



Surgical management of digestive system cancers during the coronavirus disease 2019 pandemic: review of general suggestions

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ABSTRACT

Since December 2019, the world has been battling the COVID-19 pandemic, and health workers are at the forefront of the fight. Surgeons also fulfill their duty; however, elective cases had to be postponed in order to use resources appropriately in the fight against coronavirus. Although benign elective surgical procedures can be postponed to a distant time during this pandemic, surgical interventions for urgent and life-threatening situations are mandatory to perform but the main uncertainty among surgeons is about cancer patients. In this paper, we aimed to present a suggestion to the surgeon about how to manage digestive system cancers during pandemic in the light of the published articles and guidelines.

Keywords: COVID-19, coronavirus, pandemic, digestive system, cancer, malign

INTRODUCTION

"There are no incurable diseases - only the lack of will. There are no worthless herbs - only the lack of knowledge."

When Ibn-i Sina said this sentence many centuries ago, perhaps he did not know that he would give such hope to physicians of the future struggling with a pandemic for which an optimal treatment method is not discovered yet. While in a health crisis that concerns the whole world and threatens people from all walks of life, healthcare professionals continue to work at the frontline, adhering to their oaths. Surgeons also continue to work properly everywhere in the task given to them in this difficult process. In many places with intensive patient burden, most surgeons perform medical duties in the emergency room, inpatient or intensive care units reserved only for COVID-19 patients. However, although benign elective surgical procedures can be delayed and postponed to a distant time during this pandemic, surgical interventions for urgent and life-threatening situations are mandatory to perform. Although there is no dilemma in terms of management to these emergency cases, the main uncertainty among surgeons is about cancer patients.

It appears that there are three major problems for the management of cancer patients during the pandemic. The first of these is the patient bed, ventilator and intensive care capacity of the hospital where the surgeon works. Due to the increasing number of COVID-19 patients, the need to keep these patients isolated and ventilator and intensive care needs due to respiratory problems, most of these resources are used for patients with COVID-19. For this reason, a surgeon has to consider how long the patient will stay in the preoperative and postoperative period, whether there will be a need for a ventilator and how long he/she can stay in the intensive care unit before operating the cancer patient. Moreover, in this process, there is legal uncertainty against the risk of the patient becoming infected with COVID-19 in the hospital.

Secondly, first data from the Far East have shown us that mortality rate is high in malignant patients infected with COVID-19. When malignant patients undergoing

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surgery have been infected with coronavirus, mortality rates are even higher (1). Therefore, the surgeon will have to choose between the risk of progression of the disease if he/she waits and the risk of infection in the process of making an operation decision to a cancer patient.

The third problem is the risks posed by the operation itself to the surgeon. The operations of cancer patients are relatively long, and the surgeon is in direct contact with the patient's body fluids during this period. Also, it is not yet clear whether the COVID-19 virus is transported by fumes from the electrocautery used, or by gases leaking from the patient in minimally invasive surgery. For this reason, the surgeon will be obliged to know the risk of COVID-19 of the patient he/she will operate and, if positive, take all precautions to protect itself and its team. Therefore, the surgeon should be able to provide these measures or have optimal conditions before operating the cancer patient.

Cancer is a progressive disease, and how long this pandemic process will last is uncertain. For this reason, oncologic surgeons are obliged to know which disease or patients should not be risked, and which patients should be operated at risk, and to make a decision by reporting this risk to the patient and the family. In this context, digestive system cancers constitute one of the most risky groups. In this paper, we aimed to present a suggestion to the surgeon by reviewing the articles on the subject so

far and the suggestions of different associations and guidelines. Since this process is an ongoing condition and new information continues to appear, the surgeon should not forget that he / she should constantly renew him/herself.

MATERIAL and METHODS

Evaluation of the current suggestions was carried out in two separate areas. First, the articles published since the beginning of pandemic up to date (01/12/2019-15/04/2020) about the subject have been passed through an elimination process. For that purpose, the widely used Pubmed database was referred. In the search area, the variables written for the purpose (Coronavirus 19/COVID 19/ Surgery/Cancer etc.) and the results were evaluated one by one and articles related to surgery of the digestive system and cancer were reviewed. In search combinations, the option that gave the widest result on the subject was chosen (COVID 19 Surgery/368 results). From these, 20 articles were identified on the management of digestive system cancers during the pandemic (10 in English, 10 in Chinese). Articles written in English were evaluated entirely, and articles written in other languages (all Chinese) were evaluated after translation. The articles were categorized according to the organs they were interested in and the results were presented separately. Secondly, the suggestions of the associations and organizations known worldwide and have many international members were presented. Article categories and guides are shown in Table 1.

