

Running Head: Urologic care in Covid-19 Pandemic

Management of Patients Who Seek Urologic Care in Covid-19 Pandemic Era

¹Senol Tonyali, ²Hakan Bahadir Haberal, ¹Rifat Burak Ergul, ¹Murat Dursun

¹Istanbul University, İstanbul School of Medicine, Department of Urology, Istanbul

²University of Health Sciences, Keçiören Training and Research Hospital, Ankara

Keywords: Covid-19, new coronavirus, pandemic, urology

INTRODUCTION

Human beings are being exposed to extreme events such as natural disasters, pandemic, war etc. time to time. Novel coronavirus Disease (Covid-19) has emerged in Wuhan, China in December 2019 ⁽¹⁾ and became a pandemic in a few weeks. This pandemic brings along with a significant workload to healthcare givers and economic burden to governments. To overcome this pandemic, every government took their own precautions such quarantine and limited daily life. By being in the core of the pandemic, health care systems took strict measures including postponement of all elective surgeries and outpatient clinic visits. In this review, we aimed to summarize the current urologic practice trends worldwide to help urologist in decision making in Covid-19 pandemic. There have been numerous studies and reviews in this topic however most of them focusing on a unique section of urology such as urooncology

or urolithiasis. this review is a more compact article contains different areas of urology that many urologists might be utilized.

MATERIALS AND METHODS

We have performed a PubMed and Internet search by using the keywords: 'Covid', 'new coronavirus', 'coronavirus urology', 'covid urology' without a date restriction. Studies consisting of valid findings and recommendations on review topics were included the review. Main review topics were urooncology, urinary stone disease, urological emergencies and renal transplantation.

GENERAL RECOMMENDATIONS

All elective surgeries for benign urological conditions such as urinary tract stone disease that not caused complicated obstruction, benign prostate enlargement, infertility, incontinence and genitourinary prolapse, erectile dysfunction ⁽²⁾ undescendent testis, vesico-ureteral reflux should be postponed till the lasting of Covid-19 outbreak ⁽³⁾.

UROLITHIASIS

Renal colic should be managed conservatively as much as possible to prevent additional workload to the healthcare system and the staff. However, it must be considered that such a benign disease like urolithiasis might lead severe complications like sepsis and renal failure. And also intractable pain may necessitate an intervention for ureteral stone.

Urosepsis that originates from urinary tract constitutes up to 30% of all sepsis case. Urosepsis is commonly related to an obstructive urinary tract due to urinary tract calculi. Despite the antibiotherapy and interventional procedures like nephrostomy or J stent insertion, many patients need intensive care unit support and the reported mortality rate is as high as 10% ⁽⁴⁾.

In an obstructed renal unit due to ureteral stones both nephrostomy tube and double-J stent insertion are valid management options. However, one must consider that these procedures must be performed under local anesthesia when possible to spare a ventilator ⁽⁵⁾.

Insertion of DJS might be challenging in case of an impacted ureteral stone under local anesthesia especially in men. Sivalingam et al. ⁽⁶⁾ had shown that ureteral stent placement under local anesthesia is a safe and efficacious procedure. They reported a higher stent insertion failure rate in patients under local anesthesia compared to patients under general anesthesia which was not statistically significant, 8.7 % vs. 1.3 %, $p = .07$. As pain is one of the main limitations of stent insertion under local anesthesia, using flexible cystoscope might be helpful in improving patient comfort. Informing patients about the procedure under local anesthesia is of vital importance for procedure success ⁽⁶⁾. Some authors also suggested that self-watching stent insertion by the patient might decrease anxiety and pain related to the procedure ⁽⁷⁾.

Indwelling ureteral stents constitute another issue to be managed during the disasters and pandemic. There are many people who had replaced ureteral DJS for various reasons such as obstructing ureteral stones, ureteral strictures, and malignancies or to prevent urinary leakage after urological operations. DJS removal might be postponed as long as possible till the situation becomes normal. It has been shown that 71.4% of DJS could be removed with simple cystoscopic interventions in patients having a DJS for 6 to 12 months. This rate decreases to 44% in patients having a DJS for 13 to 24 months ⁽⁸⁾. The material of the DJS (silicone, polyurethane), the status of the patients and chemical composition of urine is also important issues in stent encrustation ⁽⁹⁾ and must be considered in decision making. Prolonged indwelling time as well as urolithiasis and urinary tract infection history might facilitate stent encrustation. Thus some researchers suggested an oral composition containing an urine acidifier (L-methionin) and crystallization inhibitors (phytin) ⁽¹⁰⁾. Continuous antibiotic treatment has no advantage over intermittent antibiotic usage in patients with acute

complicated urinary tract infection due to urinary obstruction, undergoing PCN or DJS insertion ⁽¹¹⁾.

