Triage of General Oncological Surgery During COVID-19 Pandemic

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ABSTRACT
A world wide pandemic of COVID 19 has been affected by the global health system of the majority of the world. The significant burden of the pandemic results in severe damage to several steps of health supply. Although significant health authorities and surgical societies gave the rapid response to this world wide outbreak, major concerns emerge for emergency and oncological cases which could be life-threatening on this sophisticated chaotic crisis environment. Local precautions should be considered on this outbreak when every country and geographical region may manage its resources with severe limitations. In this review, we try to collect recommendations about the triage of general surgical cancer care which are emphasized by the Turkish surgical community and world oncological societies up to date.

Key words: triage; COVID 19; oncological surgery; general surgery

Introduction
Since January 2020, a world-wide pandemic of COVID 19 was announced by WHO (World Health Organization) and which primarily results in pneumonia with a range of symptoms and disease course. This virus outbreak has been changed the whole human-related life issues starting from health issues. First Chinese physicians and scientist try to describe the disease characteristics, and many guidelines and recommendations have been updated for diagnostic and treatment processes. Disease-specific recommendations have emerged since the epidemiological data was revealed that this virus-led infectious disease would most likely affect the immuno-compromised patients. In early studies published in China revealed cancer patients have a twofold increased risk of COVID-19 infection. Nevertheless, the fatality rate of COVID-19 patients with pre-existing malignancy is higher than patients without any comorbid conditions. Disease severity is also increased in cancer patients with COVID-19 infection. So the management of cancer therapy needs careful triage of case and disease-specific considerations.

Surgical and cancer societies from different countries have been published in several general and cancer-type specific recommendations so far. There are many aspects and issues which oncological and surgical care have to be evaluated more carefully in this pandemic era when COVID-19 precautions have been added additional burden and responsibility to both physicians and patients. In this narrative review, we try to assess both general oncological principles and cancer-type specific recommendations during COVID 19 Pandemia.
Review of Available Recommendations

A. General Considerations

1) Issues related to country and human resources
There are many challenges to encounter during the pandemic. Primary of them is the optimal use of health staff across the country. Some oncology teams might work as common care givers during the pandemic. So careful planning should be made to organize of cancer physician is necessary. Another critical issue is to ensure a suitable health environment which results in minimal interruption of cancer therapies, especially for patients whose disease are in a curative stage.

Finding available resources of medical therapeutics might be problematic during this outbreak. This could lead to a significant negative impact on cancer care. For some cancers, there are a few options of drugs for clinical preferences and drug shortages may be life-threatening. In such a case, it is meaningful to use all available resources to cases which are really presented as an emergency

2) Issues related to local/hospital resources
According to ACS (American College of Surgeons) Elective Case Triage Guidelines for Surgical Care there are 3 Phases of hospitals regarding the feasibility of resources including ICU beds, number of available ventilators etc. during COVID-19 pandemic. Surgical cases should be evaluated according to these phases of the local hospital.

Phase 0: No COVID-19 patients, hospital operating as normal

Phase 1: Semi-Urgent Setting (Preparation Phase). Few COVID-19 Patients, hospital resources not exhausted, there are enough ICU ventilator capacity, COVID case trajectory not in the rapid escalation phase

Phase 2: Urgent Setting. Many COVID-19 Patients, ICU beds and ventilator capacity limited, OR supplies limited or COVID case trajectory within the hospital in rapidly escalating phase

Phase 3: All hospital resources devoted to COVID-19 patients, no ventilator, ICU beds, OR supplies exhausted.

3) Issues related to patient factors
The previous medical history and age are essential factors to be assessed before analyzing the relative risk of hospitalization which can lead to increased COVID-19 transmission, so a decision which weighs the benefit more than the risk like neoadjuvant chemotherapy rather than operation.

Patients should be evaluated for ICU need or perioperative potential morbidity risk requiring long hospitalization before any surgical attempt. If the hospital resources are not enough to even for COVID-19 patients, elective oncological cases could be deferred.