Table 1. Search results, article categories and guides presented

<p>Search results COVID 19: 4272 (chosen) COVID: 3831 Coronavirus: 3100 Coronavirus 19: 2212 nCoV: 485 nCoV 19: 343</p>	<p>COVID 19 Surgery: 368 (chosen) COVID 19 Cancer: 273 COVID 19 Gastrointestinal: 81 COVID 19 Digestive: 72 COVID 19 Malignancy: 41</p>
<p>Article categories (n= 20) (English)</p> <ul style="list-style-type: none"> • General Digestive System: 3 • Esophagogastric: 1 • Hepatopancreaticobiliary: 0 (transplantation excluded) • Colorectal: 6 	<p>(Chinese)</p> <ul style="list-style-type: none"> • General Digestive System: 3 • Esophagogastric: 1 • Hepatopancreaticobiliary: 2 (transplantation excluded) • Colorectal: 4
<p>Guidelines</p> <ul style="list-style-type: none"> • American College of Surgeons COVID-19 Guidelines for Triage of Colorectal Cancer Patients • Society for Surgical Oncology Resource for Management Options of Colorectal Cancer During COVID-19 • Society for Surgical Oncology Resource for Management Options of GI and HPB Cancers During COVID-19 • Society of American Gastrointestinal and Endoscopic Surgeons Recommendations Regarding Surgical Management of Gastric Cancer Patients During the Response to the COVID-19 Crisis • Society of American Gastrointestinal and Endoscopic Surgeons - AHPBA Recommendations Regarding Surgical Management of HPB Cancer Patients During the Response to the COVID-19 Crisis • Society of American Gastrointestinal and Endoscopic Surgeons Recommendations Regarding Surgical Management of Colorectal Cancer Patients During the Response to the COVID-19 Crisis 	

Before proceeding to get the results, it is important to remind that the working conditions will not be the same for every surgeon in the pandemic process so that the decision must be made according to the patient and these conditions during the process. The surgeon must be alert that the information may change constantly in the ongoing process.

EARLY SUGGESTIONS and RESULTS of FIELD STUDIES

1. Management of Esophagogastric Cancer Patients

Based on the Eastern literature, progression time from localized to locally advanced esophagogastric cancer disease is 34-44 months (2). In esophageal tumors, this period may be shorter, and the patient may become symptomatic even in the early period. However, since postoperative complication risks are high and patients become vulnerable to respiratory and septic complications, it should be kept in mind that operating these patients during the pandemic also has risks. Therefore, the decision must be made individually according to the patient.

Li et al. have made suggestions about the management of patients with esophageal cancer during the pandemic period (2). Accordingly, in stage I patients, surgical treatment or endoscopic resection can be selected according to the patient's condition. Pre-operative neoadjuvant therapy is recommended in stage II and III patients. Stage IV patients are directed to the oncology and radiotherapy department. For patients who complete pre-operative neoadjuvant therapy, depending on the limited or elective surgery system of the hospital, if the patient is unable to perform surgery on time, additional chemotherapy may be added 1 or 2 times, or preoperative nutritional support is provided to heal and closely monitor the underlying disease.

In their extensive study, Ma et al. remind that 6-month waiting period in early stomach cancer does not change the prognosis, and in stage II and III disease, this period is 3 months (3). Therefore, Ma et al. advocates that operation can be postponed in patients with early gastric cancer, and in local advanced diseases, appropriate time can be gained with neoadjuvant therapy. Similarly, Chen et al. have stated that appropriate patients should be directed to neoadjuvant therapy based on NCCN guideline suggestions (4).

Likewise, the French group recommends postponing operations in a way to prioritize neoadjuvant therapy in esophageal and gastric tumors and suggests discussing the risks with the patient planned to undergo surgery (5).

2. Management of Hepatopancreaticobiliary Cancer Patients

As stated in the article of Wu et al. in hepatocellular carcinoma, the tumor volume duplication time is on average 85.7 days (6). This period may be shortened in hepatocellular cancers that initially have a small tumor volume or carcinoma due to Hepati-

tis C. According to Wu et al., most hepatobiliary system tumors will not turn into non-resectable tumors after the appropriate operation postpone. Although this delay time is not clear, these tumors can progress aggressively. Even if the tumor is found to progress rapidly after 1 to 2 months and is no longer suitable for surgery, this indicates that the tumor has an extremely high degree of malignancy and possibly the first surgical effect will not be satisfactory. Furthermore, for patients with cholangiocarcinoma with jaundice, one may consider catheterization and drainage to reduce jaundice and improve nutrition. In addition to surgery, interventional treatment methods is an important option for malignant tumors of the hepatobiliary system and can be selected in suitable patients (6). Radiofrequency ablation (RFA) or chemoembolization in hepatocellular cancer; RFA for colorectal liver metastases are some options.

Advice of the French group is to postpone the planned operation time for early liver tumors. They suggest minor hepatic resections if the patient has low postoperative risks but if major hepatic resection is needed or patient has high postoperative risks, operation time might be postponed (5).

Morbidity after pancreatic surgery could be high and this is mostly an aggressive tumor. The French group suggests operation only for low risk patients and only if resources are available for patient (5). For high risk group, they offer neoadjuvant chemotherapy. Gou et al. have reported four patients with pancreatic disease treated during the pandemic, and all were infected with COVID-19, one died, one was still in hospital and two were discharged, and mentioned the importance of preventing nosocomial infections during this process (7).

