

Original Research Article

DOI: <https://dx.doi.org/10.18203/2349-2902.ijssj20204675>

The pattern, management, and preventive protocols used for urological procedures during the pandemic of COVID-19: an experience of a tertiary care centre

Mayank Agrawal, Venkat Arjun Gite*, Prakash Sankapal, Vivek Shaw

Department of Urology, Grant Government medical college and Sir J. J. Hospital, Mumbai, Maharashtra, India

Received: 22 August 2020

Accepted: 08 October 2020

***Correspondence:**

Dr. Venkat Arjun Gite,
E-mail: balajigite@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: During pandemic of coronavirus disease 2019 (COVID-19), there is a need for prioritization of the patients. Suspension of elective procedures avoids the load on already burdened medical facilities. Our aim was to highlight the pattern of urological procedures during the pandemic, preventive protocol used, and challenges faced in their management.

Methods: This was a retrospective observational study of 152 patients who underwent urological procedures between March 22 and June 30, 2020, at a tertiary care centre. Outpatient department (OPD) consultation and elective urological procedures were suspended. Only emergency, semi-emergency, and OPD room procedures were performed. Procedures were classified into four categories i.e. emergency, semi-emergency, OPD room, and elective procedures. Patient demographics and operative details were assessed. Descriptive statistics were applied.

Results: A total of 152 patients were included in the study. Majority of the patients were our follow up (70.4%) and rest were new patients (29.6%). Out of the total procedures done, 67.1% were emergency or semi-emergency and 32.9% were OPD room procedures. Local anaesthesia was the most used anaesthesia (69.1%). COVID-19 swab testing was done only for the inpatients (41) of which eight patients were tested positive. In the end, none of the health care workers had symptoms of COVID-19.

Conclusions: The pattern of surgeries shows that most of the urological procedures performed during COVID-19 pandemic were for either emergency or semi-emergency urological conditions. Obstructive uropathy is one of the commonest indications for the urological procedures performed during this pandemic.

Keywords: Corona Virus, COVID-19 pandemic, Pattern, PPE, Urological procedures

INTRODUCTION

On December 31, 2019, Chinese authorities notified the World Health Organization (WHO) regarding a novel coronavirus, that was first reported in Wuhan, China.^{1,2} On February 11, 2020, named the disease coronavirus disease 2019 (COVID-19).³ On March 11, 2020, the WHO declared it as a pandemic.⁴ Subsequently, the virus spread in India as well. On March 24, 2020, the Government of India ordered a nationwide lockdown for 21 days which was subsequently extended till May 31, 2020, (and till June 30, 2020, in containment zones)

limiting the movement of the entire 1.3 billion population of India as a preventive measure against the pandemic.⁵

Due to lockdown, non-availability of public transport, and restrictions imposed over the movement of people across the cities and villages, the routine medical services have suffered. There is prioritization of the patients like triage in a mass casualty, to decrease the load on already overwhelmed existing medical facilities.⁶

Currently, the data on the pattern of urological surgeries and the protocol in the management during the COVID-

19 pandemic remains sparse. The aim of our retrospective observational study is to share our experience and highlight the pattern of urological procedures we performed during this time. Our study may help the others to get benefits from our experience and to foresee the challenges which lie ahead when routine urological practices are resumed as this viral infection is going to stay for a long time and may not get eradicated.⁷

METHODS

This was a retrospective observational study that was conducted from March 22, 2020, to June 30, 2020. The study included all patients who underwent urological procedures at a 2844 bedded government run medical college and multi-speciality hospital (tertiary care centre) during the defined time frame. The study was approved by the institute ethics committee.

The target population was the patients who were our own follow-up, patients referred to us by the broad specialities, and patients who were directly attended to in

the emergency room for the urological problems. All such patients who needed interventions during the period of nationwide lockdown, formulated the sample size.

In compliance with the institutional and government directives OPD (out-patient department) consultations and elective urological procedures were suspended. Patients who were referred to us were assessed and screened by the primary treating physicians as well as by us in terms of COVID-19 related symptoms and urological problems. While such patients were clinically assessed, examined, and investigated by the urologist, protective equipment in the form of surgical cap, N95 masks, and gloves were donned. During examination, patients and their relatives also wore surgical masks. Alcohol-based hand rub was used both before and after examining the patients.

