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INPATIENT CARE FOR UROLOGICAL PATIENTS IN A PANDEMIC OF THE CORONAVIRUS DISEASE - COVID-19 INFECTION

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Abstract

Since the first cases of coronavirus disease were detected in Wuhan (Hubei Province, China) in December 2019, the spread distribution of COVID-19 has expanded so much that the World Health Organization declared COVID-19 a pandemic. The most common symptoms of coronavirus infection are fever (85-90%), cough (65-70%), general weakness (35-40%), shortness of breath or feeling short of breath (15-20%); less common symptoms such as myalgia, headaches, sore throat and chills (10-15%). Currently, cases of infection are recorded in almost all countries of the world, there is a daily increase in the number of infected by an average of 100,000, and the death toll by average estimates is over 3,000,000. At present time, the "leading" position in the number of cases of COVID-19 detected belongs to the United States, in which over the entire observation period, more than 32,000,000 thousand cases were recorded. Another badly affected region is Europe, in which more than 43,000,000 thousand cases were recorded. The rapid growth in the number of newly diagnosed cases of COVID-19 dictates the need to search for optimal ways of providing medical care. It is obvious that inpatient practice carrying high risk of infection for patients as well as for medical stuff. Moreover, postoperative mortality rate in infected patients may be as high as 20%. Since the pandemic onset many authors and societies have provided recommendations on how the risk of infection during inpatient practice should be reduced. This article discusses the options for providing inpatient care to urological patients in a pandemic of the coronary viral infection COVID-19.

Keywords: *coronavirus disease, morbidity, mortality, pandemic, treatment.*

General clinical and epidemiological data

In most cases, coronavirus infection (CVI) causes an acute respiratory disease [*Guan W et al., 2019*], however, in some cases, an asymptomatic course of the disease may be observed [*Hu Z et al., 2020; Leia S et al., 2020*]. In these cases, such patients are carriers of CVI and pose the greatest threat from an epidemiological point of view. The most common symptoms of CVI are fever (85-90%), cough (65-70%), general weakness (35-40%), shortness of breath or feeling short of breath (15-20%); less common symptoms such as myalgia, headaches, sore throat and chills (10-15%) [*Guan W et al., 2019*]. The rarest symptoms (<10%) include nausea, nasal congestion, vomiting, and diarrhea. Symptoms such as impaired perception of taste and odors are described as pathognomonic symptoms [*Hopkins C et al., 2020; Luers J et al., 2020; Lechien J et al., 2020*]. The most characteristic changes in laboratory tests are lymphopenia, an increase in prothrombin time, and an increase in the level of lactate dehydrogenase [*Rodrigues J et al., 2020; Wang D et al., 2020*]. Increases in the level of C-reactive protein and D-dimer are also characteristic [*Naie A et al., 2020*].

The main feature of CVI is the development of viral pneumonia, which determines the severity of the disease, the need for hospitalization of the patient in the intensive care unit, and the need to

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transfer the patient to mechanical ventilation (6%) [*Guan W et al., 2019*]. The features of viral pneumonia caused by CVI include the bilateral and polysegmental nature of lung lesions and the peripheral localization of lesions, mainly in the basal parts of the lungs [*Kanne J et al., 2020 a*], as a result of which the latter can lead to the development of respiratory failure and acute respiratory distress syndrome. Even though in most cases (81%) the disease is accompanied by mild symptoms [*Wu Z et al., 2019*], there is evidence of a high (28%) hospital mortality in patients with CVI [*Zhou F et al., 2020*]. Mortality among patients with a severe course of the disease and patients on mechanical ventilation can reach 62% and 81%, respectively [*Yang X et al., 2020*].

The described risk factors for a severe course and poor outcome include age ≥ 65 years, concomitant cardiovascular and/or cerebrovascular pathology [*Du R et al., 2020*]. Pneumonia is most often detected 10-12 days after the onset of the disease [*Wong H et al., 2019*]. A chest x-ray can help identify signs of SARS. Computed tomography (CT) of the lungs has a higher sensitivity in terms of detecting viral pneumonia since it can detect pathognomonic changes in the lung tissue like ground glass [*Kanne J et al., 2020 b; Ai T et al., 2020; Kooraki S et al., 2020*]. Remarkable is the fact that radiological signs of pneumonia can be detected in 54% of asymptomatic patients [*Shohei I et al., 2020*]. Another effective method for detecting respiratory failure is measuring blood oxygen saturation (SpO2%). A decrease in SpO2 below 94% should raise the suspicion of the presence of an active inflammatory process in the lungs and become a reason for further clinical studies.

