must be weighed. The medical team responsible for the patient should, together with oncology, anesthesia and intensivists, decide on the surgery.

In the current context of a pandemic, care in the operating room must be taken even if the patient has a

negative test. As already mentioned above, the recommended diagnostic test is the swab with virus identification by RT-PCR. However, this test has a low sensitivity. Therefore, some precautions must be applied in the operating room in order to reduce the risk of infection for healthcare workers.

Aerosol generating procedures expose healthcare workers at high risk of contagion. Aerosols can be produced during intubation and extubation, (13) electrocautery of blood, tissues or any body fluids and during laparoscopic (pneumoperitoneum) (16). An operating room with a negative pressure environment is the ideal to reduce dissemination of the virus by preventing air from escaping the room (14). With regard to surgical procedures there are insufficient data to recommend for an open and the laparoscopy has several proven benefits. The surgical team should choose an approach that minimizes operating time. During laparoscopy, smoke and aerosols are generated, not only by cauterization of blood vessels but also by dissection (15). This smoke can contain virulent DNA and RNA and is sometimes evacuated directly into the overpressured operating room by opening a valve on a trocar. According to SAGES, during laparoscopy, the incisions for trocars should be small as possible to not allow leakage around ports, the CO₂ insufflation should be kept to a minimum and proper filters and closed systems for CO₂ desufflation is recommended. In open surgical operations, a smoke extractor/aspirator should be also used and energy devices and electrical instruments should be utilized on the lowest energy level (16). When the patient is infected by coronavirus, the surgical team must wear a complete personal protective equipment (PPE) with masks with a microparticle filter (FPP2 or FPP3) (17).

In the recovery period at hospital is recommend reducing as much as possible the hospital visits to minimize the risk of exposure to the virus.

RESULTS

Patient circuit before surgery

Decision to operate

The decision to operate a patient has the potential to place the patient, healthcare workers, and other hospitalized patients at risk of infection with SARS-CoV-2. In order to prevent the spread and prepare hospitals for the surge of coronavirus cases, hospitals around the world have canceled elective procedures.

In Braga Hospital only the patients with pathology that could put the patient life in risk were operated. In

the colorectal department only patients with colorectal cancer were submitted to elective surgery during pandemic period. Benign proctological surgery and reconstructive procedures have been postponed.

On the day before surgery, all patients were tested. The diagnosis was made by RT-PCR using samples from nasopharyngeal and oropharyngeal swabs. During the pandemic phase, none of the patients admitted for elective surgery had a positive screening. According to our hospital protocol, if a patient proposed for surgery was infected, the decision to operate was the responsibility of the surgical team.

The American College of Surgery presented guidelines on how to prioritize cases. Guidance on the triage of elective surgery is based on an Elective Surgery Acuity Scale that allows providers to understand the potential impact on limiting the hospital capacity to treat patients COVID-19. This scale divided the procedures into three phases. In the phase I the hospital resources are not exhausted so almost cancer patients can be submitted to surgery. In the other hand, in the phase III the hospitals resources are all routed to COVID-19 patients. In this phase only patients in whom death is likely to occur within hours should do surgery (10).

During the pandemic period, we never reached the maximum capacity of hospitalization or ICU beds and there was no need to change our conduct towards cancer patients. In this way, we were able to do surgery to all the colorectal cancer patients according to the surgical waiting list without any delay.

Patient pre-operative preparation

All patients were discussed in multidisciplinary consultation before surgery. The format of such discussion changed. The specialties involved, general surgery, oncology and radioncology, maintained the consultations but by videoconference. Then, after the decision of the multidisciplinary consultation, patients with surgical indication were guided to a presential pre-operative consultation with a surgeon. In this consultation, the pre-surgical evaluation exams were requested, the procedure was explained and the informed consent was signed. Anesthetic evaluation was performed on the day of surgery in the operating room.

The screening test for COVID-19 was performed on the day before the surgery. Most patients were admitted only on the day of surgery.