After evaluation, the patients were classified into four categories based on the type of intervention needed i.e. emergency, semi-emergency, OPD room, and elective procedures (Table 1).

Table 1: Classification of the procedures based on the urgency of the intervention needed.

Emergency	Semi-emergency	OPD room procedures
<ul style="list-style-type: none"> • Diversion (Primary DJ Stenting / Primary PCN) for- <ul style="list-style-type: none"> ◦ Obstructive uropathy ◦ Pyonephrosis ◦ Emphysematous pyelonephritis • Trauma <ul style="list-style-type: none"> ◦ Renal ◦ Ureteric ◦ Bladder perforation ◦ Urethral ◦ Penile/testicular • Obstetric/ general surgery emergency <ul style="list-style-type: none"> ◦ Ureteric injury ◦ Bladder injury ◦ Placenta percreta • Acute urinary retention • testicular torsion/ trauma • penile fracture/ trauma • Foreign Body GU system • Vesical blood clot retention • Deceased donor renal transplant • Shunting for priapism • Acute infective conditions: scrotal abscess, testicular abscess, Fournier's gangrene • Phimosis 	<ul style="list-style-type: none"> • DJ stent removal / change • PCN removal / change • Diagnostic cystoscopy • Check cystoscopy • Chemotherapy • Immunotherapy • Malignancies which have high risk of progression/up staging in short time duration • Prostate biopsies • Diagnostic procedures 	<ul style="list-style-type: none"> • Foley Removal / change • SPC change / removal • Urethral/ meatal calibration • Hormonal therapy

OPD=Outpatient Department, DJ=Double J, PCN=Per Cutaneous Nephrostomy, GU=Genito-Urinary, SPC=Supra pubic catheter

Emergency: Conditions requiring immediate recognition and management without delay; posing risk to the patient's life or the organ.

Semi-emergency: Procedures that must be done to preserve the patient's life or organ but does not need to be performed immediately.

OPD room procedures: Conditions that can be managed in the OPD room, which does not need admission/OT support.

Elective: Procedures that can be scheduled for the future and can be managed temporarily with conservative management without threatening the life or the organ of the patient.

Before the start of the pandemic, monthly average workload in our department was, 1200 OPD consultations, 160 OPD room procedures, and 200 OT procedures (day care and inpatients) which includes emergency, semi-emergency, and routine surgeries.

During the study period only emergency, semi-emergency, and OPD room procedures were performed. All patients who needed emergency procedures were admitted. Amongst patients in need of semi-emergency procedure, the admission was based on their age, chief complaints, clinical examination findings, investigations, comorbidities, and expected difficulty in the procedure (Figure 1). Rest all semi-emergency procedures were done on day-care basis. Patients who needed elective surgeries were advised to be in touch via telephone to know when the routine surgeries would resume.

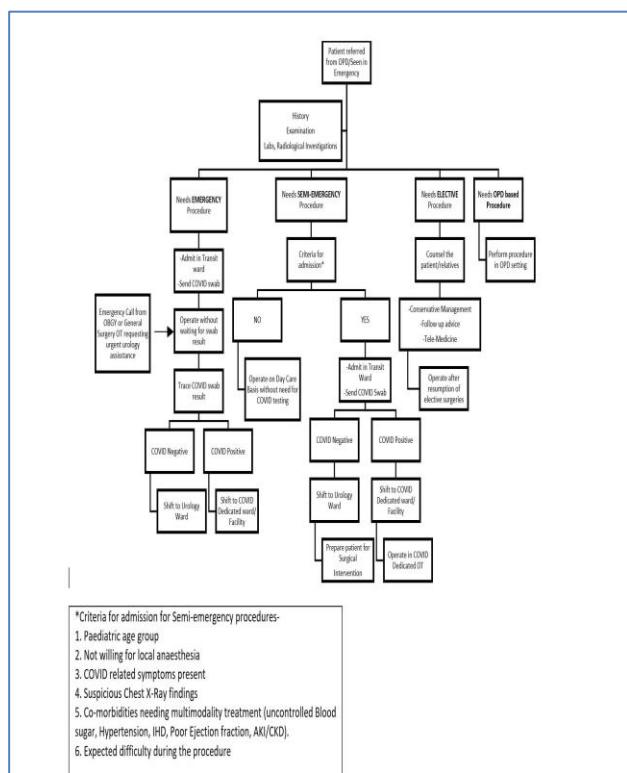


Figure 1: Patient management flowchart.

