

Impact of COVID-19 Pandemic on Urology Practice: Review of Literature

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ABSTRACT

Coronavirus Disease (COVID-19) pandemic is a challenge to the healthcare system including urology which is big and formidable. The present scenario has changed the health preferences to emergency and essential services only. Reallocation of healthcare providers, wards and equipments resulted in suspension of all outpatient and elective activities to select only non-deferrable and critical procedures. Consequently, all health care workers including urologists must abide by the recommendations when dealing with the COVID-19 patients. This pandemic has also disrupted the training and education programs of urology residents also. Subsequently, in this review article, authors have discussed the influence of COVID-19 on urological practice. Authors have also reviewed the recommendations on triaging of urology procedures (emergent and non-emergent), office based urological procedures, oncologic surgeries, paediatric urology, urology-pathology interaction and economic burden on healthcare system during COVID-19 pandemic.

Keywords: Coronavirus, Guideline, Severe acute respiratory syndrome, Surgery

INTRODUCTION

The World Health Organisation (WHO) named the causative virus as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2), the resulting pneumonia as COVID-19 [1] and declared it as a pandemic [2] on 11th March 2020. The global number of cases has exponentially increased to 37,704,153 with 1,079,029 COVID-19 related deaths [3].

Coronaviruses are enveloped single stranded Ribonucleic Acid (RNA) viruses that affect respiratory, enterohepatic and neurologic systems in humans and mammals [4]. SARS-COV-2 is a highly infectious disease with three main routes for transmission- human-to-human, aerosol transmission, and transmission by touch [5]. Literature stated that urologists may have to deal with COVID-19 patients presenting only with fever and may misinterpret as urosepsis. Therefore, the awareness about the symptoms and their prevalence is important for all medical personnel even surgeons [6].

COVID-19 has emerged as the worst challenge to the global health care system in the modern era leading to net shift from patient-centred medicine to a community centred approach. This has resulted in a major redistribution of health resources in the form of reallocation of health care personnel, suspension of all non-urgent surgical procedures, limitation of inpatient and outpatient services to critically ill patients, closure of urology wards and the availability of anaesthetists [7-9]. Furthermore, many urology conferences including the European Association of Urology (EAU), the American Association of Urology (AUA) annual meetings were postponed during this pandemic [10]. Moreover, the current pandemic has also jeopardised the clinical researches which may affect their final outcomes [11]. Currently, the major concern is that there is no reliable provision on the duration of this pandemic and its economic and social consequences.

COVID-19 AFFINITY FOR UROLOGY

Certain organs (including urothelium of bladder, proximal convoluted tubules in kidney) have high risk of viral invasion, based on the Angiotensin Converting Enzyme 2 (ACE2)-positive cells expression. SARS-COV-2 has a specific spike protein 3-D structure that has strong binding affinity to the ACE2 receptors [12] leading to Acute Kidney Injury (AKI) and sepsis [13,14]. A significant mortality rates (60-90%) were associated with AKI patients [13].

In the study for COVID-19 recovered patients, the viral RNA remained positive in the urine samples of 6.9% patients even after the throat swab turned to be negative [15]. On the contrary, another study showed that SARS-COV-2 was not identified in the urine specimens [16].

Furthermore, there is a major apprehension over the possibility of COVID-19 transmission through semen or sperm donation required for assisted reproductive techniques. Study conducted by Li D et al., found, semen testing of 6 (15.8%) patients out of 38 were positive for SARS-CoV-2 [17]. Although such detection should not come as a surprise, the contribution of semen to virus transmission and hence, further studies are required to determine the epidemiology and disease burden.

Recommendation for the triaging of the urology patients:

1. A five point scale for surgical priority tiers has been developed ranging from score 0 as emergency to score 4 as non-emergency case, requires urgent treatment to score 0 as non-essential procedures can be delayed [18]. The aim is to be prepared to suspend the surgical procedures on the basis of urgency in a staged manner.
2. EAU has also developed the recommendations based on the priority basis as follows [19]:
 - Life threatening situations cannot be postponed for more 24 hours (emergency). Surgeries, if postponed >6 weeks can lead to progression, metastasis of the disease, loss of organ function or deaths likely (**high priority**).
 - If postponed for 3-4 months, it is unlikely that disease progresses, metastasizes or loss of organ function occurs (**intermediate priority**).
 - If progression, metastasis or loss of function very unlikely if postponed 6 months (**low priority**).