Our hospital has reserved a floor with four wards to admit infected patients. On the remaining floors were admitted patients from different specialties with a negative test or that were not suspect (initially not all

inpatients were tested because of the lack of tests). Uninfected patients admitted for surgery awaited in a surgical ward and patients with a positive test were allocated to that ward on a different floor from the hospital.

In those patients with indication for intestinal preparation (left colonic and rectal resections) this was done at home according to the indications given in the preoperative consultation (contrary to what happened previously in which patients with more co-morbidities performed the preparation at the hospital).

Patient treatment during surgery

In order to avoid the transmission of SARS-Cov-2 between patients or between patients to healthcare workers and, in an attempt to save the maximum amount of PPE, the operating rooms were divided into two areas: area of infected or suspect patients and area of uninfected patients. At our hospital, specific circuits were designed for the circulation of these patients from the ward to the operating room. In the OR, positive patients were operated in rooms prepared for COVID (in our hospital, 3 out of 12 rooms were reserved for this purpose). The surgical team, who will participate in the surgery, access the COVID room after being equipped with the PPE. After surgery, the equipment was removed according to the safety regulation. The exit from the room was through a different door that led to a different corridor from the entrance. Throughout the surgery, a member of the nursing team remained outside the room to replace the necessary material. The room designated for recovery for COVID patients had communication with these 3 operating rooms and did not communicate with the recovery room for uninfected patients.

As already mentioned, none of the patients admitted for elective surgery had a positive SARS-Cov-2 test. The complete PPE was never needed. Whatever, since we only rely on the swab and it can have false negatives, some precautions were taken in the operating theatre even in patients with a confirmed negative test.

The choice of the surgical technique was always based on what would be most beneficial for the patient. Most patients were approached laparoscopically. In order to reduce the production of aerosols during laparoscopy, the colorectal department used the AirSeal[®] insufflation system to assist laparoscopic surgeries. This system optimizes gas flow to provide a stable pneumoperitoneum, facilitates smoke evacuation and filtration and provides a valve free access (18). The use of masks was mandatory both inside the

operating room, in the corridors and common areas.

Anesthesia procedures carry a high risk of infection. Anesthetists started to approach the airway in compliance with safety measures, regardless of the screening result, thus reducing the risk of individual contagion and of the surgical team. With uninfected patients, the anesthesiologists wore a fit-tested mask FFP2 or FFP3, full-face shield or other eye protection and gloves. If the patient was infected with coronavirus a full PPE was used. During intubation, the patient face was covered with a plastic drape to reduce the contact and dissemination of particles.

Follow-up after surgery

In the ward all patients and healthcare professionals wore surgical masks. Hospital visits were reduced to a minimum and only the terminally ill received visits from family members (one member at the time).

The colorectal department was divided and the elements of each part had different working hours (one half of the week came a part of the team and the other half came in the remaining time).

After hospital discharge, patients were evaluated in a postoperative consultation that was scheduled within 1 month. If there was a need for an earlier reassessment, due to changes in the appearance of the surgical wound, pain or other reason inherent to an early postoperative period, the patient was also evaluated in person. To be seen at consultation, the patient did not need to undergo a new screening of COVID-19. The use of surgical mask and compliance with hand hygiene measures was mandatory. The consultation room was disinfected between each patient, the number of patients scheduled was significantly reduced and the healthcare workers wore surgical masks. If, after initial postoperative evaluation, the patient was evolving favorably, he was then referred to an oncology group consultation. In the oncology group consultation, the oncological treatment after surgery was outlined. The vast majority of these consultations were carried out without the presence of the patient and the decision was then communicated by phone. Whenever the patient had doubts about his medical condition he could get in contact with the responsible surgeon via phone or email. The follow-up consultations were non-presential.

