DERLEME / *REVIEW*

Triage of General Oncological Surgery During COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Genel Onkolojik Cerrahide Triaj

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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*

ÖZET

Dünya çapında COVID 19 adında bir salgın global sağlık sistemini etkilemektedir. Sağlık zinciri bir çok aşamada pandeminin yol açtığı ciddi bir yük taşımaktadır. Dünya sağlık otoriteleri ve cerrahi dernekler bu pandemiye hızla cevap verip kılavuzlar hazırlasalar da, kaotik kriz ortamında yaşamı tehdit eden acil ve onkolojik cerrahi vakaların yönetimiyle ilgili ciddi bir endişe söz konusudur. Her ülkenin elindeki tıbbi kaynakları ciddi kısıtlamalarla kullandığı bu ortamda yerel önlemlerin alınması önem kazanmıştır. Bu derlemede genel cerrahi kanser vakalarının yönetiminde Türk ve dünya onkolojik cerrahi dernekleri tarafından ortaya konan kılavuz önerileri ortaya konulmuştur.

Anahtar kelimeler: *triaj; COVID 19; onkolojik cerrahi; genel cerrahi*

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[1,2]. 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[3]. 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.

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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[3].

2) Issues related to local/hospital resources

According to ACS (AmericanCollege 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[4].

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 thefamily[5].

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 not 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[3].

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[4–6].

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[1,2]. 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 stage[5,7].

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 beter options" could be practised by this team. For liver cancers chemotherapy, ablativetechniques (percutaneous, MIS, open with thermal/non-thermal), embolic therapies (radioembolization, TACE), radiosurgery, biliary stents may

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

Tiers/Description	Definition	Locations	Examples	Action
Tier1a	Low acuity surgery/healthy patient Outpatient surgery Not life-threatening illness	HOPD ASC	EGD Colonoscopy	Postpone surgery or perform ASC
Tier 1b	Low acuity surgery/unhealthy patient	HOPD ASC Hospital with low/no COVID-19 census		Postpone surgery or perform ASC
Tier 2a	Intermediate acuity surgery/healthy patient Not life-threatening but potential for future morbidity and mortality Requires in-hospital stay	HOPD ASC Hospitalwith low/no COVID-19 census	Low risk of cancer Non-urgent orthopaedic, urologic operations	Postpone surgery if possible consider ASC
Tier 2b	Intermediate acuity surgery/unhealthy patient	HOPD ASC Hospital with low/no COVID-19 census		Postpone surgery if possible consider ASC
Tier3a	High acuity surgery/healthy patient	Hospital	Most cancers Highly symptomatic patients	Do not postpone
Tier 3b	High acuity surgery/unhealthy patient	Hospital		Do not postpone

HOPD: Hospital Outpatient Department, ASC: Ambulatory Surgery Center

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 *Laparoscopy to rule out occult metastases before chemotherapy could be skipped when aerosolization concerns due to low hospital resources
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 Cancers non-responsive to therapy should be considered for surgery
Complicated Cases	Endoscopic procedures risky for aerosol transmission and only should be considered to allow nutrition and control bleeding under full PPE. For proximal tumours with uncomplete 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, radiationtherapy, targeted immunotherapies may be optimal "next beter options" besides resection (MIS, open) and transplantation (biliarycancers). Table 3 shows treatment options according to the hospital phase response[7,8].

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 Laterstages	Ablation, resection, transplantation	TACE, ablation, careful lobservation	
	Colorectal Mets	TACE, Medical therapy, supportive care.		
		Resection for Tier 2a, chemotherapy for Tier 2b or greater	Chemotherapy	
Biliary	Intrahepatic Cholangiocarcinoma	Resection for Tier 2a, chemotherapy for Tier 2b or greater Stenting	Chemotherapy, embolictherapy	
	Hilar cholangiocarcinoma	Resection and transplantation if indicated	Stenting Chemotherapy, chemoradiation and/or transfer to an eligible unit	
Pancreatic	Resectable	Resection or chemotherapy	Neoadjuvant chemotherapy	
	Borderline	Neoadjuvantchemotherapy	Neoadjuvant chemotherapy	
Extra-hepaticbiliary	Pancreatic IPMN, cysts, low-moderate grade neuroendocrinetumours	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.		
Early cancer found on resected polyp: Tier 2	Defer surgery or Resection	Defer Surgery	
Asymptomatic Cancer T1-2 N0 (Tier 2)	Resect	Resect or defer surgery	Defer Surgery
Asymptomatic Cancer Colon T3-4, N0 andTx 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	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[10,11]. Primary anastomosis in high risk patients (ultra-low anastomoses, diabetics, preoperative radiotherapy, elderly must be avoided[6].

Another ongoing debate for minimal invasive surgery (MIS) vs. open surgery was still on track. When viral spread via carbondioxide 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[10,11].

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 [4,12]. 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[4]. For all phases, autologous reconstructions should be deferred[12].

Nevertheless, there are still a few emergencies for breast cases. Patients with progressive disease on systemic treatment, angiosarcoma and malignant phyllodes tumour should be considered as breast emergencies and not be deferred[12].

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

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 Clinical stage T2 or N1 Estrogen(ER) / Progesterone(PR) / HER2 negative tumors Triple-negative or HER2 positive tumours Excision of malignant recurrence Biopsies likely to be malignant	Breast abscess requiring incision and drainage Hematoma drainage Revision for ischemic flap after mastectomy	Breast abscess requiring incision and drainage Hematoma drainage Revision for ischemic flap after mastectomy
Cases to be deferred	Excision of benign lesions Biopsies likely to be benign High risk lesions(Atypia, papillomas) Prophylactic cancer/non-cancer surgeries cTisNO lesions-ER positive and negative Re-excision surgery Tumours responding to neoadjuvant hormonal treatment Clinical Stage T1NO ER/PR positive and Her2 negative tumours which might receive hormonal therapy Inflammatory and locally advanced cancers when patients should receive neoadjuvant therapy	All breast operations	All breast operations
Alternative options (When resources eligible)	T1 NO ER/OR positive and Her2 negative tumours can receive hormonal therapy* For triple-negative and Her2 positive tumours neoadjuvant therapy Some of T2 N1 ER/PR positive and Her two negative tumours are candidates for hormonal therapy*	Neoadjuvant therapy for eligible patients Observation	Neoadjuvant therapy for eligible patients Observation

*Some patients with early-stage ER-positivetumours do not have a response tochemotherapy well. Amongst them are patients with stage 1 or some stage 2 cancers, low-intermediate grade tumours, 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.

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.

pandemic were shown in Table 6 [13,14]. The otherwise functional adrenal tumour which response to medical therapy well and asymptomatic non-functional adrenal adenomas can be delayed. Cytoreductive surgery should be considered after individualized decision led by the multidisciplinary team[13].

Conclusion

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[6].

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 personel 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[4,6,12,15].

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[16,17]. 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[6].

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