At our centre, initial policy was to admit all COVID-19 positive cases (symptomatic and asymptomatic) in COVID-19 dedicated facilities and their close contacts were traced and quarantined at home or quarantine

centres. Later, policy was changed by the government to test and admit only symptomatic patients for COVID-19.

As per the institute's directives all patients were initially admitted to the 'staging ward'. These were specially designated wards where the patients from all the specialities were admitted. These wards have restricted movement of both health care workers (HCWs) and visitors. Social distancing is ensured between the patients. To enter these wards, one must don the PPE. At admission, the throat swabs of all the patients were sent for COVID-19 via reverse-transcription-polymerase-chain-reaction (RT-PCR). Depending on the results, negative patients were shifted to specialty wards and positive to COVID-19 designated facilities (Figure 1). All emergency procedures were done without waiting for swab results.

Patients who were operated on a day-care basis were not advised to undergo COVID-19 testing unless they had symptoms or finding of COVID-19 on chest x-ray in which case, they were advised admission.

In operating theatre (OT) all patients were operated preferably with endoscopic means. Wherever possible local anaesthesia was preferred over spinal, sedation, or general anaesthesia. All day-care procedures were performed under local anaesthesia. In OT, personal protective equipment (PPE) were used by the operating team. The number of OT personnel, other HCWs, and inadvertent moments inside and outside the OT were kept to the minimum. In the post-operative period, patients were discharged when they were stable, along with confirmation of negative throat-swab samples.

At the end of the study time, the data were compiled and comprehended. The parameters which were recorded and assessed were the patient demographics, clinical history, investigations, COVID-19 status, diagnosis, type of anaesthesia, and procedures performed.

Statistical analysis was performed using Microsoft excel 2010 and IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were applied, and the data was interpreted. The categorical variables were presented as absolute frequencies with their respective percentages (%) whereas continuous variables were presented as mean and range.

RESULTS

A total of 152 patients (110 males and 42 females) were included in this study, with a mean age of 42.4 years (range- 13-72). A total of 152 procedures were done of which, 111 procedures (73%) were done on a day-care/OPD basis and rest 41 (27%) were inpatients (Table 2). None of the day-care/OPD patients needed admission post-procedure.

Table 2: Characteristics of the study population.

	N (n=152)	Percentage
Demographics		
Total number of the patients (n)	152	100.0%
Mean age (years)	42.4	-
Males	110	72.4%
Females	42	27.6%
Type of registration		
Day-care	111	73.0%
Inpatients	41	27.0%
Type of patients		
Follow up patients	107	70.4%
New patients	45	29.6%
COVID-19 Status		
COVID-19 status unknown	111	73.0%
COVID-19 tested*	41	27.0%
COVID-19 positive	8	19.5%
COVID-19 negative	33	80.5%

*COVID-19 testing was done only for the inpatients.

COVID-19 = Coronavirus disease 2019

Majority of the patients were our follow up patients (70.4%) and rest were new patients (29.6%). Majority of the procedures were OT procedures (67.1%) and 32.9% were OPD room procedures. Most of the OT procedures were performed endoscopically (63.8%). Semi-emergency procedures were the most common type of procedure (42.1%). Local anaesthesia was the most common form of anaesthesia given, used in 69.1% of the

patients and general anaesthesia was the least used form of anaesthesia (3.9%) (Table 3).

Table 3: Characteristics of the procedures performed, and the type of anaesthesia used.

	N (n=152)	Percentage
Type of procedure		
Semi-emergency	64	42.1%
OPD room	50	32.9%
Emergency	38	25.0%
Type of surgery (emergency + semi-emergency)		
Endoscopic	97	63.8%
Open	5	3.3%
Type of anaesthesia used		
Local	105	69.1%
Sedation	16	10.5%
Spinal	12	7.9%
General anaesthesia	6	3.9%
No anaesthesia used*	13	8.6%

*In 13 patients (hormonal therapy and catheter removal) no type of anaesthesia was used. OPD= Outpatient Department

In our follow up patients, DJ removal (18.4%) or DJ change (15.8%) were the most commonly performed procedures as their DJ stent duration was nearing or was more than 3 months. (Table 4). A total of 21 patients (13.8%) underwent procedures for malignancies. Of these, 13 were our follow-up and the remaining 8 were new patients.