3. Management of Colorectal Cancer Patients

Yu et al. have reported their experience on the method of operation in colorectal cancer patients during the pandemic process (8). According to the opinions of the authors, in laparoscopic surgery, the surgeon's contact with the abdominal cavity will decrease and the aerosol emission overcome by electrical equipment will also decrease. Moreover, compared with total laparoscopic surgery, laparoscopic surgery with an auxiliary incision can reduce the operation time and thus the exposure time. Based on these ideas, Yu et al. recommends laparoscopy-assisted radical surgery for colorectal cancer patients during the pandemic but they highlight that the aerosols need to be strictly managed. They also underline that NOSES and TaTME procedures should be carried out cautiously and protective stomas should be carried out reasonably. There are very few publications on transmission of COVID-19 in open and minimally invasive surgery, and their level of evidence is low. There are points where laparoscopic and open surgery provide advantages and disadvantages to each other and there is no consensus in this regard. However, the only point provided by consensus is that risk reduction modifications must be provided, whether open

or minimal surgery (9). In this regard, the recommendations of the Turkish Surgical Society and Turkish Society of Colon and Rectum Diseases can be reviewed (10,11).

Hu et al. have reported their views on the management of pre-cancerous, early, locally advanced, obstructive, metastatic and neoadjuvant colorectal cancer patients during the pandemic process (12). Accordingly, they recommend symptom and colonoscopy follow-up once a month during the pandemic for polyps that are dysplastic and are not suitable for endoscopic resection. It is stated that treatment can be postponed in patients with early colorectal cancer after screening and evaluation, but surgical treatment, especially endoscopic resection, can be applied depending on the patient's intent to treat. In locally-advanced disease, it was emphasized that neoadjuvant therapy can be applied in both colon and rectum tumors, and time can be saved in this process. Chen et al. and the French group have made similar suggestions in their articles (4,5). A similar algorithm has been proposed for metastatic disease. However, the authors emphasize that the patient should be followed up with symptoms, tumor markers and imaging during the treatment and the necessity of surgery in case of progression. The necessity of surgery in obstructive colorectal cancer is unquestionable. The removal of the main tumor with ostomy or the application of a stent should be decided according to the patient. After all, Angelos et al. recommend traditional open method rather than laparoscopy for emergency colorectal surgery for their concern about airborne transmission of the virus (13). For patients who have completed neoadjuvant therapy and who need to make an appointment for radical surgery, it is recommended that patients be properly delayed during surgery and chemotherapy is performed during the waiting period. Generally, surgery is recommended to be performed 8 to 12 weeks after neoadjuvant chemoradiotherapy and can be extended up to 12 weeks for now.

Luo et al. have had several additional suggestions for colorectal surgery during the pandemic process (14). In this process, they have argued that respiratory department and infectious department should also be included in the multidisciplinary team. Because of the cross infection risk during the colonoscopy examination, they suggest giving priority to urgent and life-threatening cases.

Suggestions also appear in the same direction on the western side of the world (15). Pellino et al. remind us that 3-10 years survival is lower if treatment is started after more than 90 days from diagnosis for colorectal cancer (16). The ideal time of resection of colon cancer has been estimated to be between 3 and 6 weeks from diagnosis and the authors suggest that alternative treatment to radical surgery in very early-stage cancer or in very advanced disease should be discussed. In another study

by them, they hypothesize that laparoscopic surgery may be the approach of choice, and they find open and transanal approach hazardous because of aerosolized biological fluids (17). In fact, it is still not clear whether the virus can be found in the leaked CO₂ used for minimal invasive surgery.

De Felice et al. recommend short-course radiotherapy but delayed surgery after 5-13 weeks for locally-advanced rectal tumors (18). They have concluded that it has same results in terms of sphincter preservation and negative margins compared to immediate surgery but higher pathological complete response rates. With this plan, they state that the patient's hospital stay will be minimized.

4. Management of Oncological Emergencies

In fact, there is no difference between the management of oncological emergencies and management of other emergencies, except for a slight nuance differences. It is possible to encounter emergencies such as obstruction, perforation, bleeding and infection, as well as cancer related conditions such as nutritional disorders and jaundice during the pandemic. It is not possible to delay the operation in life-threatening situations. Therefore, the operation should be carried out by explaining the possible risks to the patients and their relatives. Recommendations of Gok et al. can be used for the management of emergency patients (19).

Except for these emergencies, patients with esophagogastric cancer may have emergencies such as bleeding and fistula. Conservative symptomatic treatment can be chosen in patients with mild bleeding and small fistula with minor systemic symptoms. In severe bleeding, interventional radiology, endoscopy or emergency surgery can be preferred. Patients with severe systemic infection caused by fistula should also be treated with drainage and medical therapy (2). Patients with hepatopancreaticobiliary cancer with jaundice and malnutrition, catheterization and drainage can be considered, if their operations will be postponed (6). The patient with colorectal bleeding can be approached in a similar way. Colorectal cancer patients with obstruction, perforation and massive bleeding should be operated immediately (20).

SUGGESTIONS of ASSOCIATIONS and ORGANIZATIONS

Before understanding the recommendations of the guides, it is necessary to review the classification of healthcare institutions according to COVID-19 patient density. This classification is presented in Table 2. Some of the world's leading associations and organizations have prepared some organ-based guidelines for the management of cancer patients in the pandemic process. Although these guidelines are similar to the study results, we think that they will give the physician an organized idea (Table 3-8).