POTENTIAL EFFECTS ON UROLOGY SERVICE

Emergency Procedures

Due to limited availability of Personal Protective Equipment (PPE), anaesthetists and ventilators during the COVID-19 pandemic, priority should be given to those procedures that can be performed under local anaesthesia even in urgent urological conditions [20,21].

For the management of upper urinary tract obstruction or infection, the use of ureteral stents or nephrostomy tubes under local

anaesthesia is advocated but if not possible, then considers the ureteral stents under general anaesthesia. In case of acute retention of urine, the insertion of urethral or suprapubic catheter under local anaesthesia is advised. Furthermore, clot retention due to bladder or prostate cancer recommendation is for cystoscopic evacuation and transurethral haemostasis of the bladder or prostate cancer to limit the need for blood transfusion. Regarding patients with genitourinary trauma they recommended surgical exploration only in haemodynamically unstable patients otherwise proceed with procedures that can be performed under local anaesthesia. Lastly, the authors suggested immediate intervention of patients with priapism in the form of cavernosal aspiration or shunting, drainage and debridement for scrotal abscess or fourniers gangrene respectively, removal of device if artificial urinary sphincter or penile prosthesis got infected, surgical exploration for testicular torsion or penile fracture [21].

Non-Emergency Procedures

Oncology: Management of urological malignancies requires a multidisciplinary approach and allocation of care and risk stratification of these patients is a complex procedure. Cancer patients per se are characterised by higher susceptibility to infectious disease with 3.5 times more risk of COVID-19 related serious events in the form of requirement of critical care and mechanical ventilation or death due to their immunocompromised state associated to the nature of their malignancy and the anticancer management (chemotherapy, radiotherapy, or surgery) [21,22]. Many urology centres worldwide has suspended all elective cancer surgeries or adjuvant treatment in patients with stable cancer and surveillance strategy or other modes of treatment (chemotherapy/radiotherapy) is adopted in cancer patients with COVID-19 [22,23].

In Iran, limiting the urological surgeries to just emergencies and life threatening conditions lead to delay in the various high priority surgeries such as Transurethral Resection of Bladder Tumour (TURBT), Retroperitoneal Lymph Node Dissection (RPLND), radical cystectomy, radical nephroureterectomy, and radical prostatectomy [24]. On the contrary, if a patient is treated with radiotherapy, there will be increased number of hospital visits which further increases the exposure to infection [25]. The major risk factor for cancer patients during the COVID-19 pandemic is the inability to receive sufficient medical support [26].

Ficarra V et al., distinguished the urological cancer surgeries into different categories [20]:

Nondeferrable surgeries: Include all the procedures whose suspension may compromise oncological or functional outcomes. Consider TURBT for high risk Nonmuscle Invasive Bladder Cancer (NMIBC), any high grade bladder cancer, or tumours more than 2 cm at the time of diagnosis, whereas radical cystectomy and urinary diversion is recommended for muscle-invasive bladder cancer or refractory carcinoma in-situ. Radical orchidectomy is advocated for testicular cancer and surgery for post-chemotherapy RPLND. Radical nephrectomy is advised for renal cancers and radical nephroureterectomy for high grade upper tract urothelial carcinoma. High risk or locally advanced prostatic carcinoma or patients not suitable for radiation should be managed with radical prostatectomy with pelvic lymph node dissection. Consider partial penectomy for penile cancer, clinical T1G3 stage.

Semi-nondeferrable surgeries: Should be considered in the zones with limited diffusion of COVID-19 and comprises radical prostatectomy for intermediate and high risk prostatic cancer, TURBT for low-grade and small size bladder tumours, and for cT1b stage renal tumours, consider partial or radical nephrectomy.

Deferrable or replaceable surgeries: Include all the other urologic malignancies which can be treated by other options.

Similar recommendations were laid by Stensland KD et al., with two major differences- most prostatectomies include selected

high-risk and other risk prostate cancer should be delayed or offered radiation therapy based on the National Comprehensive Cancer Network (NCCN) guidelines; and adrenalectomy is recommended for adrenal tumours larger than 6 cm [21].

Benign Diseases

Recommendation is to suspend all benign elective surgeries till the end of COVID-19 emergency including surgery for male urethral disease, urinary incontinence, reconstructive urological, benign prostatic hyperplasia, infertility, erectile dysfunction, prosthetic implantation and genitourinary prolapse [20,21].