The patient’s informed consent for surgery is more essential during the pandemic. The COVID-19 specific health risks should be added the informed consent, and overall risks should be clearly discussed with the patient and the family.

4) Issues related to cancer-specific factors
ACS released “Guidance for Triage of non-Emergent Surgical Procedures” and evaluated cancer patients with “ESAS (Elective surgery acuity scale) Tiersystem” (Table 1). This system evaluates both malignant and non-malignant cases according to the urgency of the operation. Although there are no rigid approaches for non-malignant elective surgeries during the pandemic, patients with cancer who have possible curative surgery on preoperative evaluation should undergo surgery if the delay of surgical therapy more than three months leads adverse oncological outcomes to the patient.

In modern cancer care, the oncological therapy of the patient had been evaluated by a multidisciplinary team, including the surgeon, medical oncologist, radiation oncologist, pathologist, nuclear physician. In this pandemic era, multidisciplinary meetings should be made on online fashion without any need of specific time, and all cancer cases should be evaluated on its own biologic nature.

Considering the ESAS tierscale, many cancer patients might be considered as Tier2a or Tier 2b. After a careful evaluation by a multidisciplinary team surgeon should consider alternative measures in case of high-risk features related to patient, environment and resources. Cases considered as Tier 3a or Tier 3b should undergo available procedures to solve the urgent condition.

B. Cancer Type-Specific Considerations

Most gastrointestinal cancer surgeries are not elective. Urgent cases should be done with precautions against COVID-19 transmission risk, which are nicely detailed in previous studies. If there sources of the hospital are not adequate to perform and manage possible
perioperative complications, the surgery should be delayed, or the patient should be referred to a centre with eligible resources.7.

1) Gastric and oesophagal cancer
After evaluating hospital COVID 19 phase response when both surgery and non-surgical alternatives could be possible options for Phase 1, but for Phase 2–3 surgery should be delayed until the pandemic rates diminish and resources are eligible. On Table 2 possible treatment options of gastric cancer were detailed according to cancer stage5,7.

2) Hepato-pancreato-biliary (HPB) cancers
These are cancers which are usually not considered as elective operations and have aggressive biologic behaviour. After a rapid evaluation of the hospital phase response, every single case should be managed by a multidisciplinary team where surgery remains the mainstay of curative treatment. The other “next better options” could be practised by this team. For liver cancers chemotherapy, ablative techniques (percutaneous, MIS, open with thermal/non-thermal), embolic therapies (radioembolization, TACE), radiosurgery, biliary stents may

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**Table 1. Elective surgery acuity scale (ESAS) Tier protocole**

| Tiers/Description | Definition | Locations | Examples | Action |
|-------------------|------------|-----------|----------|--------|
| Tier 1a           | Low acuity surgery/healthy patient | HOPD | EGD | Postpone surgery or perform ASC |
|                   | Outpatient surgery                      | ASC | Colonoscopy            |        |
|                   | Not life-threatening illness          |      |                      |        |
| Tier 1b           | Low acuity surgery/unhealthy patient   | HOPD | EGD | Postpone surgery or perform ASC |
|                   | Hospital with low/no COVID-19 census  | ASC | Colonoscopy            |        |
| Tier 2a           | Intermediate acuity surgery/healthy patient | HOPD | Low risk of cancer | Postpone surgery if possible consider ASC |
|                   | Not life-threatening but potential for future morbidity and mortality | ASC | Non-urgent orthopaedic, urologic operations |        |
|                   | Requires in-hospital stay              | Hospital with low/no COVID-19 census |        |        |
| Tier 2b           | Intermediate acuity surgery/unhealthy patient | HOPD | Low risk of cancer | Postpone surgery if possible consider ASC |
|                   | Hospital with low/no COVID-19 census  | ASC | Non-urgent orthopaedic, urologic operations |        |
| Tier 3a           | High acuity surgery/healthy patient    | Hospital | Most cancers | Do not postpone |
|                   | Highly symptomatic patients            |      | Highly symptomatic patients |        |
| Tier 3b           | High acuity surgery/unhealthy patient  | Hospital | Most cancers | Do not postpone |