Table 2. COVID-19 phases of hospital or healthcare systems

Phase		Description
0	Unaffected	No COVID-19 patients, hospital works properly.
1	Semi-Urgent	Few COVID-19 patients, hospital resources not exhausted, institution still has ICU ventilator capacity and COVID-19 trajectory not in rapid escalation phase.
2	Urgent	Many COVID-19 patients, ICU and ventilator capacity limited, OR supplies limited.
3	Emergent	Hospital resources are all routed to COVID-19 patients, no ventilator or ICU capacity, OR supplies exhausted.

Table 3. American College of Surgeons COVID-19 Guidelines for Triage of Colorectal Cancer Patients (<https://www.facs.org/covid-19/clinical-guidance/elective-case/colorectal-cancer>)

Phase I	Phase II	Phase III
<p>Cases that need to be operated as soon as feasible (recognizing status of each hospital likely to evolve over next week or two):</p> <ul style="list-style-type: none"> Nearly obstructing colon Nearly obstructing rectal cancer Cancers requiring frequent transfusions Asymptomatic colon cancers Rectal cancers after neoadjuvant chemoradiation with no response to therapy Cancers with concern about local perforation and sepsis Early stage rectal cancers where adjuvant therapy not appropriate <p>Diagnoses that could be deferred 3 months</p> <ul style="list-style-type: none"> Malignant polyps, either with or without prior endoscopic resection Prophylactic indications for hereditary conditions Large, benign appearing asymptomatic polyps Small, asymptomatic colon carcinoids Small, asymptomatic rectal carcinoids <p>Alternative treatment approaches to delay surgery that can be considered:</p> <ul style="list-style-type: none"> Locally advanced resectable colon cancer <ul style="list-style-type: none"> Neoadjuvant chemotherapy for 2-3 months followed by surgery Rectal cancer cases with clear and early evidence of downstaging from neoadjuvant chemoradiation <ul style="list-style-type: none"> Where additional wait time is safe Where additional chemotherapy can be administered Locally advanced rectal cancers or recurrent rectal cancers requiring exenterative surgery <ul style="list-style-type: none"> Where additional chemotherapy can be administered Oligometastatic disease where effective systemic therapy is available 	<p>Cases that need to be operated as soon as feasible (recognizing status of hospital likely to progress over next few days):</p> <ul style="list-style-type: none"> Nearly obstructing colon cancer where stenting is not an option Nearly obstructing rectal cancer (should be diverted) Cancers with high (inpatient) transfusion requirements Cancers with pending evidence of local perforation and sepsis <p>Cases that should be deferred:</p> <ul style="list-style-type: none"> All colorectal procedures typically scheduled as routine <p>Alternative treatment approaches:</p> <ul style="list-style-type: none"> Transfer patients to hospital with capacity Consider neoadjuvant therapy for colon and rectal cancer Consider more local endoluminal therapies for early colon and rectal cancers when safe 	<p>Cases that need to be operated as soon as feasible (status of hospital likely to progress in hours)</p> <ul style="list-style-type: none"> Perforated, obstructed, or actively bleeding (inpatient transfusion dependent) cancers Cases with sepsis <p>All other cases deferred</p> <p>Alternate treatment recommended</p> <ul style="list-style-type: none"> Transfer patients to hospital with capacity Diverting stomas Chemotherapy Radiation

Table 4. Society for Surgical Oncology Resource for Management Options of Colorectal Cancer During COVID-19 (<https://www.surgonc.org/wp-content/uploads/2020/04/Colorectal-Resource-during-COVID-19-4.6.20.pdf>)

Phase I	Phase II	Phase III
<p>Conditions for which operations to be deferred</p> <ul style="list-style-type: none"> • Benign colorectal polyps • Malignant colorectal polyps (focus of cancer within polyps) • Prophylactic procedures for hereditary (e.g. familial adenomatous polyposis) or inflammatory (e.g. inflammatory bowel disease) conditions <p>Conditions for which operations may be considered</p> <ul style="list-style-type: none"> • Emergency cases (as defined) • Non-metastatic colon cancer- curative intent surgery <ul style="list-style-type: none"> - Asymptomatic - Near-obstructing - Requiring frequent transfusions - Evidence of impending perforation • Non-metastatic rectal cancer <ul style="list-style-type: none"> - Early stage rectal cancer not appropriate for neoadjuvant/adjuvant therapy - Rectal cancers after neoadjuvant therapy with no response to therapy • Resectable oligometastatic disease <ul style="list-style-type: none"> - Exhausted effective systemic therapy 	<p>Conditions for which operations to be deferred</p> <ul style="list-style-type: none"> • All procedures for asymptomatic or minimally-symptomatic cancers <p>Conditions for which operations may be considered</p> <ul style="list-style-type: none"> • Emergency cases (as defined) • Significantly symptomatic cancers (e.g. severe pain) • Near-obstructing colon and rectal cancers <ul style="list-style-type: none"> - Consider diversion alone for rectal or complex colon cancers • Bleeding colorectal cancers with high transfusion requirements 	<p>Conditions for which operations to be deferred</p> <ul style="list-style-type: none"> • All procedures unless imminently life-threatening (death within hours without intervention) <p>Conditions for which operations may be considered</p> <ul style="list-style-type: none"> • Emergency cases (as defined) with no feasible alternative approach
<p>ALTERNATIVE CONSIDERATIONS AND APPROACHES TO DELAY SURGERY (ALL PHASES)</p> <ul style="list-style-type: none"> • Locally-advanced resectable colon cancer <ul style="list-style-type: none"> - Consider neoadjuvant chemotherapy • Locally-advanced resectable rectal cancer <ul style="list-style-type: none"> - Strong consideration of total neoadjuvant therapy (TNT) - For radiation component, strongly consider short course 5 x 5 Gy regimen (vs. long course chemoradiation) - With evidence of downstaging, delay surgery post-neoadjuvant therapy up to 12-16 weeks - Consider additional systemic chemotherapy if prolonged delay • Bleeding from cancer <ul style="list-style-type: none"> - Consider radiation treatment, embolization where appropriate • Near-obstructing cancers <ul style="list-style-type: none"> - Consider stenting where possible - Consider chemotherapy, radiation where possible • Resectable oligometastatic disease <ul style="list-style-type: none"> - Continue effective systemic therapy - Consider non-surgical ablative/embolic approaches where appropriate • Where possible, consider transfer of urgent patients to other facilities with capacity 		