Table 4: Type of procedures performed.

OT procedures (emergency + semi-emergency)		
Procedure performed	Indication	Primary diagnosis/surgery performed
DJ removal	DJ duration nearing or more than 3 months	URSL
		PCNL
		Pyeloplasty
		ESWL
		Hysterectomy for fibroid
		Renal transplant
DJ change	DJ duration nearing or more than 3 months	Renal stone
		Ureteric stone
		PUJ obstruction
		Ureteric stricture
		Ca cervix with uropathy
		GU Prolapse on vaginal pessary with uropathy
Primary DJ stenting	Obstructive uropathy/ trauma	Renal calculi
		Ureteric calculi
		Emphysematous PN
		Ca cervix with uropathy
		Ureteric stricture due to GUTB
		Renal Trauma
Primary PCN insertion	Obstructive uropathy	Pyonephrosis
		Ca cervix with uropathy
Check cystoscopy	Follow up of malignancy case	TURBT for ca urinary bladder

Continued.

OT procedures (emergency + semi-emergency)					
Procedure performed	Indication	Primary diagnosis/surgery performed	N (n=152)	N (n=152)	Percentage
Bladder repair	Bladder Injury	Previous LSCS placenta accreta	3 1	4	2.6
Endoscopic urethral dilatation	Acute urinary retention	anterior urethral narrowing	4	4	2.6
TURBT	Malignancy	Ca urinary bladder	4	4	2.6
Primary SPC insertion	Acute urinary retention	Urethral stricture Urethral calculus	3 1	4	2.6
PCN change	PCN duration nearing or more than 3 months	Renal calculi with ureteric stricture	3	3	2.0
Clot evacuation	Clot retention	Coagulopathy	2	2	1.3
Foreign body removal	Foreign body	Self-inflicted vesical foreign body	1	1	0.7
Genital trauma	Penile degloving injury with scrotal laceration	Repair of penile and scrotal skin	1	1	0.7
OPD room procedures					
PUC change	Catheter duration nearing or more than one month	BOO (BEP)	8		
		Neurogenic bladder	4	14	9.2
		Vesical calculus	2		
PUC removal	Post-operative/ TWOC	BOO (BEP)	6		
		DVIU	3	10	6.6
		Urethral dilatation	1		
SPC change	Catheter duration nearing or more than month	Neurogenic bladder	4		
		BOO (BEP)	4	10	6.6
		Pan-urethral stricture	2		
Primary PUC insertion	Acute urinary retention	BOO (BEP)	7		
		Urethral calculus	2	10	6.6
		Vesical calculus	1		
Hormonal therapy	Adjuvant treatment malignancy case	Metastatic ca prostate	3	3	2.0
BCG immuno-therapy	Adjuvant treatment malignancy case	Follow up - ca urinary bladder	3	3	2.0

OT= Operating Theatre, DJ=Double J, URSL= Ureteroscopic Lithotripsy, PCNL= Percutaneous Nephrolithotomy, ESWL=Extracorporeal Shock Wave Lithotripsy, PUJ=Pelvic Ureteric Junction, GU= Genito Urinary, Ca= Carcinoma, PN= Pyelonephritis, GUTB= Genito-Urinary Tuberculosis, PCN= Percutaneous Nephrostomy, TURBT= Trans Urethral Resection of Bladder Tumour, LSCS= lower Segment Caesarean Section, SPC=Supra Pubic Catheter, OPD=Out Patient Department, PUC= Per Urethral Catheter, BOO = Bladder Outlet Obstruction, TWOC= Trial With Out Catheter, DVIU = Direct Visual Internal Uretherotomy, BEP= Benign Enlargement of Prostate, BCG= Bacille Calmette Guerin.

Swab test for COVID-19 was sent for all the admitted patients (41) (Table 2). The results for the same were available prior to the surgery only in 25 patients. Four out of these 25 patients were tested positive for COVID-19. They were operated in COVID-19 designated OT and in the post-operative period they were shifted to COVID-19 designated ward. Post-surgery the swab of remaining 16 inpatients were traced and 4 were found to be positive. Positive patients were shifted to COVID-19 designated facilities. All inpatients were tested negative for COVID-19 at the time of discharge. There was no mortality in the studied population.