Epidemiological characteristics and surgical statistics

During the period between March 16 and May 16 of

Table 1 - Benign vs malign diagnosis pre and during the pandemic (elective procedure, %)

	2019	2020
Benign condition	47, 14%	3,57%*
Malign condition	52,86%	96,43%

*Patient with a cervical suspect adenopathy that was not confirmed by histology

2020, twenty eight patients were electively operated. No outpatient procedure was performed. In the previous year and in the same period, seventy patients were operated, 13 of which were on an ambulatory basis. During the peak of coronavirus infection, the OR reduced its surgical activity functioning only for cancer patients and urgent/emergent patients (see *table 1*). For this reason, the number of surgical periods assigned to the colorectal department decreased considerably. On the other hand, the number of patients referred from primary healthcare due to colorectal neoplasia also decreased. This reduction is probably related to the suspension of the CRC screening. *Table 2* shows the total number of surgeries broken down by types of procedures. Laparoscopy was the most practiced approach (see *graphic 1*). Applying the Chi-Square test, we found that there are no significant differences between the coronavirus and non-coronavirus period regard to the surgical approach (Pearson Chi-Square 0.014; p value 0.905) and it was possible to maintain the laparoscopic approach although with some adaptations (see *table 3*). The average age of patients operated on during the pandemic was 61,5 years old and there was no difference in the mean age in the two periods (p value 0.056) (see *table 4*).

Table 2 - Total number of surgeries broken down by types of procedures during pandemic

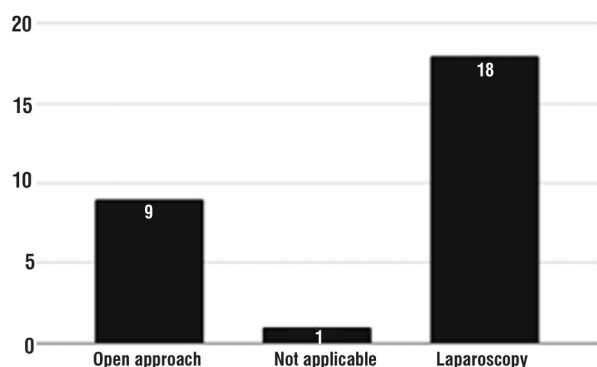
Appendectomy ^a	1
Right Colectomy	9
Segmental Resection of the Splenic Angle	1
Left Colectomy	1
Anterior Resection of the Rectum	7
Abdominoperineal Resection	2
Total Colectomy	1
Derivative Stoma ^b	4
Excisional Biopsy ^c	1
Enterectomy ^d	1
	28

^aPatient with suspected mucinous tumor of the ileocecal appendix;

^bOcclusion due to anal stenosis due to rectal cancer; removal of rectal prosthesis due to poor positioning in a patient with rectal cancer; occlusion by carcinomatosis due to urothelial cancer and transverse colon cancer with invasion of neighboring structures;

^cSuspected ganglionic metastasis;

^dSuspected small bowel neuroendocrine tumor.



Graphic 1 - Surgical approach (absolute numbers)

Surgical complications

Post-surgery complications were described according to the Clavien Dindo classification. Grade III or higher complications were considered major. We used the ASA Physical Status Classification System to assess the preoperative condition of the patient. The patients submitted to surgery during the pandemic had a similar ASA to the patients operated in the previous year. No significative differences was verified (p value 0.172).

In 2020, the complication rate was not statistically different from the previous year (ambulatory patients were excluded) (Pearson Chi-Square 2.640; p value 0.104) as well as the rate of major complications (Pearson Chi-Square 0.754; p value 0.385). We had a rate of major complication of 10.7% (see *table 5*).

In the coronavirus period, there was no increase in the number of days of hospitalization comparing to the previous year (mean of 4.77 days during the pandemic vs 6.00 days in the previous year, p value 0.279).