GENITOURINARY CANCERS IN COVID-19 PANDEMIC

Patients with any cancer are more prone to infections due to immune deficiency because of malignancies and related treatments. Studies show that cancer patients are more prone to Covid-19 infection and patients show poor prognosis ⁽¹²⁻¹⁴⁾. The COVID-19 infection, declared as a pandemic, causes postponement of the routine treatments. Despite the recommendations of hospitals and public authorities to postpone elective procedures, it is not clearly defined which surgical procedures are particularly elective regarding genitourinary cancers and whether these delays will result in increased mortality or progression in genitourinary cancers. In this context, the procedures that may result in cancer-related negative consequences if delayed should be regarded as non-deferrable. On the other hand, when planning the procedures that are considered to be non-deferrable, the condition of intensive care beds and comorbidities of patients in covid-19 pandemics should also be considered ⁽²⁾. Also, some treatment modalities such as radiotherapy and chemotherapy may be considered as an alternative to surgery in some genitourinary cancers. ⁽¹⁵⁾. Therefore, urological malignancies should be managed multidisciplinary.

Prostate Cancer (PCa)

Although there are some differences, it is generally reported that prostate cancer surgery can be postponed or alternative treatments can be applied.

Ficarra et al. ⁽²⁾ divided all genitourinary cancer surgeries into 4 groups: 1- Non-deferrable surgical procedures (surgeries which's delay will affect oncological and functional results), 2- Semi-non-deferrable surgical interventions, (surgeries to be performed in countries where COVID-19 is limited), 3- Deferrable surgical interventions, 4- replaceable surgical

interventions. High-risk and locally advanced PCa's were evaluated in semi-non-deferrable group. These patients suggested to be treated with radiotherapy as much as possible. If radiotherapy option is not suitable, prostate surgery is included in the non-deferrable group. If no curative treatment option is available, initiation of androgen deprivation therapy in high-risk PCa has also been reported as an alternative. It is recommended that surgical treatments that cannot be postponed should be directed to units that do not belong to COVID-19 pandemic hospitals, if possible.

Stensland KD et al. ⁽⁵⁾ suggested that surgical treatments could be delayed in all patients with low-risk and intermediate-risk PCa. Also, surgery can be postponed in selected patients with high-risk PCa. It is also reported that radiotherapy alternative can be applied in high-risk and locally advanced PCa.

In a review from Brazil authors recommended active monitoring in low-risk PCa and postponing the treatment for 3 months in moderate-risk PCa in Covid-19 pandemic. In a different manner, in high-risk prostate cancer, they suggested giving androgen deprivation treatment for 3 months before local therapy. In castration-sensitive metastatic PCa, androgen deprivation therapy (ADT) 6-month form with apalutamid or enzalutamide was recommended as the first treatment option ⁽¹⁶⁾.

In another analysis by the Cleveland Clinic Foundation, an algorithm has been developed that demonstrates surgical treatment priorities in five-step. Score 0 is emergency surgeries like testicular torsion and score 4 is non-mandatory procedures such as live donor renal transplantation ⁽¹⁷⁾. According to this algorithm, patients with ISUP grade 1 and ISUP grade 2 prostate cancer with less than 2 core-positive being <2 mm maximum diameter were assumed as score 4. They concluded that the treatment of these patients does not need to be planned nowadays and it was recommended evaluating 3 months later. The patients with ISUP grade

3-5 were assumed as score 2. It was recommended that the treatment of these patients could be delayed up to 4 weeks.

In a review by Ho et al ⁽¹⁸⁾ all urological interventions were divided into 4 groups as urgent procedures, elective procedures, low and high priority procedures. In contrast with aforementioned analyzes; an evaluation was not made according to the stage of prostate cancer. It was suggested that robotic prostatectomy surgery could be performed with low priority among all urological procedures. In addition, they did not include radical prostatectomy operation among the non-deferrable urological surgical procedures.

The British Association of Urological Surgeons (BAUS) has published the COVID-19 guideline for compliance with reduced health care ⁽¹⁹⁾. They recommended LHRH analogues or bicalutamide 150 mg and to postpone curative treatment after pandemic in high-risk PCa. If metastatic prostate cancer is present, starting LHRH analogues and postponing primary chemotherapy is also recommended ⁽²⁰⁾.