During and at the end of the study, none of the HCWs from the department had any symptoms of COVID-19 or required testing as during this period testing of asymptomatic HCWs was not done as per the hospital protocol.

DISCUSSION

COVID-19 is a clinical syndrome caused by a novel coronavirus called Sars-Cov-2 (severe acute respiratory syndrome coronavirus 2).^{8,9} India is one of the worst affected countries in this pandemic. On June 5, 2020 India had seventh highest number of COVID-19 positive cases worldwide.¹⁰

Our hospital is a government run medical college and multi-speciality hospital located in western India and caters to a large population from western India. It is one of the worst affected regions by COVID-19, both in terms of the total number of confirmed cases as well as the mortality.^{10,11}

During this time, one must prioritize patients based on the risk to their lives or organs. Elective surgeries would

increase the chances of occupying an intensive care unit (ICU) bed and ventilator when the resources are needed for the management of COVID-19 patients.^{6,12,13} We used the same protocol and suspended the elective urological procedures which along with use of local anaesthesia, decreased the workload of already busy anaesthesiologists.

This study highlights the pattern of all types of urological procedures performed during the pandemic. During the pandemic, emergency, and semi-emergency conditions like, obstructive uropathy or acute urinary retention were the most common reasons for the OT procedures. As the routine OPD consultations were suspended, we encountered only a limited number of patients who were referred to us by the broad specialities. As a result, the number of total procedures performed were also less. Also, most of the procedures were performed on our follow up patients. Factors which can explain these patterns are, restriction of movement and unavailability of public transport due to lockdown, suspension of urology OPD consultations and elective procedures, fear of hospital-acquired infection resulting in less number of patients seeking medical help and, use of telemedicine.

In our hospital, all admissions during the pandemic were sent to 'staging wards'. As these wards had restricted entry and patient movement, they helped in restricting the transmission of infection within the hospital. Segregation of the patients was done depending upon their throat swab results. It has been reported that the hospitals are one of the important sources of COVID-19 transmission within the community.¹⁴ In a retrospective, single-centre study in Wuhan, 41% of 138 patients were thought to have acquired infection in the hospital.¹⁵ Thus, avoiding hospital visits and admissions of non-COVID-19 patients for elective procedures is important as was done in our study. We suspended elective procedures like definitive surgeries for stone disease, prostate surgeries, nephrectomies for benign conditions, reconstructive and corrective surgeries and live kidney donor transplants. Only those procedures which were needed to safeguard the organ and the life of the patient, were carried out. This helped in decreasing the non-COVID-19 patients visit to the hospital.

One of the major problems with COVID-19 is that most of the positive cases are asymptomatic.¹⁶ Patients or their relatives who come to the hospital for non-COVID-19 conditions could themselves be asymptomatic for COVID-19 infection. This can increase the risk of asymptomatic carrier transmission of COVID-19.^{17,18} During the initial days of the pandemic, only symptomatic patients were tested largely because of the absence of adequate testing capacity. The rates of testing were low. Capacity issues, absence of political will, and operational feasibility were to be blamed.¹⁹ The testing capability needed to be augmented.²⁰ However, efforts have been made as more testing kits have become available, and more testing companies and laboratories

have been approved.¹⁹ At our centre during the study, the testing was done only for the symptomatic patients and all the inpatients.

In our study, 8 inpatients (all asymptomatic for COVID-19) were tested positive for COVID-19. Four of these patients whose results were available prior to their surgery, were shifted to COVID-19 designated wards and operated in COVID-19 designated OTs. It helped in isolating these asymptomatic positive patients from other patients at an early stage thus avoiding the patient to patient transmission of infection. Ideally, testing of all the patients who need procedures should be done. RT-PCR is currently the most reliable diagnostic method for COVID-19 around the world.²¹ The result of the test may take up to 24-48 hours. As our institute is a high-volume testing centre, due to the high load of testing, the time taken for the test results to be available is around 48 hours. In case of emergency surgery waiting for the swab result is not an option. So, the use of PPE is the best policy.

Considering every individual as a likely source of COVID-19 infection and the use of different levels of PPE in form of N95 masks/respirators, face shields, gloves in OPDs, wards, and OTs are recommended to decrease the risk of transmission of infection to HCWs.²²⁻²⁴ We used full-body PPE in cases where COVID-19 status was not known. Human immunodeficiency virus (HIV) kits along with N95 masks and Face shields were used in the rest of the cases. In OPDs, we used surgical caps, N95 masks, face shields, and surgical gloves.