Renal Transplantation

The COVID-19 pandemic represents a serious hazard for the transplant patients, donors, and transplant programs around the world. The co-morbidities associated with increased mortality during COVID-19 pandemic are not uncommon in patients of Chronic Kidney Disease (CKD) and who are undergoing dialysis [27]. CKD patients are at increased risk of developing infectious diseases as compared to general population due to their status of immunosuppression [28,29]. The clinical presentation, treatment, and prognosis of COVID-19 pneumonia may differ in the patients of CKD from the general population, hence the importance of early SARS-CoV-2 screening, in those cases where the infection is suspected [30]. COVID-19 has not been reported in the donor-recipient transmission of solid organ transplants [31]. However, related viruses such as the SARS-CoV and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) were demonstrated in transplant recipients during previous outbreaks of these viruses [32,33]. Based on experiences with previous infections, it is well known that any recipient exposed to the virus would become infected. The reasons of donor-derived infection could be exposure of the donor, the viral load of individuals during the incubation period and asymptomatic people [32,33]. The viral load and the viability of the virus within the blood and other organs would also affect the risk of donor transmission [34]. Several renal transplant guidelines recommend that SARS-COV-2 testing must be done in donors of high suspicion, history of travel to an epidemic region [35-37] with universal screening of all patients irrespective of history [30].

Specific consideration for transplant recipients is required due to their chronic immunosuppression status. Screening tests is advocated in the recipients suspected for COVID-19 [30]. Kidney transplant recipients infected with SARS-CoV-2 have treatment recommendations on the basis of symptomatology. Mild symptoms (without dyspnea/tachypnea/fever) advised on telephone for home quarantine and contact to hospital if condition deteriorates. Moderate/severe symptoms, (temperature >38°C or poor general condition) is recommended for evaluation at the hospital [30]. However, apart from symptomatic support therapy, no specific treatment for COVID-19 positive renal transplant patients has been confirmed till yet [38].

Minimally invasive surgery (Laparoscopic/robotic)

The safety of laparoscopy procedures (conventional or robot-assisted) is a major concern now-a-days due to potential risk of dissemination of COVID-19 by the smoke generated [39]. Initial studies had reported the presence of hepatitis B virus [40], HIV [41] in the smoke generated during laparoscopic procedures. While concrete evidence of viral contamination during laparoscopy procedure is still awaited precautions should be taken as COVID-19 virus is viable in aerosol for three hours [42]. While Intercollegiate General Surgery Guidance advocated that laparoscopy should not be used [43], others advised to use laparoscopy procedures with discretion [44] or prefer for open approach if possible [45]. In this setting, it is recommended to keep laparoscopy instruments clean, avoid using faulty trocars with air leakage, prefer to use bipolar

energy, adjust electrocautery settings to minimum in order to reduce smoke formation. Furthermore, keep the pneumoperitoneum and trendelenburg position to minimum, use devices that are able to aspirate the smoke from the pneumoperitoneum and usage of drains should be minimum as exposure of body fluids demand extra-caution and additional PPE during post-operative period [45,46]. Finally, the guidelines of EAU Robotic Urology Section (ERUS) suggested a list of non-deferrable and semi-nondeferrable robot-assisted procedures based on impact of COVID-19 at different centres and advocated that the surgery ought to be performed by an experienced robotic surgeon to limit the use of medical resources [47]. Guidelines for endoscopic procedures are same as for laparoscopy. All surgeons must wear goggles or shield visor mask during surgery and careful cleaning of head support of the console between two cases [46].

Outpatient Clinics and Office based Procedures

Majority of outpatients clinics were postponed or cancelled depending upon the impact of COVID-19 pandemic. In some centres, clinics were prioritised and non-urgent cases were consulted over phone and postponed for at least six months [48].

In this pandemic, there is a concern about resource utilisation due to disproportion of supply and demand in the health care system [49]. Katz EG et al., recommended a framework regarding triage office-based procedures during the COVID-19 pandemic [50]. The procedures such as Urethral bulking (stress urinary incontinence), intravesical dimethyl sulfoxide instillation (interstitial cystitis), UroLift (lower urinary tract symptoms), intravesical Botox, percutaneous tibial nerve stimulation (overactive bladder), diagnostic cystoscopy (microscopic haematuria), surveillance cystoscopy (treatment response assessment for NMIBC, >6 months of diagnosis), intravesical BCG (*Bacillus Calmette-Guerin*) (high risk or intermediate NMIBC), prostate biopsy (prostate cancer) and urodynamic study should be deferred for at least 3 to 6 months depending on individual settings. They also advocated that following procedures must be done without delay including diagnostic cystoscopy (gross haematuria), surveillance cystoscopy (treatment response assessment for NMIBC, <6 months of diagnosis), ureteral stent removal after ureteroscopy.