All diagnosis, treatment and follow-up strategies for urological diseases were recently published in EAU guideline. The procedures is divided into 4 groups as urgent ones (procedures to be done within 24 hours), those with high priority (can be delayed up to 6 weeks), those with intermediate priority (can be delayed up to 3 months) and those with low priority (can be delayed up to 6 months) ⁽³⁾. Accordingly, active monitoring can be performed in low-risk localized PCA or 6-12 months can be waited for active treatment. Intermediate-risk localized PCa was evaluated in intermediate priority group. It was stated that all active treatments could be postponed up to 6 months after the pandemic. High-risk localized PCa was also included in the intermediate priority group. If surgical treatment is planned for the patient, it has been reported that it can be delayed up to 6 months. If radiotherapy (RT) is planned, it is recommended that androgen deprivation therapy to be started immediately and RT to be performed within 6 months. Locally advanced prostate cancer with lymph node

metastasis was evaluated in high priority group. In contrast with the review from Brazil ⁽¹⁶⁾, ADT was not recommended before radical prostatectomy in this group. If surgery is planned, it seems appropriate to perform it within 6 weeks according to EAU guidelines. As an alternative to surgery, long-term ADT and RT are given as an option. Castration-resistant metastatic prostate cancer is in the high-priority group and it is recommended to start appropriate life-length treatments within 6 weeks.

Non Muscle Invasive Bladder Cancer (NMIBC)

Ficarra et al. ⁽²⁾ assumed the low and intermediate risk non-invasive bladder cancers in semi-non-deferrable group. It was reported that TUR-BT should not be postponed in patients with high-risk NMIBC and with tumors >2 cm at initial diagnosis. Stensland et al. suggest that TUR-BT procedure should not be postponed in patients who are expected to have T1 bladder cancer, because approximately 50% of T1 tumors may have muscle invasive bladder cancer ⁽⁵⁾.

In their review Carneiro et al. ⁽¹⁶⁾ reported that TUR-BT can be postponed in elderly patients with comorbidities and in asymptomatic patients with small and superficial tumors detected radiologically. They also reported that re-TUR could be postponed if there was no muscle tissue in the specimen, which was performed by an experienced surgeon, or if there was Ta high-grade tumor. They suggest that follow-up cystoscopies should be performed with local anesthesia, if possible, with a flexible cystoscope and should not be postponed.

According to the analysis published by the Cleveland Clinic, TUR-BT for high-risk NMIBC was recommended to be performed without delay. In low-risk bladder cancer, TURBT has been accepted as level 3 and it was stated that the procedure can be postponed for 4-12 weeks ⁽¹⁷⁾. In their review, Ho et al. reported that TURBT for low-risk NMIBC is in the low priority group. Likewise, they evaluated the high-risk NMIBC in high priority group. They suggest

that the procedure should not be postponed in patients with suspected T1 bladder cancer ⁽¹⁸⁾. According to the recommendations by BAUS in terms of compliance with reduced health services, TURBT should be performed in the presence of an active bleeding and solid tumor in primary bladder tumor. It has been stated that the diagnostic evaluation could be delayed especially in patients who do not have visible hematuria over 60 years of age ⁽¹⁹⁾.

According to the recently published EAU guideline for COVID-19 pandemic, if there are macroscopic hematuria and clot retention requiring bladder catheterization, the patient should be evaluated urgently and TURBT should be planned within 24 hours. In addition, patients with macroscopic hematuria should be considered as high priority and imaging should be done within 6 weeks. In patients with small recurrent papillary tumors and a history of low-grade tumor, TURBT procedure is considered to be low priority and the procedure can be postponed for up to 6 months. It was stated also that the reTUR procedure could be delayed up to 6 months in patients with T1 tumor with muscle tissue in the specimen, which are thought to be completely resected. On the other hand, TURBT can be postponed for up to 3 months in all primary tumors and recurrent tumors larger than 1 cm without a high-grade bladder tumor history and hematuria. It is recommended that TURBT should be performed within 6 weeks in patients with intermittent hematuria and high-grade tumor history. It is also recommended that reTUR should be performed within 6 weeks in patients with residual tumors whose T1 high-grade bladder tumor was detected as a result of pathology without muscle tissue in the specimen ⁽³⁾.

In conclusion, TURBT may be postponing in the patients with low-grade NMIBC. TURBT procedure should not be delayed in the patients with high-grade tumor or macroscopic hematuria.