HOPD: Hospital Outpatient Department, ASC: Ambulatory Surgery Center

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**Table 2. Gastric cancer treatment during COVID-19 pandemic**

| Clinical Situation | Treatment |
|-------------------|-----------|
| T1a               | Phase 1. ESD/EMR when eligible resources  |
|                   | Phase 2-3: Defer the procedure and weekly reassessment  |
| T1b and T2 without clinically positive lymph node | Surgical resection; however, a 4-6 week time to operation is reasonable until best optimal resources enabled. |
| T2 with positive lymph node or T3 or higher Grade Cancers | Neoadjuvant chemotherapy is recommended |
| Patients after neoadjuvant treatment | After neoadjuvant therapy 3-6 weeks to surgery but on a multidisciplinary fashion an additional 1-2 cycles of chemotherapy can be added during the pandemic crisis |
| Complicated Cases | Cancers non-responsive to therapy should be considered for surgery |
| For proximal tumours with incomplete obstruction chemoradiotherapy may obviate the need for a stent and diminish bleeding |
| For complete obstruction, surgery could be warranted |
be optimal choices with/without surgery. For pancreato-biliary cancers, chemotherapy, radiation therapy, targeted immunotherapies may be optimal “next better options” besides resection (MIS, open) and transplantation (biliarycancers). Table 3 shows treatment options according to the hospital phase response.9

3) Colorectal cancers
“Turkish Society of Colon and Rectal Cancer Surgery” published Colo-Rectal Cancer Management Guideline during COVID-19 Pandemic. Colorectal cancer therapy has many options to perform.

Tailored colorectal cancer treatment was proposed regarding patients risks, clinical presentation, tumour characteristics, surgical risk factors and current situation of the healthcare system.9 These recommendations could be integrated with ACS Hospital Phase Response system and ESAS Tier based system. Treatment options were shown in Table 4.10,11

| Table 3. Treatment for HPB cancers during pandemic |
|-----------------------------------------------|
| Cancer Site | Clinic | Phase 1 | Phase 2 | Phase 3 |
| Liver | HCC Early-stage Later stages | Ablation, resection, transplantation | TACE, ablative, careful lobervation |
| Colorectal Mets | | | |
| Biliary | | | |
| Intrahepatic Cholangiocarcinoma | | | |
| Hilar cholangiocarcinoma | | | |
| | Resection for Tier 2a, chemotherapy for Tier 2b or greater | Chemotherapy |
| | Resection for Tier 2a, chemotherapy for Tier 2b or greater | Chemotherapy, embolotherapy |
| | Stenting | Stenting |
| | Resection and transplantation if indicated | Chemotherapy, chemoradiation and/or transfer to an eligible unit |
| Pancreatic | Resectable | Resection or chemotherapy | Neoadjuvant chemotherapy |
| Extra-hepaticbiliary | Borderline | Neoadjuvantchemotherapy | Neoadjuvant chemotherapy |
| Extra-pancreatic | Pancreatic IPMN, cysts, low-moderate grade neuroendocrine tumours | All observation/delay in the surgical management | For neuroendocrine metastatic/progressive tumours targeted therapy |