Referral time for multidisciplinary consultation

All cancer patients were discussed before and after oncologic surgery in a multidisciplinary consultation. We evaluated the referral time to surgery after the first multidisciplinary consultation and the time between surgery and the second multidisciplinary consultation. The last one could be influenced by various factors like post-operative complications and pathological anatomy response time. During the first wave, the average waiting time for surgery was 10.14 days. Comparing with the homologous period of the previous year, with a waiting time of 30 days, there were significant differences (p value 0.010, applying T test). The time between surgery and the second multidisciplinary consultation was also shorter during the pandemic with an average of waiting days of 19.71. (p value 0.022,

Table 3 - Surgical Approach

	N	%
2019		
Open	17	34.7%
Laparoscopy	32	65.3%
2020		
Open	9	33.3%
Laparoscopy	18	66.6%

Table 4 - Epidemiologic characteristics during pre-pandemic and pandemic phase

	2019	2020
Sex (N)	45 male and 25 female	13 male and 15 female
Age (Mean)	64,27 years	61,50 years

Table 5 - Surgical Complications

	N	%
2019		
None, Grade I or Grade II	53	92.98%
Grade III or higher	4	7.02%
2020		
None, Grade I or Grade II	25	89.3
Grade III or higher	3	10.7

applying Mann-Whitney test). The time of referral to the consultation after surgery was not influenced by postoperative complications (p value 0.890, applying T test). Analyzing our results, during this first wave, there was no delay in the oncological treatment of colorectal patients.

Prevalence of infection among healthcare workers

During the pandemic period in which the surgical activity was maintained, there were no records of infection by coronavirus in surgeons. The elements of the colorectal department showed a negative swab after collective screening.

DISCUSSION

Before the vaccine against SARS-Cov-2 and until herd immunity is achieved, measures to reduce social interaction such as mask use, social distance and lockdowns were the only measures capable of reducing active cases. The pressure in healthcare shifted the resources to care for COVID-19 patients what may jeopardize non COVID-19 patients. Cancer patients due

to their state of immunosuppression may have a less favorable outcome if they contract the COVID-19 disease (mechanical ventilation, ICU admission and death) compared to the general population. Therefore, as reported above, the care of these patients needs to be reorganized at different levels.

Even during a pandemic, oncologic patients require timely treatment and surgery is a therapeutic approach with major benefits in terms of survival, especially for early-stage patients with CRC and may be the only possible therapeutic option of some complications due to CRC progression.

To guide healthcare facilities in these unprecedented times, some surgical and oncological societies, namely the ESMO, SAGES, ACS and many more, have developed guidelines to mitigate the negative effects of the COVID-19 on the diagnosis and treatment of cancer patients. The Centers for Disease Control and Prevention (CDC) and the American College of Surgeons (ACS) have recommended rescheduling elective surgeries. At our Hospital, we rescheduled all benign surgical cases and restructured the OR periods to respond to oncological cases. In the colorectal department all patients waiting for oncologic surgery were operated without any delay. However, the number volume of patients treated was significantly lower than the previous year. The lower volume of cancer patients is probably not related to the poor management of hospital resources since the specialty consultations (first consultations after referral) and multidisciplinary group discussion were maintained, even through telemedicine, for cancer patients. The population was advised to stay home in the first months of the pandemic and the primary health care were not able to maintain routine consultations and, consequently, cancer screening programs. Thus, asymptomatic patients were not diagnosed and the symptomatic patients probably resorted later to the health system due to the social isolation imposed by the pandemic. The long-term impact of pandemic strike is not yet fully known.