Intravesical BCG and COVID-19

There are various suggestions for intravesical BCG treatment in the pandemic. Ficarra et al. ⁽²⁾ suggested that intravesical BCG therapy should not be postponed in patients with high-risk bladder cancer. In another review, it is suggested that intravesical BCG induction therapy should not be postponed, maintenance therapy can be discontinued and re-evaluated after 3 months ⁽²¹⁾. In the review published by Carneiro et al ⁽¹⁶⁾, it is recommended to continue intravesical BCG induction and 1-year maintenance treatment in intermediate and high-risk noninvasive bladder cancer. According to the EAU guidelines, intravesical BCG therapy can be postponed for up to 6 months in intermediate-risk NMIBC. In high-risk bladder cancer, intravesical BCG is recommended to be performed within 6 weeks with maintenance treatment up to 1 year ⁽³⁾. As a result of these data, it is widely recommended that induction therapy and maintenance therapy for 1 year should not be postponed, especially in the patients with high grade bladder cancer.

Additionally, theories suggesting that the BCG vaccine is protective against COVID-19 suggest that intravesical BCG therapy may have a protective effect against Covid-19 pandemic. In a study, the authors investigated the incidence of COVID-19 cases in countries where the BCG vaccine was not used routinely, and they observed that the COVID-19 cases are fewer in countries where the vaccine in newborns were routinely used ⁽²²⁾. However, on April 11, 2020, WHO stated that they did not recommend BCG vaccine for protection from COVID-19 ⁽²³⁾.

Muscle Invasive Bladder Cancer (MIBC)

According to the current data, it is concluded that the cystectomy operation should be performed at the planned time and should not be postponed in patients with non-metastatic MIBC. Also, in most studies, it is suggested that neoadjuvant chemotherapy can be planned in these patients if appropriate.

Ficarra et al. ⁽²⁾ recommend performing radical cystectomy in MIBC cases and in the presence of resistant carcinoma in-situ (CIS). Similarly, Stensland et al. suggest that cystectomy should be performed in resistant CIS cases and MIBC cases if neoadjuvant chemotherapy is not possible ⁽⁵⁾. In concordance with aforementioned studies, Carneiro et al. stated that MIBC is an aggressive tumor and radical cystectomy should not be postponed ⁽¹⁶⁾.

According to the analysis published by the Cleveland Clinic, cystectomy is accepted as level 1 in patients with high-risk MIBC and it is recommended to be performed without delay ⁽¹⁷⁾. Likewise, Ho et al. suggest that cystectomy should not to be postponed in patients with MIBC or resistant CIS ⁽¹⁸⁾. In contrast, according to the recommendations issued by BAUS in terms of compliance with reduced health care, it is reported that radiotherapy should be planned in patients with T2-4, N0, M0 disease, and if radiotherapy is contraindicated, cystectomy and urinary diversion should be performed ⁽¹⁹⁾.

In EAU guidelines, planned cystectomy or multimodal bladder-sparing treatment due to T2-4, N0, M0 disease is evaluated in the intermediate priority group. It is recommended that these treatments should be performed within 3 months as planned ⁽³⁾. Unlike other reviews, they stated that neoadjuvant chemotherapy in T2-T3 N0 M0 disease could be skipped.

Upper Urinary Tract Cancer (UTUC)

Considering the reviews, it is concluded that the planned nephroureterectomy operation for urothelial tumors of the upper urinary system should not be postponed. In EAU guideline ⁽³⁾, it is recommended that nephroureterectomy should be performed within 6 weeks. Recommendations are only available in the EAU guidelines for patients with low-risk tumors. Surgical procedures in these patients are evaluated in the intermediate priority group and it is recommended to perform the procedure within 3 months.

Kidney Cancer

Ficarra et al. ⁽²⁾ suggest that radical nephrectomy and thrombectomy should not be postponed in clinical T3-4 kidney cancer. They also recommend that radical nephrectomy or partial nephrectomy should be performed in selected cases as planned in T2 kidney cancers. Similarly, Stensland et al. reported that radical nephrectomy should not be postponed in T3-4 tumors ⁽⁵⁾. They reported that radical or partial nephrectomy could be delayed or ablative treatments could be planned in patients with T1 renal cancer.