| Table 4. Treatment options for colorectal cancer patients during COVID-19 pandemic |
|-----------------------------------------------|
| Clinical Condition | Phase 1 | Phase 2 | Phase 3 |
| Large suspicious polyps, hereditary syndromes, dysplasia/carcinoma in situ in biopsy specimens, incomplete margins on polypectomy | All off these entities would be evaluated as Tier 1 or 2a and specific surgeries might be delayed for COVID-19 Phase 1-3 Hospitals until pandemic subsides. | Defer surgery or Resection | Defer Surgery |
| Early cancer found on resected polyp: Tier 2 | | | |
| Asymptomatic Cancer T1-2 N0 (Tier 2) | Defer surgery or Resection | Resect or defer surgery | Defer Surgery |
| Asymptomatic Cancer Colon T3-4, N0 and Tx N+ (Tier 2) | Resect | Resect or defer surgery | Chemotherapy or transfer to an eligible reference unit in Phase 0-2 |
| Rectal T3-4, N0 and Tx N+ (Tier 2) | Induction chemotherapy or chemoradiation or radiation, Extended chemotherapy if the tumor response well | Defer surgery up to 12-16 weeks after completion of radiation | |
| Symptomatic Cancers (Tier 3) defined as bleeding requiring transfusion, obstructing or near-obstructing, impending perforation. | Resection | Resection | Stoma or endoscopic stenting Transfer to an eligible reference unit in Phase 0-2 |
Alternative treatment options specific for colorectal cancer patients may include neoadjuvant chemotherapy for locally advanced resectable colon cancer; total neoadjuvant therapy for locally advanced resectable rectal cancer; and extended delay of surgery to 12–16 weeks after neoadjuvant radiotherapy. For bleeding cancer cases, radiotherapy and embolization are other options. Cases of near-obstructing tumor are eligible for endoscopic stenting and chemo-radiotherapy where possible. For resectable oligo-metastatic disease, therapy could be go on with systemic therapy and ablative/embolic approaches could be alternative options. Primary anastomosis in high risk patients (ultra-low anastomoses, diabetics, preoperative radiotherapy, elderly must be avoided.

Another ongoing debate for minimal invasive surgery (MIS) vs. open surgery was still on track. When viral spread via carbon dioxide aerosolization during MIS approaches entails a concerning risk, the choice of operation type must be evaluated in the context of patient benefit, available resources like smoke filters against viral transmission and protective equipment for personnel.

### 4) Breast cancers

Unlike the gastrointestinal cancers, selected breast cancer surgery could be deferred. Oncological and hormonal therapy may have priority during this outbreak. General recommendations were shown in Table 5. In some situations like proceeding surgery vs neoadjuvant chemotherapy which might lead the patient to an immuno-compromised state, a multidisciplinary based, individualized approach is needed according to local resources. Although the radiation oncology unit might be closed during the pandemic breast-conserving therapy should be encouraged when possible. For all phases, autologous reconstructions should be deferred.

Nevertheless, there are still a few emergencies for breast cases. Patients with progressive disease on systemic treatment, angiosarcoma and malignant phyllodes tumor should be considered as breast emergencies and not be deferred.

### 5) Endocrine cancers

Most of the endocrine cancer operations can be delayed. Urgent surgery for endocrine cancers have interferred as surgery required within 4–8 weeks during

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**Table 5. Treatment options for breast cancer patients during COVID-19 pandemic**

| Clinical Situation | Phase 1 | Phase 2 | Phase 3 |
|-------------------|---------|---------|---------|
| **Cases to be done as soon as eligible resources** | | | |
| Patients after neoadjuvant treatment | Breast abscess requiring incision and drainage | Breast abscess requiring incision and drainage |
| Clinical stage T2 or N1 Estrogen(ER) / Progesterone(PR) / HER2 negative tumors | Breast abscess requiring incision and drainage | Breast abscess requiring incision and drainage |
| Triple-negative or HER2 positive tumors | Hematoma drainage | Hematoma drainage |
| Excision of malignant recurrence | Revision for ischemic flap after mastectomy | Revision for ischemic flap after mastectomy |
| Biopsies likely to be malignant | | |
| **Cases to be deferred** | | | |
| Excision of benign lesions | All breast operations | All breast operations |
| Biopsies likely to be benign | | |
| High risk lesions (Atypia, papillomas) | | |
| Prophylactic cancer/non-cancer surgeries | | |
| cTisN0 lesions - ER positive and negative | | |
| Re-excision surgery | | |
| Tumors responding to neoadjuvant hormonal treatment | | |
| Clinical Stage T1N0 ER/PR positive and Her2 negative tumors which might receive hormonal therapy | | |
| Inflammatory and locally advanced cancers when patients should receive neoadjuvant therapy | | |
| **Alternative options (When resources eligible)** | | | |
| T1 NO ER/OR positive and Her2 negative tumors can receive hormonal therapy* | Neoadjuvant therapy for eligible patients | Neoadjuvant therapy for eligible patients |
| For triple-negative and Her2 positive tumors neoadjuvant therapy | Observation | Observation |
| Some of T2 N1 ER/PR positive and Her two negative tumors are candidates for hormonal therapy* | | |