Table 5. Society for Surgical Oncology Resource for Management Options of GI and HPB Cancers During COVID-19 (<https://www.surgonc.org/wp-content/uploads/2020/04/GI-and-HPB-Resource-during-COVID-19-4.6.20.pdf>)

Gastric and Esophageal Cancer		
<ul style="list-style-type: none"> • cT1a lesions amenable to endoscopic resection may preferentially undergo endoscopic management where resources are available. • cT1b cancers should be resected. • cT2 or higher and node positive tumors should be treated with neoadjuvant systemic therapy. • Staging laparoscopy with peritoneal washings is often utilized for patients being considered for neoadjuvant treatment. Given the recent concerns of laparoscopic surgery in COVID-19 patients and the additional use of resources, consideration may be given to proceeding straight to neoadjuvant treatment in COVID-19 positive patients, and if staging laparoscopy is decided to be performed, efforts to minimize PPE utilized and staff involved / exposed in the procedure should be made using appropriate pneumoperitoneum risk reduction strategies. • Patients finishing neoadjuvant chemotherapy may stay on chemotherapy if responding to and tolerating treatment, and resources do not support proceeding to resection. If patients are not responding to systemic treatment, resection and/or referral may be considered. • Patients with gastric outlet obstruction or hemorrhage may be treated with endoscopic measures to allow for enteral nutrition/ control of bleeding and proceed to surgery if these measures fail. • Surgery may be considered for short-term deferral in less biologically aggressive cancers, such as GIST, unless symptomatic or bleeding. 		
Hepato-pancreato-biliary Cancer		
Phase I	Phase II	Phase III
<p>Cases to be operated as soon as feasible</p> <ul style="list-style-type: none"> • Symptomatic and asymptomatic duodenal adenocarcinoma • Symptomatic and asymptomatic ampullary adenocarcinoma • Symptomatic and asymptomatic extra-hepatic cholangiocarcinoma • Symptomatic and asymptomatic intra-hepatic cholangiocarcinoma • Symptomatic and asymptomatic gallbladder adenocarcinoma • Pancreatic adenocarcinoma patients completing the projected course neoadjuvant therapy where more therapy may be detrimental to their health status • Pancreatic neuroendocrine carcinomas (small/large cell) completing the projected course neoadjuvant therapy where more therapy may be detrimental to their health status • Metastatic colorectal cancer to the liver completing the projected course neoadjuvant therapy where more therapy may be detrimental to their liver • Symptomatic low grade tumors <p>Cases to consider alternative therapies to safely delay surgery to a more stable time</p> <ul style="list-style-type: none"> • Consider neoadjuvant chemotherapy for large intra-hepatic cholangiocarcinoma that will require a major liver resection • Consider ablation, regional therapy procedures, or neoadjuvant therapy for hepatocellular carcinoma • Consider neoadjuvant therapy for all newly diagnosed pancreatic adenocarcinoma patients and extending planned neoadjuvant to total upfront therapy if patient tolerating regimen • Consider adding radiation to neoadjuvant chemotherapy protocols to delay surgery if warranted for biology by multi-disciplinary tumor boards • Staging/margin operations in incidentally detected gallbladder cancers on final pathology • Consider somatostatin analogues or regional therapy in newly identified liver metastasis in well-differentiated neuroendocrine in previously resected <p>Cases that should be deferred</p> <ul style="list-style-type: none"> • Asymptomatic pancreatic or duodenal well-differentiated neuroendocrine tumors • Asymptomatic duodenal and ampullary adenomas with or without high grade dysplasia • Asymptomatic GIST • Asymptomatic high risk IPMN or MCN pancreatic cysts • Hepatic adenomas, gallbladder confined polyps/masses, or indeterminate low- grade appearing neoplasms • Choledochal cysts • Metastatic renal cell cancer to pancreas or liver 	<p>Cases to be operated as soon as feasible</p> <ul style="list-style-type: none"> • Peri-ampullary tumors causing gastric outlet obstruction where endoscopic stenting is not a good option • Bleeding tumors that cannot safely be managed with interventional radiology, endoscopy, or radiation • Hormonally active neuroendocrine tumors, like insulinomas, that pose a major health threat untreated • If extended delay would potentially make an advanced tumor become unresectable and all other forms of therapy have been maxed out • Management of surgical complications if interventional approach not feasible <p>Cases that should be deferred</p> <ul style="list-style-type: none"> • Same cases from Phase 1 • All asymptomatic tumors from Phase 1 <p>Alternative treatment approaches recommend</p> <ul style="list-style-type: none"> • All delayed approaches suggested in Phase 1 • Consider neoadjuvant chemotherapy in tumors that you otherwise would not give chemotherapy upfront if could do so safely • Consider adding radiation to tumors that you otherwise would not give radiation to if could do so safely • SBRT to liver metastasis • Consider regional liver therapy for extended indications to bridge to a later surgery • Consider neoadjuvant hormone therapy where appropriate • Observation in low grade tumors 	<p>Cases to be operated as soon as feasible</p> <ul style="list-style-type: none"> • Management of surgical complication if interventional approach not feasible • Bleeding tumors that cannot safely be managed with interventional radiology, endoscopy, or radiation • Any tumor with acute perforation that can be salvaged operatively <p>Cases that should be deferred</p> <ul style="list-style-type: none"> • All HPB tumors <p>Alternative treatment approaches recommend</p> <ul style="list-style-type: none"> • Same as above