Urology Resident Programs

It is apparent that this pandemic had a major impact on the urology resident training programs all over the world, jeopardising the clinical activities and academic curriculums. As per recommendations, surgeries have to be performed by expert surgeons, with the aim to reduce the operative time and complications [47] so, residents are least or not involved during the procedures. Moreover, to avoid gathering and footfall in the hospitals, case discussions, ward rounds and department's meetings were cancelled [48]. A survey showed that the involvement of residents in training programs-clinical (79.8% to 87.2%) and surgical (49.3% to 73.5%) in pre-COVID-19 pandemic. However, during the COVID-19 period, there was a major suppression of training activities-clinical (41.1% to 81.2%) and surgical (44.2% to 62.1%) [51].

In view of continuing the surgical and scientific learning, new substitutes of teaching methods were implemented. The webinars are developed on various urological topics where both teachers and residents can interact with each other. The clinical staff meetings and virtual rounds were also organised in webinar format [52]. The pre-recorded videos and podcasts channels of routine urological procedures, new techniques, tips and tricks in urology can be developed [53]. Finally, in order to continue the learning curve, surgical simulation training programs (home based) can also be developed [54].

SPECIAL CONSIDERATIONS

Paediatric Urology

Majority of paediatric urology procedures do not require urgent care, however, delay may subsequently impair the renal function. Most of the children infected with COVID-19 present with mild to moderate symptoms such as fever, cough and nasal discharge, severe symptoms are more common among children < five-year-old [55].

According Quaedackers JSLT et al., every patient should be screened for COVID-19 prior to surgery [56]. There recommendations for paediatric urological surgeries are divided into four stages:

- **Stage 1**, postpone all benign scrotal and penile surgery such as orchidopexy, hydrocele, circumcision; functional surgeries like incontinence surgery, meatotomy; surgeries for hypospadias, buried penis, bladder exstrophy.
- **Stage 2** describes to perform only semi urgent cases including endoscopic bulk-injection or ureteral reimplantation for Vesicoureteral Reflux (VUR), pyeloplasty in Pelvic Ureteric Obstruction (PUJO) without loss of differential function, urolithiasis in absence of infection or obstruction and intravesical botulinum-toxin for neurogenic bladder dysfunction.
- **Stage 3** delineates about the patients in whom delay will leads to subsequent progression of disease or organ damage such as pyeloplasty in PUJO or obstructed megaureter with progressive loss of differential function, Posterior Urethral Valves (PUV), urolithiasis with recurring infections.
- Furthermore, **stage 4** describes to perform surgery in cases of life-threatening conditions such as urosepsis with obstruction, genitourinary trauma with haemodynamic unstable patients or urinary leakage, PUV patient in whom transurethral catheter cannot be placed, oncology (wilms tumour, malignant testicular or paratesticular tumours in selected cases and testicular torsion with pain (non-neonatal).

In addition, Quaedackers JSLT et al., also advocates guidelines for paediatric urology outpatient clinic visits into four stages [56]:

- **Stage 1**, avoid consulting outpatient cases of benign scrotal and penile pathology or incontinence.
- **Stage 2** recommends seeing cases of semi-urgency like follow-up ultrasound after upper tract reconstruction.
- **Stage 3** delineates care for immediate cases in which delay will leads to subsequent irreversible progression of disease or organ damage like severely obstructive uropathy suspected on ultrasound and voiding.
- **Stage 4** specifies care for those cases in which delay can be potentially life-threatening.

UROLOGY-PATHOLOGY INTERACTION

During COVID-19 pandemic, urology-pathology interaction is also matter of concern. The pathologists and laboratory workers should be careful particularly when handling fresh urological specimens (urine, surgical specimens) [57]. WHO has recommended guidelines for handling COVID-19-positive specimens, defining transport conditions (delivery by hand and according to good biosafety practices), delivery of samples in non-leaking bags or containers with full patient identity and COVID-19 status [58].

The SARS-CoV-2 has the peculiarity of surviving for long duration on inanimate objects such as cryostat, used during processing of fresh-frozen sections [59]. Hence, it is suggested to restrict the submission of fresh-frozen section specimen only when absolutely necessary [60].

CONCLUSION(S)

COVID-19 pandemic has presented as an unprecedented health scenario worldwide. The lack of timely management of urological

conditions might produce unfavourable consequences on the overall patient outcomes. All healthcare providers including urologists should abide by the guidelines when dealing with COVID-19 patients. It seems that the repercussion of this pandemic is still unknown and difficult to quantify at present.

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