Carneiro et al. ⁽¹⁶⁾ recommended postponing the surgery in asymptomatic patients with T1a renal cancer. They suggested that if partial nephrectomy is planned in asymptomatic T1b or T2 patients, it should not be postponed; and if radical nephrectomy is planned, it could be postponed. They reported that surgery should be performed in patients with T3-4 cancer, especially in the presence of renal vein or vena cava inferior thrombus. According to the Cleveland Clinic recommendations ⁽¹⁷⁾, it is stated that radical nephrectomy should be performed as planned in patients with inferior vena cava thrombosis. They reported that other radical nephrectomies could be postponed up to 4 weeks. It is suggested that partial nephrectomies over 4 cm should be performed between 4-12 weeks, while lower-sized partial nephrectomies could be postponed for more than 3 months.

In BAUS's recommendations ⁽¹⁹⁾, there is also information about complicated renal cysts. It is recommended that complicated kidney cysts smaller than 4 cm should be followed up with imaging 6-9 months later; and those between 4-7 cm should be followed up with imaging after 3-6 months.

EAU guidelines ⁽³⁾ reported that the treatment of all T1b-T2a patients could be postponed for 3 months. It is also recommended that surgeries for clinically advanced T2-T4 cancer should be performed within 6 weeks. Kidney cancers with active bleeding are included in the emergency group and it is stated that these cancers should be treated with embolization as

first-line therapy. In metastatic disease, cytoreductive nephrectomy and other focal treatments could be postponed for 6 months.

In conclusion, it is stated that surgical treatment should not be postponed in patients with T3-4 kidney cancers, and suggested to be performed as planned. In T1-2 cancers, surgical treatment could be postponed or ablation treatments could be recommended in appropriate cases. (**Table 1**)

Testicular Cancer

It is suggested that diagnostic procedures and inguinal orchiectomy should be performed as soon as possible in all patients with suspected testicular tumors. In general, it is recommended that the RPLND procedure after chemotherapy should not be postponed. Alternatively, Stensland et al. ⁽⁵⁾ suggest chemotherapy or radiotherapy instead of RPLND if clinically appropriate. In contrast, Carneiro et al. ⁽¹⁶⁾ reported that it would not be appropriate to use bleomycin if adjuvant chemotherapy will be given. They state that bleomycin should be avoided due to its risk on pulmonary toxicity.

Penile cancer

There are fewer recommendations in reviews on penile cancer. In general, it is recommended not to postpone extensive local excision, partial or total penectomy operations for penile cancer. It is also recommended that the appropriate lymph node dissection be performed on time.

RENAL TRANSPLANTATION

There is not any robust data on management and prognosis of patients on renal replacement therapy either with hemodialysis or renal transplantation. As renal transplanted patients have a systemic immunosuppressive state, they might have poorer prognosis when infected with

Covid-19. However, it has been reported that some renal transplant patients recovered from Covid-19 without discontinuing or reducing immunosuppressant. Exaggerated inflammation and severe cytokine release are thought to be responsible from multiple organ dysfunction and death in patients having Covid-19. Thus, it has been suggested that immunosuppressant therapy might protect transplanted patients from severe immune response ⁽²⁴⁾. And also cyclosporine A might prevent coronavirus dissemination by preventing its replication ⁽²⁵⁾. Aggressive cessation or reducing the dosage of immunosuppressant therapy might be an option in renal transplanted patients with severe pneumonia or acute respiratory distress syndrome ⁽²⁶⁾.

UROLOGIC EMERGENCIES AND URGENCIES

Acute Genitourinary Infections:

Acute genitourinary infections that require early intervention include scrotal abscesses, Fournier's gangrene, penile prosthesis infections and artificial urinary sphincter infections ^(2,5). It should be kept in mind that those with comorbid diseases are susceptible to these infections ^(27,28). If these infections are not treated at an early stage, infection can lead to sepsis and may cause intensive care unit support requirement. It is known that Coronavirus may cause the need for intensive care unit admission and mechanical ventilator support ⁽²⁹⁾. In this case, these patients may cause delays in the treatment of patients who need intensive care unit support due to COVID-19. Therefore, the treatments of these acute infections should not be postponed and interventions should be performed at an early stage of disease.

Priapism:

Aspiration/irrigation and intracavernosal injections should be the first-line treatment methods for priapism. Shunt treatments should be performed to patients with refractory priapism. Of

shunt treatments, distal methods should be preferred primarily and local anesthesia should be the first choice.

Testicular Torsion:

Testicular torsions should be attempted to be manually detorted. Patients with restored blood flow after manual detorsion can be discharged; scrotal exploration and testicular fixation can be postponed to a later date. However, patients should be advised to reapply immediately in the event of pain recurrence.