Table 6. Society of American Gastrointestinal and Endoscopic Surgeons Recommendations Regarding Surgical Management of Gastric Cancer Patients During the Response to the COVID-19 Crisis (<https://www.sages.org/sages-recommendations-surgical-management-gastric-cancer-covid-19-crisis/>)

Gastric Cancer

T1a cancers - these patients may be candidates for EMR or ESD and referring them for a same-day procedure. These may be considered in Phase I depending on hospital resources. If not, then weekly "check-ins" to reassess the stage are reasonable to find the best "window". In Phase II - III, these should be deferred. Also note, there are concerns for aerosolization with endoscopic procedures (EMR/ESD) and thus we recommend delaying these procedures and ensuring patient is COVID-19 negative.

T1b and T2 cancers - these patients need surgery, however, a 4-6 week window to time the operation when hospital resources are optimal (relatively-speaking) is reasonable. Minimally invasive options are preferable as they will likely decrease the length of stay in the hospital.

T3 or higher cancers, or those who are clinically node positive - these are patients in whom neoadjuvant chemotherapy is recommended, allowing physicians a 3-4 month window to plan surgery (likely after the crisis phase has passed).

Staging Diagnostic Laparoscopy - although patients with this stage of gastric cancer typically have staging with diagnostic laparoscopy prior to the initiation of chemotherapy to rule out occult metastatic disease, if hospital resources and space are critical at the time and the patient is at higher risk due to age or comorbidities, then consideration for proceeding straight to chemotherapy is reasonable. Plan for diagnostic laparoscopy after chemotherapy is completed and prior to operation.

Obstructing and Bleeding Gastric Cancers - for gastroesophageal junction cancers, immediate initiation of chemotherapy and radiation therapy may obviate the need for a stent for gastric outlet obstructions. If the obstruction is complete and the patient requires admission to a hospital, then proceed with gastrectomy. However, for near-complete obstructions, chemotherapy may improve the ability to eat within 2-3 days. Avoid stents as they make as they could make subsequent procedures more challenging.

For a bleeding lesion, non-surgical approaches (IR and or endoscopy) should be attempted first. When not able to control otherwise, a surgical resection may be indicated.

Patients who have completed Neoadjuvant treatment and are Waiting for Surgery - these patients are difficult to manage, although from last chemotherapy to operation there is a window of 3-6 weeks during which surgery can be planned without losing the opportunity for potential cure. For some patients, consider speaking with the medical oncologist about adding an additional 1-2 cycles of chemotherapy to bridge the patient through the worst of the pandemic crisis and plan surgery there after.

Table 7. Society of American Gastrointestinal and Endoscopic Surgeons - AHPBA Recommendations Regarding Surgical Management of HPB Cancer Patients During the Response to the COVID-19 Crisis (<https://www.sages.org/sages-ahpba-recommendations-surgical-management-of-hpb-cancer-covid-19/>)

Organ	Clinical Situation	Phase I	Phase II	Phase III
Liver	HCC Very early stage (0)/Early Stage (A)/< 3 cm * For later stages consider TACE, Medical therapy, supportive care as appropriate	Consider ablation/resection/transplant as appropriate	Consider TACE, ablation, or observation (ie delay of definitive tx)	
	Colorectal mets	Consider chemotherapy vs. resection	Chemotherapy	
Biliary	Intrahepatic cholangiocarcinoma	Consider chemotherapy vs. resection	Consider chemotherapy, embolic therapy	
	Hilar cholangiocarcinoma	Stenting as indicated. Resection, transplantation as indicated	Stenting as indicated. Consider chemotherapy, chemoradiation, and/or transfer	
Pancreatic and extra-hepatic biliary	Resectable	Resection or consider chemotherapy	Neoadjuvant chemotherapy	
	Borderline	Neoadjuvant chemotherapy		
	Pancreatic IPMN, cysts, low-mod grade neuroendocrine neoplasms	All: observation (i.e. delay surgical management) Neuroendocrine: if metastatic or progressing, consider targeted therapy		