At the end of our study, as per the hospital protocol none of the HCWs from the department were tested for the COVID-19 infection as none of them were symptomatic. However, it does not rule out asymptomatic carriers. Ideally, all HCWs should be tested, which will help in reducing in-hospital transmission.¹⁴

We must adjust to the present conditions as this virus is going to stay for a long time.⁷ There will be a time in the future when we must resume the elective urological procedures. This should be a cautious approach as we do not want to risk COVID-19 infections in our patients who come for an elective procedure. The difficult balance between priority treatment of patients with COVID-19 and non-COVID-19 patients who require elective treatment for other conditions is challenging.²⁵ The road map to future entails continuing the use of the adequate level of PPE to avoid infection risk to HCWs and decreasing hospital transmission of infection, mass production of PPE and medical equipment to overcome the shortage, increasing the number of ICU beds, incorporating telemedicine for patient management, prioritising the patients to avoid the risk of organ damage, and wait till the time an effective vaccine is available.²⁶⁻³⁰

We also recommend the following measures, 1) test all patients for COVID-19 in OPD before

admission/intervention, 2) imparting education regarding infectious disease transmission and the use of PPE by all HCWs; 3) use of universal precautions while examining the patient (N95 masks, face shield, and alcohol-based hand rub); 4) ensure the supply chain of PPE; 5) establishing adequate number of COVID-19 dedicated wards, OTs, and ICUs; 6) during the pandemic, postponing elective surgical procedures; 7) use of telemedicine to avoid unnecessary hospital visits; 8) upgrading the health care infrastructure and formulation of the standard operating protocol with respect to managing COVID-19 patients that will help in the resumption of elective procedures.

As this is a single centre retrospective observational study with small sample size, so to have a generalised opinion about the urological practices during the COVID-19 pandemic and formulation of SOPs to resume the elective procedures, multi-centre experimental study with large sample size is needed. However, considering the fact that this study was conducted at a government run medical college and multi-speciality hospital located in western India where the reported number of COVID-19 infections and related deaths are amongst the highest in the world, findings of our study will be relevant to many regions around the world.

CONCLUSION

The pattern of surgeries shows that most of the urological procedures performed during COVID-19 pandemic were for either emergency or semi-emergency urological conditions. Obstructive uropathy is one of the commonest indications for the urological procedures performed during this pandemic.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Grant Government Medical college and Sir JJ Group of Hospitals, Mumbai (approval number: IEC/Pharm/RP/135/JUL/2020)

REFERENCES

1. Sohrabi C, Alsaifi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *Int J Surg.* 2020;76:71-6.
2. Hui DS, Azhar EI, Madani TA, Ntoumi F, Kock R, Dar O, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health- the latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis.* 2020;91:264-6.
3. World Health Organization (2020) Novel Coronavirus disease (2019-nCoV) Situation Report-22. Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200211-sitrep-22-ncov.pdf?sfvrsn=fb6d49b1_2. Accessed 5 July 2020.
4. World Health Organization (2020). Coronavirus disease 2019 (COVID-19) Situation Report-51. Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10. Accessed on 5 July 2020.
5. Ministry of home affairs, Government of India (2020) Circulars for COVID-19. Available at: <https://www.mha.gov.in/notifications/circulars-covid-19>. Accessed on 5 July 2020.
6. Stensland KD, Morgan TM, Moinzadeh A, Lee CT, Briganti A, Catto JW, et al. Considerations in the triage of urologic surgeries during the COVID-19 pandemic. *European urology.* 2020;77(6):663-6.
7. World Health Organization (2020) COVID-19 Virtual press conference. May 13, 2020. Available at: <https://www.who.int/docs/default-source/coronaviruse/transcripts/who-pressconference-13may2020.pdf?sfvrsn=ee0d2cde2>. Accessed on 5 July 2020.
8. CDC (2019) 2019 Novel Coronavirus, Wuhan, China. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/about/index.html>. Accessed on 5 July 2020.
9. Gorbalenya AE, Baker SC, Baric R, Groot RJ, Drosten C, Gulyaeva AA, et al. The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* 2020;5:536-44.
10. World Health Organization (2020). Coronavirus disease 2019 (COVID-19) Situation Report-137. Available at: https://www.who.int/docs/default-source/sri-lanka-documents/20200605-covid-19-sitrep-137.pdf?sfvrsn=a13df572_2. Accessed on 5 July 2020.
11. Ministry of Health and Family Welfare, Government of India (2020). COVID-19 statewise Status. Available at: <https://www.mohfw.gov.in/>. Accessed on 5 July 2020.
12. American College of Surgeons (2020). COVID-19: recommendations for management of elective surgical procedures 2020. Available at: <https://www.facs.org/about-acos/covid-19/information-for-surgeons>. Accessed on 5 July 2020.
13. Aminian A, Safari S, Razeghian-Jahromi A, Ghorbani M, Delaney CP. COVID-19 Outbreak and Surgical Practice: Unexpected Fatality in Perioperative Period. *Ann Surg.* 2020;272:e27-9.
14. Black JR, Bailey C, Przewrocka J, Dijkstra KK, Swanton C. COVID-19: the case for health-care worker screening to prevent hospital transmission. *Lancet.* 2020;395(10234):1418-20.
15. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus- infected pneumonia in Wuhan, China. *JAMA.* 2020;323(11):1061-9.