ESMO tried to study the impact on outcomes from cancer surgery of the COVID-19 pandemic and it shows that even a short delay (3 months) in treating aggressive cancers can have a significant impact on patient survival. For cancers with a relative favorable prognosis, a delay of 6 months may result in significant summed attributable deaths as many of these cancers are common. In CRC, this analysis, shows that a 6 month delay to surgery in stage III CRC for patients older than 50 years could lead to a reduction in 5-year net survival that can reach 30%.¹⁹ Delay in the

diagnosis and treatment will also result in tumors being more advanced and potentially less curable, jeopardizing the long-term survival but also increasing the costs to treat in terms of both surgery and/or chemotherapy. On the other hand, the resources needed for those patients with cancers that present as emergencies such as sepsis due to perforation or occlusion and bleeding of the gastrointestinal tract will be much higher (20). Fligor et al did a systematic review to identify literature between 2005 and 2020 investigating the impact of time to surgery on oncologic outcomes in colorectal, pancreatic, and gastric cancer. This systematic review showed that there is moderate evidence of worse outcomes with delaying surgical resection (21). The administration of neoadjuvant treatment for early stage is the standard care for stage II and III of rectal cancer but not validated in early colon cancer but some few recommendations might be highlighted in the era of the COVID-19 pandemic. A study from the FOxTROT Collaborative Group demonstrated that in high risk stage II and III colon cancer, 6 weeks of neoadjuvant chemotherapy with oxaliplatin, folinic acid, and fluorouracil therapy resulted in marked histological downstaging and a halving of the rate of incomplete resection (22). If colonic resection must be delayed, administration of neoadjuvant chemotherapy should be considered.

The ACS guidelines, during coronavirus period, recommend resection as soon as possible for rectal cancer following neoadjuvant therapy and consideration of delay for rectal cancer cases with "clear and early evidence of downstaging from neoadjuvant chemoradiation," either with additional wait time or chemotherapy (10). ESMO guidelines have the same principle for rectal cancer.

The safety, feasibility and oncologic equivalence of laparoscopic surgery in CRC have been proven and the clinical benefits have also been demonstrated over open approaches (23). In our department the laparoscopic approach is the standard and the approach was not changed during the pandemic. The theoretical contamination routes of contamination during laparoscopic surgery can be divided in those with proven infectious transmission (droplets, aerosol produced during laparoscopy and close contact) and those with proven RNA but with an unknown contamination potential (blood, feces and surgical specimen) (24-26). Studies show that there is no reason to perform open surgery when laparoscopy is better for the patient. Although previous research has shown that laparoscopy can lead to aerosolization of virus there is no evidence to indicate that this happens with COVID-19. If devices to

filter released CO₂ for aerosolized particles are used, laparoscopy can be more safe than open surgery (smoke evacuation may be more difficult to control) (27).

As WHO recommends the use of complete PPE (FFP2 mask, goggles or face shield, a long-sleeved water-resistant gown and gloves) when practice direct care or aerosol-generating procedures to a patient suspect or confirmed with COVID-19 (28). Even in negative patients we maintain some precautions in the OR to minimize the risk of contagion but with profitability of resources available.

Our study shows that it is possible to maintain the treatment and follow-up of patients with CRC without worsening the rate of complications or increased incidence of coronavirus infection. Coronavirus is expected to remain in circulation for many years. In medium/long term, avoidance of delay in cancer surgery should be one of the highest priority. Health systems should create safe protocols that allow sufficient resourcing for cancer diagnosis (from primary care to hospital care) and treatment. Our hospital, despite being a reference hospital in the north of the country, never reached the saturation of resources, which allowed us to continue the surgical activity and create protocols more and more adjusted to the new reality. In this article, we also provide some recommendations hoping to help surgeons from related departments across the world.

CONCLUSION

Our study shows that it is safe and possible to perform oncologic colorectal surgery during pandemic without compromising the quality of the treatments provided. After the implementation of safe circuits and application of safety measures in the OR and in the wards, we lower the risk of infection for patients and hospital staff. During the epidemic outbreak stage of COVID-19, the way we approach the patients has changed even in those patients who had a negative swab and all this safety measures implemented were important to minimize the risk of contagion. In the future, it is imperative to develop a detailed clinical guidelines for diagnosis and treatment of CRC patients during situation like the coronavirus outbreak.

Conflict of interest

The authors declared no potential conflicts of interest.

Funding

The authors received no financial support for the publication of this article.

Ethical approval

For performing this study ethical approval was obtained.

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