Table 8. Society of American Gastrointestinal and Endoscopic Surgeons Recommendations Regarding Surgical Management of Colorectal Cancer Patients During the Response to the COVID-19 Crisis (<https://www.sages.org/recommendations-surgical-management-colorectal-cancer-covid-19/>)

Clinical Situation	Phase I	Phase II	Phase III
Large or suspicious polyps Hereditary syndromes Dysplasia/Carcinoma in situ in biopsy specimens, Incomplete, questionable margins on polypectomy	For COVID-19 Phase I - III Hospitals surgery would be delayed until the pandemic abates and resources return		
Early cancer in resected polyp	Consider deferring surgery vs. resection	Defer Surgery	
Asymptomatic Cancer T1-2 N0	Resect	Resect vs. deferring surgery	Defer surgery
Asymptomatic Cancer Colon T3-4, N0 and Tx N+	Resect	Resect vs. deferring surgery	Consider chemotherapy vs. transfer
Rectal T3-4, N0 and Tx N+	Induction chemotherapy versus chemoradiation versus radiation, consider extended chemotherapy, also consider delaying surgery up to 12-16 weeks following completion of radiation		
Symptomatic cancers defined as bleeding requiring transfusion, obstructing or near-obstructing, impending perforation	Resect	Resect, consider stent vs. stoma	Stoma vs. stent, consider transfer

CONCLUSIONS and RECOMMENDATIONS to TURKISH SURGEONS DEALING with GASTROINTESTINAL CANCERS

- To help prevent the spread of the virus, control of staff mobility and measures to reduce the number of accepted patients to the hospital, available service and intensive care capacity and number of ventilators should be the largest determinant of the surgeon's ability to perform oncologic surgeries. An isolated unit, operating room and team can be created for oncologic patients to continue operations, if possible.
- The level of exposure of the hospital with COVID-19 and the upcoming action plan should be known and the operation plan of oncological patients should be decided accordingly.
- All patients with malignancy should be informed according to the recommendations of the guides and the treatment plan should be decided together with the patient and the patient's family. In accordance with the guidelines, the operation of suitable patients should be postponed as much as possible, and the age and comorbidities of the patient and the postoperative risk of the surgery should be taken into consideration in patients to undergo surgery. Again, appropriate cases could be directed to secondary therapies in line with the guidelines. In this group of patients, a multidisciplinary oncology team must make the decision. Patients whose operation is postponed or directed to secondary treatment should be called for routine control.
- An informed consent form must be obtained from all malignant patients who will be operated and hospitalized regarding COVID-19 infection and its predicted risks.

5. There are very few studies on viral transmission in open or minimally invasive surgery, and the evidence levels of these studies are low. Laparoscopic surgery seems to be advantageous both in terms of low risk to the patient and early post-operative discharge time. However, the risk of transmission by gases that spread from the abdomen to the operating room environment and put the instruments and items in the operating room and other personnel at risk is not clear yet. Open surgery is advantageous because it reduces the duration of surgery and minimizes the risk of transmission to non-operating personnel. However, the risk of direct contact with body fluids and the transmission of fume from the energy devices used is not yet clear. Until otherwise indicated, all surgeons must take precautions for COVID-19 spread related to the surgical method to be performed in the operating room (endoscopic/minimally invasive/open).

6. In these difficult times, every surgeon should remember that there is always another surgeon who will help himself or herself in every subject and condition, and should not hesitate to seek help. We are all in this together.