Acute Urinary Obstruction:

Patients with acute urinary tract obstruction should be decompressed immediately. Obstruction at any level of the urinary tract increases the risk of urinary tract infections and may predispose patients to sepsis. ⁽³⁰⁾ For this reason, it is important to provide urgent decompression in these patients. In patients with globe vesicale, decompression should be performed by urethral or suprapubic catheter. We advocate nephrostomy placement in patients with acute upper urinary tract obstruction, as it is an easier method to apply under local anesthesia. In centers that do not have nephrostomy catheter, a double J stent should be placed under local or general anesthesia.

Genitourinary Trauma:

Hemodynamically stable patients should be followed conservatively ^(2,5). The treatment options that can be performed under local anesthesia (endovascular embolization, ureteral stenting, suprapubic catheterization) should be considered as the first-line treatment methods in hemodynamically stable patients. Surgical treatments should be applied to only hemodynamically unstable patients. Penile fractures and testicular ruptures should be operated immediately. The hospitalization period should be kept to a minimum considering the risk of both hospital-acquired and Coronavirus infections ⁽³¹⁾.

Gross Hematuria:

It is known that there is a decrease in blood donation rates during the COVID-19 pandemic.

⁽³²⁾ Therefore, preserving the hospital blood supply is very important in this situation. In patients with gross hematuria, immediate cystoscopic intervention is important to prevent hemoglobin reduction that will require blood transfusion.

While performing urgent urological interventions or surgeries as well as elective ones, urologist and health-practioners must take precautions regard to Covid-19 transmission. There is a growing literature on transmission route of Covid-19. Blood, stool, urine, semen and other bodily fluids might result in transmission of Covid-19⁽³¹⁾. Those patients must be questioned on Covid-19 related symptoms and may undergo PCR testing or thoracal computerized tomography for Covid-19 according to local algorithms.

CONCLUSION

It is obvious that Covid-19 will be in our life for a while. Till the outbreak ends or a vaccine developed, we have to organize our daily practice to maintain health care providing, to preserve health care facility capacity and work power as well as treating urological pathologies. The strategies must be developed locally based on regional health care capacity and dynamics and Covid-19 case numbers.

Compliance with ethical standards

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Convention.

REFERENCES

1. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;382:1199-207.
2. Ficarra V, Novara G, Abrate A, et al. Urology practice during COVID-19 pandemic. *Minerva Urol Nefrol*. 2020.
3. Ribal M, Conford P, Briganti A, Knoll T, Gravas S. EAU Guidelines Office Rapid Reaction Group: An organisation-wide collaborative effort to adapt the EAU guidelines recommendations to the COVID-19 era. <https://uroweb.org/wp-content/uploads/EAU-Guidelines-Office-Rapid-Reaction-Group-An-organisation-wide-collaborative-effort-to-adapt-the-EAU-guidelines-recommendations-to-the-COVID-19-era.pdf>. Accessed 4.20.2020.
4. Pandey S, Sankhwar SN, Goel A, et al. Quick Sequential (Sepsis related) Organ Failure Assessment: A high performance rapid prognostication tool in patients having acute pyelonephritis with upper urinary tract calculi. *Investigative and Clinical Urology*. 2019;60:120.
5. Stensland KD, Morgan TM, Moinzadeh A, et al. Considerations in the Triage of Urologic Surgeries During the COVID-19 Pandemic. *Eur Urol*. 2020;Accepted A.
6. Sivalingam S, Tamm-Daniels I, Nakada SY. Office-based Ureteral Stent Placement Under Local Anesthesia for Obstructing Stones Is Safe and Efficacious. *Urology*. 2013;81:498-502.
7. Hussein NS, Norazan MR. Impact of Self-Watching Double J Stent Insertion on Pain Experience of Male Patients: A Randomized Control Study Using Visual Analog Scale. *ISRN Urology*. 2013;2013:1-5.
8. Polat H, Yucel MO, Utangac MM, et al. Management of Forgotten Ureteral Stents: Relationship Between Indwelling Time and Required Treatment Approaches. *Balkan Med J*. 2017;34:301-7.
9. Zhao J, Cao Z, Ren L, et al. A novel ureteral stent material with antibacterial and reducing encrustation properties. *Mater Sci Eng C Mater Biol Appl*. 2016;68:221-8.
10. Grases F, Torrecilla C, Fernández-Concha J, et al. 2020.
11. Tenke P, Kovacs B, Benkő R, Ashaber D, Nagy E. Continuous versus intermittent levofloxacin treatment in complicated urinary tract infections caused by urinary obstruction temporarily relieved by foreign body insertion. *International Journal of Antimicrobial Agents*. 2006;28:82-5.
12. Sica A, Massarotti M. Myeloid suppressor cells in cancer and autoimmunity. *J Autoimmun*. 2017;85:117-25.
13. Bitterman R, Eliakim-Raz N, Vinograd I, Zalmanovici Trestioreanu A, Leibovici L, Paul M. Influenza vaccines in immunosuppressed adults with cancer. *Cochrane Database Syst Rev*. 2018;2:CD008983.
14. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. *Lancet Oncol*. 2020;21:335-7.
15. Ahmed K, Hayat S, Dasgupta P. Global challenges to urology practice during COVID-19 pandemic. *BJU Int*. 2020.
16. Carneiro A, Wroclawski ML, Nahar B, et al. Impact of the COVID-19 Pandemic on the Urologist's clinical practice in Brazil: a management guideline proposal for low- and middle-income countries during the crisis period. *Int Braz J Urol*. 2020;46.
17. Goldman HB, Haber GP. Recommendations for Tiered Stratification of Urological Surgery Urgency in the COVID-19 Era. *Journal of Urology*. 2020.
18. Ho HC, Hughes T, Bozlu M, Kadioglu A, Somani BK. What do urologists need to know: Diagnosis, treatment, and follow-up during COVID-19 pandemic. *Turk J Urol*. 2020.
19. Surgeons BAoU.
20. Desouky E. Urology in the Era of COVID-19: Mass Casualty Triage. *Urology Practice*. 2020.
21. Katz EG, Stensland KS, Mandeville JA, et al. Triaging Office-Based Urology Procedures During the COVID-19 Pandemic. *Journal of Urology*. 2020.