16. Day M. Covid-19: four fifths of cases are asymptomatic, China figures indicate. *BMJ.* 2020;369:m1375.
17. Tong ZD, Tang A, Li KF, Li P, Wang HL, Yi JP, et al. Potential presymptomatic transmission of SARS-CoV-2, Zhejiang province, China, 2020. *Emerg Infect Dis.* 2020;26(5):1052.
18. Bai Y, Yao L, Wei T. Presumed asymptomatic carrier transmission of COVID-19. *JAMA.* 2020;323:1406-7.
19. Lancet. India under COVID-19 lockdown. *Lancet.* 2020;395:1315.
20. Gupta N, Bhatnagar T, Rade K, Murhekar M, Gangakhedkar RR, Nagar A. Strategic planning to augment the testing capacity for COVID-19 in India. *Indian J Med Res.* 2020;151:210-5.
21. Hong KH, Lee SW, Kim TS. Guidelines for Laboratory Diagnosis of Coronavirus Disease 2019 (COVID-19) in Korea. *Ann Lab Med.* 2020;40:351-60.
22. Zhang Z, Liu S, Xiang M, Li S, Zhao D, Huang C, et al. Protecting healthcare personnel from 2019-nCoV infection risks: lessons and suggestions. *Front Med.* 2020;14:229-31.
23. American College of Surgeons (2020) COVID-19: considerations for optimum surgeon protection before, during, and after operation. Available at: <https://www.facs.org/covid-19/clinical-guidance/surgeon-protection>. Accessed on 5 July 2020.
24. Centers for Medicare and Medicaid Services (2020). Non-emergent, elective medical services, and treatment recommendations. Available at: <https://www.cms.gov/files/document/cms-non-emergent-elective-medical-recommendations.pdf>. Accessed on 5 July 2020.
25. Naspro R, Da Pozzo LF. Urology in the time of corona. *Nat Rev Urol.* 2020;17:251-3.
26. American College of Surgeons (2020). American College of Surgeons Post-COVID-19 Readiness Checklist for Resuming Surgery. Available at: <https://www.facs.org/covid-19/checklist>. Accessed on 5 July 2020.
27. American College of Surgeons (2020). Local Resumption of Elective Surgery Guidance. Available at: <https://www.facs.org/covid-19/clinical-guidance/resuming-elective-surgery>. Accessed on 5 July 2020.
28. American College of Surgeons (2020). Joint Statement: Roadmap for Resuming Elective Surgery after COVID-19 Pandemic. Available at: <https://www.facs.org/covid-19/clinical-guidance/roadmap-elective-surgery>. Accessed 5 July 2020.
29. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare.* 2020;26:309-13.
30. Ohannessian R, Duong TA, Odone A. Global Telemedicine Implementation and Integration Within Health Systems to Fight the COVID-19 Pandemic: A Call to Action. *JMIR Public Health Surveill.* 2020;6:e18810.

Cite this article as: Agrawal M, Gite VA, Sankapal P, Shaw V. The pattern, management, and preventive protocols used for urological procedures during the pandemic of COVID-19: an experience of a tertiary care centre. *Int Surg J* 2020;7:3695-702.