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REFERENCES

- Liang W, Guan W, Chen R, Wang W, Li J, Xu K, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. *Lancet Oncol* 2020; 21(3): 335-7.
- Li Y, Qin JJ, Wang Z, Yu Y, Wen YY, Chen XK, et al. Surgical treatment for esophageal cancer during the outbreak of COVID-19. *Zhonghua Zhong Liu Za Zhi* 2020; 42(0): E003. doi: 10.3760/cma.j.cn112152-20200226-00128.
- Ma FH, Hu HT, Tian YT. Surgical treatment strategy for digestive system malignancies during the outbreak of novel coronavirus pneumonia. *Zhonghua Zhong Liu Za Zhi* 2020; 42(0): E001. doi: 10.3760/cma.j.cn112152-20200223-00117.
- Chen YH, Peng JS. Treatment strategy for gastrointestinal tumor under the outbreak of novel coronavirus pneumonia in China. *Zhonghua Wei Chang Wai Ke Za Zhi* 2020; 23(2): 1-4
- Tuech JJ, Gangloff A, Di Fiore F, Michel P, Brigand C, Slim K, et al. Strategy for the practice of digestive and oncological surgery during Covid-19 epidemic. *J Visc Surg* 2020 March 31. doi: 10.1016/j.jvisc-surg.2020.03.008.
- Wu F, Song Y, Zeng HY, Ye F, Rong WQ, Wang LM, et al. Discussion on diagnosis and treatment of hepatobiliary malignancies during the outbreak of novel coronavirus pneumonia. *Zhonghua Zhong Liu Za Zhi* 2020; 42(0): E004. doi: 10.3760/cma.j.cn112152-20200227-00137.
- Gou SM, Yin T, Xiong JX, Peng T, Li Y, Wu HS. Treatment of pancreatic diseases and prevention of infection during outbreak of 2019 coronavirus disease. *Zhonghua Wai Ke Za Zhi* 2020; 58(0): E006. doi: 10.3760/cma.j.cn112139-20200224-00123.
- Yu GY, Lou Z, Zhang W. Several suggestions of operation for colorectal cancer under the outbreak of Corona Virus Disease 19 in China. *Zhonghua Wei Chang Wai Ke Za Zhi* 2020; 23(3): 208-11.
- Vigneswaran Y, Prachand VN, Posner MC, Matthews JB, Hussain M. What is the appropriate use of laparoscopy over open procedures in the current COVID-19 climate? *J Gastrointest Surg* 2020 Apr 13. doi: 10.1007/s11605-020-04592-9.
- Karaca AS, Ozmen MM, Uçar AD, Yastı AÇ, Demirel S. General surgery operating room practice in patients with COVID-19. *Turk J Surg* 2020; 36(1). doi: 10.5578/turkjsurg.202001.
- Kamer E, Çolak T. What to do when a patient infected with COVID-19 needs an operation: a pre-surgery, peri-surgery and post-surgery guide. *Turk J Colorectal Dis* 2020; 30: 1-8.
- Hu XH, Niu WB, Zhang JF, Li BK, Yu B, Zhang ZY, et al. Thinking of treatment strategies for colorectal cancer patients in tumor hospitals under the background of coronavirus pneumonia. *Zhonghua Wei Chang Wai Ke Za Zhi* 2020; 23(3): 201-8.
- Angelos G, Dockter AG, Gachabayov M, Latifi R, Bergamaschi R. Emergency colorectal surgery in a COVID-19 pandemic epicenter. *Surg Technol Int* 2020 Apr 14; 36. pii:sti36/1297.
- Luo Y, Zhong M. Standardized diagnosis and treatment of colorectal cancer during the outbreak of corona virus disease 2019 in Renji hospital. *Zhonghua Wei Chang Wai Ke Za Zhi* 2020; 23(3): 211-6.
- Di Saverio S, Pata F, Gallo G, Carrano F, Scorza A, Sileri P, et al. Coronavirus pandemic and colorectal surgery: practical advice based on the Italian experience. *Colorectal Dis* 2020 March 31. doi: 10.1111/codi.15056.
- Pellino G, Spinelli A. How COVID 19 outbreak is impacting colorectal cancer patients in Italy: a long shadow beyond infection. *Dis Colon Rectum* 2020 March 17. doi: 10.1097/DCR.0000000000001685.
- Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. *Br J Surg* 2020 March 19. doi: 10.1002/bjs.11627.
- De Felice F, Petrucciani N. Treatment approach in locally advanced rectal cancer during Coronavirus (COVID-19) pandemic: long course or short course? *Colorectal Dis* 2020 April 1. doi: 10.1111/codi.15058.
- Gok AFK, Eryilmaz M, Ozmen MM, Alimoglu O, Ertekin C, Kurtoglu MH. Recommendations for trauma and emergency general surgery practice during COVID-19 pandemic. *Ulus Travma Acil Cerrahi Derg* 2020; 26(3): 335-42.
- Akyol C, Koc MA, Utkan G, Yildiz F, Kuzu MA. The COVID-19 pandemic and colorectal cancer: 5W1H- What should we do to whom, when, why and how? *Turk J Colorectal Dis* 2020; 30: 67-75.

**DERLEME-ÖZET**

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2019 koronavirüs hastalığı sırasında sindirim sistemi kanserlerinin cerrahi yönetimi: genel önerilerin gözden geçirilmesiMuhammet Kadri Çolakoğlu¹, Volkan Öter¹, Erdal Birol Bostancı¹, Mehmet Mahir Özmen², Kaya Sarıbeyoğlu³¹ Sağlık Bilimleri Üniversitesi Ankara Şehir Hastanesi, Gastrointestinal Cerrahi Bölümü, Ankara, Türkiye² İstinye Üniversitesi Tıp Fakültesi, Genel Cerrahi Anabilim Dalı, İstanbul/Liv Hospital Ankara, Genel Cerrahi Bölümü, Ankara, Türkiye³ Carl-thiem-klinikum, Cerrahi Bölümü, Cottbus, Almanya**ÖZET**

Aralık 2019 tarihinden bu yana dünya COVID-19 salgınıyla mücadele etmekte ve sağlık çalışanları mücadelenin ön saflarında yer almaktadır. Cerrahlar da bu süreçte görevlerini yerine getirmektedir, ancak koronavirüsle mücadelede kaynakları uygun bir şekilde kullanmak için elektif olguların ertelenmesi gerekmektedir. Benign elektif cerrahi işlemler, pandemi sırasında uzak bir zamana ertelenebilmesine rağmen, acil ve hayatı tehdit eden durumlara yönelik cerrahi müdahalelerin yapılması zorunlu olmakla birlikte, cerrahlar arasındaki esas belirsizlik kanser hastaları ile ilgilidir. Bu yazıda, pandemi sırasında sindirim sistemi kanserlerine nasıl yaklaşılması gerektiği, ilgili makaleler ve kılavuzlar ışığında gözden geçirilerek, cerraha bir öneri sunmak amaçlanmıştır.

Anahtar Kelimeler: COVID-19, koronavirüs, pandemi, sindirim sistemi, kanser, malign**DOI:** 10.5578/turksurg.4812