22. Hegarty PK, Sfakianos JP, Giannarini G, DiNardo AR, Kamat AM. COVID-19 and Bacillus Calmette-Guérin: What is the Link? *European Urology Oncology*. 2020.
23. Organization WH. 2020.
24. Wang J, Li X, Cao G, Wu X, Wang Z, Yan T. COVID-19 in a Kidney Transplant Patient. *Eur Urol*. 2020.
25. de Wilde AH, Zevenhoven-Dobbe JC, van der Meer Y, et al. Cyclosporin A inhibits the replication of diverse coronaviruses. *Journal of General Virology*. 2011;92:2542-8.
26. Zhang H, Chen Y, Yuan Q, et al. Identification of Kidney Transplant Recipients with Coronavirus Disease 2019. *Eur Urol*. 2020.
27. Pineda M, Burnett AL. Penile Prosthesis Infections-A Review of Risk Factors, Prevention, and Treatment. *Sex Med Rev*. 2016;4:389-98.
28. El-Qushayri AE, Khalaf KM, Dahy A, et al. Fournier's gangrene mortality: A 17-year systematic review and meta-analysis. *Int J Infect Dis*. 2020;92:218-25.
29. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. 2020.
30. Bonkat G, Bartoletti R, Bruyère F, et al. EAU Guidelines. *Urological Infections*. Edn. presented at the EAU Annual Congress Amsterdam, 2020. ISBN 978-94-92671-07-3. 2020.
31. Kashi AH. COVID-19, Urologists and Hospitals. *Urol J*. 2020;17:327.
32. Mohammadi S, Tabatabaei Yazdi SM, Eshghi P, Norooznejhad AH. Coronavirus-19 Disease (COVID-19) and Decrease in Blood Donation: Experience of Iranian Blood Transfusion Organization (IBTO). *Vox Sang*. 2020.

Corresponding Author:

Senol Tonyali, MD

Associate Professor of Urology

Address: Istanbul Universitesi Istanbul Tıp Fakultesi, Uroloji Anablim Dali

Cerrahi Monoblok Kat:1 Capa-Fatih/ Istanbul, Turkiye

Tel: 90 212 4142000

E-mail: senoltonyali@istanbul.edu.tr

Accepted

Table 1: Recommendations on non-deferrable surgeries for genitourinary cancer in COVID-19 pandemic