*Some patients with early-stage ER-positive tumors do not have a response to chemotherapy well. Amongst them are patients with stage 1 or some stage 2 cancers, low-intermediate grade tumors, lobular carcinomas, low Oncotype DX scores (<25), luminal A cases. There is significant clinical evidence supporting primary endocrine therapy lasting 6–12 months before surgery.
The caregivers should minimalize cancer patients exposure to the healthcare facilities. In case of positive COVID 19 test of any cancer patient, infection treatment should be prioritized over oncological therapy except urgent surgical needs. The therapy must be individualized to diminish perioperative risks. Diagnostic tools like endoscopic and interventional procedures should be tailored for suspected cases. Psychological aspects of cancer patients should be evaluated primarily when their concerns about treatment delay and isolation result in psychological and even physical fear.

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###Table 6. Urgent endocrine surgery cases to be done during COVID 19 pandemic

| Cancer Type      | Urgent Cases (Cases to be done within 4-8 weeks during the pandemic)                                                                 |
|------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Thyroid          | Life-threatening cases with local invasion (trachea, recurrent laryngeal nevre etc), aggressive biology (rapidly growing tumors, recurrence, rapidly progressive local-regional disease) |
|                  | Symptomatic Graves Disease when medical treatment failure                                                                          |
|                  | Giant goitre which leads airway obstruction                                                                                         |
|                  | Highly suspicious cases for anaplastic thyroid cancer and lymphoma requiring open biopsy                                           |
| Parathyroid      | Cases of hyperparathyroidism with severe hypercalcemia unresponsive to medical treatment                                          |
| Adrenal          | Adrenocortical cancer or highly suspicious cancer                                                                                   |
|                  | Cases of pheochromocytoma or paraganglioma which are unable to control with medical therapy                                         |
|                  | Cases of symptomatic Cushing’s syndrome which are unable to control with medical therapy                                            |
| Neuroendocrine Tumors (NET’s) | Small bowel NETs which are symptomatic like obstruction, bleeding, ischemia                                              |
|                  | Functional and symptomatic NETs of the pancreas which are unable to control with medical therapy                                   |
|                  | Symptomatic non-functional NETs of the pancreas which are unable to control with somatostatin analogues                           |
| Other            | Endocrine surgeries in pregnant women should not be delayed for potential harm to mother or foetus when medical therapy fails |

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Due to the increased risk of cancer patients to infections, their oncological therapy should be managed by outpatient fashion as soon as eligible. Hospitalizations should be devoted to new cancer patients and symptomatic patients primarily. Virtual visits by telephone should be encouraged. Classical visits should be performed by minimum required health staff, cancer surgeries should be underwent by minimum required surgical teams wearing full personal protective equipment described by societies. ERAS protocols might be enabled for all cancer patients and outpatient surgeries might be prioritized. MIS for cancer should be undertaken after evaluating possible risk and benefits regarding the hospital resources.

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ECCO (European Cancer Organization) has indicated that the health care providers should provide a COVID-19 test for all cancer patients who are receiving any kind of oncological therapy. Cancer patients who might have possible contact within 14 days and who have classic COVID-19 symptoms should be analyzed. A low-threshold to order a thorax CT could be feasible in case of discrepancy between clinical findings and the testing.

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