	Prostate cancer (Radical Prostatectomy)	NMIBC (TURBT)	MIBC (Radical Cystectomy)	UTUC (Nephroureterectomy)	Kidney Cancer (Radical/Partial Nephrectomy)	Testicular Cancer (Radical Orchidectomy/ RPLND))	Penile Cancer (Partial/Total Penectomy)
<i>Ficarra et al.</i>	High risk, locally advanced prostate cancer, unsuitable for radiation therapy	-High risk NMIBC -Tx high grade bladder cancer -Bladder cancer >2 cm at first diagnosis	-Refractory bladder CIS -Cystectomy for MIBC	High grade, ≥cT1 urothelial cancer	Clinical T3-4 renal cancer	-orchidectomy for all testicular cancer -Post chemotherapy RPLND	Clinical >T1G3 penile cancer
<i>Stensland et al.</i>	-Most prostatectomies should be delayed -Shared decision making to consider radiation therapy for NCCN high risk disease	Suspected cT1+ bladder tumors	-Cystectomy for MBIC, regardless of receipt of neoadjuvant chemotherapy -Cystectomy for CIS refractory to third line therapy	High grade and/or cT1+ tumors	-Nephrectomy for cT3+ tumors, including with renal vein and/or IVC thrombus -planned partial or radical nephrectomy for cT2 should be considered for delay based on patient specific consideration	-orchidectomy for suspected testicular tumors -post chemotherapy RPLND -Favor chemotherapy and radiation rather than RPLND when clinically appropriate	Clinically invasive cancers

Carneiro et al.	Prostatectomies can be delayed and consider radiation therapy for NCCN high risk disease	TURBT should be performed whenever possible	-Cystectomy for MIBC -recommended performing neoadjuvant chemotherapy	N/A	-Partial nephrectomy of cT1b and cT2 tumors -Nephrectomy for cT3-4 disease and/or with gross hematuria, thrombus in renal vein and/or vena cava	Radical orchidectomy should be performed as soon as possible	N/A
Cleveland Clinic Comment	Prostatectomies can be delayed	TURBT for high risk bladder cancer	Cystectomy for high risk cancer	Nephroureterectomy	Nephrectomy with IVC thrombus	Orchidectomy for testicular cancer	Surgery for penile cancer
Ho et al.	deferrable	TURBT for cT1+ suspected tumors	-Cystectomy for MIBC -CIS refractory to third line therapy	Nephroureterectomy	Radical nephrectomy for cT3+ with/without renal vein or IVC thrombus	-Orchidectomy -RPLND after chemotherapy	Partial/total penectomy
BAUS Guidance	Surgery can be postponed	-For new bladder tumor which is actively bleeding or solid tumors -very high-risk bladder cancer	-choose radiotherapy for T2-4N0M0 MIBC -if radiotherapy is contraindicated choose radical cystectomy	N/A	-Urgent nephrectomy for T2 and T3 renal cell cancer	-inguinal orchidectomy	N/A

<p>EAU Guideline</p>	<p>Surgery can be postponed</p>	<p>-TURBT in patients with bladder lesion and intermittent macroscopic hematuria or history of high-risk NMIBC</p> <p>-2nd TURBT in patients with visibly residual tumor after initial resection and large or multiple T1HG at initial resection without muscle in the specimen</p> <p>- TURBT in patients with macroscopic hematuria with clot retention requiring bladder catheterization is emergency procedure</p>	<p>-Offer radical cystectomy in T2-T4a, N0M0 tumors (Treat before end of 3 months)</p> <p>-Multimodality bladder sparing therapy can be considered for selected T2N0M0 patients</p>	<p>Perform radical nephroureterectomy (RNU) in patients with high-risk non- metastatic UTUC</p>	<p>-Clinically advanced RCC, cT2b-4, cN0-cN1 cM0</p> <p>- Advanced RCC with IVC thrombi</p> <p>- Or other, if symptomatic</p>	<p>-Orchidectomy and pathological examination of the testis (may be postponed 2-3 days)</p> <p>-Primary nerve-sparing RPLND only in CSI - NSGCT patients with contraindication to adjuvant chemotherapy and unwilling to accept AS (LE 1b), or in those with teratoma with somatic-type malignancy</p> <p>-Perform post-chemotherapy RPLND of residual masses after chemotherapy for NSGCT when serum levels of tumor markers are normal or normalizing</p> <p>-Treat growing teratoma with RPLND</p>	<p>≥ T1G3cN0: Wide local excision (WLE)/ Glansectomy +/- reconstruction</p> <p>-If cT3: Partial/total penectomy</p> <p>-If cN1-2: Radical inguinal lymphadenectomy ipsilateral pelvic dissection</p>
---------------------------------	---------------------------------	--	---	---	---	---	--

Abbreviations: EAU: European Association of Urology; TUR-BT: transurethral resection of bladder tumor; UTUC: upper urinary tract urothelial carcinoma; RNU: radical nephroureterectomy; RPLND: retroperitoneal lymph node dissection; NMIBC: non-muscle invasive bladder cancer; MIBC: muscle invasive bladder cancer;

Accepted