To overcome it is possible, due to the uniting the knowledge and will of all doctors in the world

The use of molecular analysis of biological material by polymerase chain reaction is aimed at identifying the pathogen itself, and serological testing is aimed at identifying antibodies to coronavirus circulating in the blood. Since antibodies continue to circulate even after the infection has cleared, serologic tests continue to be positive in people who have previously been exposed to the virus and have developed an immune response, which means that a positive test may not indicate active infection. Serological antibody testing is currently used for surveillance and research purposes, while molecular test methodologies are used to diagnose active infections. Currently, clinical experience is accumulating, indicating the insufficiently high sensitivity of laboratory tests. Thus, in a study conducted by Ai T. and co-authors. It was shown that the sensitivity of computed tomography in detecting COVID-19 infection was 98% compared to the sensitivity of polymerase chain reaction - 71% [*Ai T et al., 2020*]. Also, the sensitivity depends on the material being collected. So the sensitivity of molecular methods (polymerase chain reaction) in the study of material obtained with bronchoalveolar lavage and sputum is 93% and 72%, while the sensitivity in the study of nasal and pharyngeal swabs does not exceed 63% and 32%, respectively [*Wang W et al., 2020*].

CLINICAL PRACTICE IN THE CONTEXT OF THE COVID-19 PANDEMIC

The COVID-19 pandemic has significantly changed global clinical practice across all specialties. On the one hand, reducing planned hospitalizations and performing planned operations pursues the main task - to reserve beds, medical personnel, and medical equipment for the effective treatment of patients with COVID-19, as well as to reduce social contacts of planned patients in surgical hospitals. On the other hand, the rates of emergency hospitalizations and surgical interventions remain at the same level and show an upward trend.

According to the results of an online survey of 1021 Russian urologists conducted by a working group of the chief freelance urologist of the Ministry of Health of Russia, the number of scheduled consultations decreased by about 75%, and the number of planned operations - by 71%; the volume of planned oncourological operations amounted to about 30% in the total structure of operational activity, while the volume of emergency

surgical interventions increased, reaching 70% in the total structure of operational activity. Besides, 32% of respondents expressed confidence that the medical institutions in which they work will be redesigned, and 54% of respondents believed that urologists will be involved in the treatment of patients with COVID-19. The described trends are explained both by the recommendations of the authorized authorities to reduce the volume of planned operations and by the difficulties with examination and hospitalization of planned patients associated with restrictive measures.

The need to reduce planned operations is evidenced by the data of a study conducted under the leadership of Lei S. and colleagues [*Lei S et al., 2020*]. According to the data obtained, among asymptomatic patients with CVI who underwent planned surgical interventions (who developed viral pneumonia in the postoperative period), 34% developed acute respiratory distress syndrome, 29% developed shock, 29% had a bacterial infection, 23% had arrhythmia, and 14% developed acute heart disease. and 6% have acute renal failure. In 44% of cases, transfer to intensive care unit was required, and in 33% - transfer of patients to mechanical ventilation. The mortality rate in this group of patients was 20%. In 100% of cases, acute respiratory distress syndrome was the main complication among the patients who died. The most frequent (57%) comorbidities of patients were cardiovascular and oncological diseases. The mean time from the onset of the first symptom to the onset of death was 9 days.

According to Ficarra V. and co-authors [*Ficarra V et al., 2020*], to prevent the occurrence of pneumonia associated with mechanical ventilation, and to release the maximum number of mechanical ventilation devices, preference should be given to operations performed with spontaneous breathing. In addition, when providing emergency care to urological patients, the minimum amount of intervention should be limited. When providing care to patients with urological oncological diseases in whom delaying treatment is unlikely to affect oncological outcomes and cancer-specific survival, surgery should be postponed [*IGSG, 2020*].

Given the temporary lack of recommendations governing the procedure for hospitalization and medical care for patients in the urology profile, the priority list of operations may look like this (Table 1). These recommendations were adopted by a working group led by the chief freelance urologist of the Ministry of Health of Russia and summarize the available data, applicable both in the current and in the future situation when the capabilities of the medical institution (ventilators and/or other operational resources) are limited. These guidelines prioritize those conditions in which a short delay in treatment may affect future patient survival. In addition, alternative treatment options for common urological emergencies that do not involve the use of mechanical ventilation are considered. Please note that these recommendations do not take into account the patient's age, the presence of concomitant pathology, as well as the possible risk of postoperative infection with COVID-19, exactly as well as its potential impact on the postoperative period.

Treatment of patients with benign, non-life-threatening conditions is recommended to be postponed until a favorable epidemiological situation is restored [*Ficarra Vet al., 2020*]. A study by Ling Y. and colleagues [*Ling Y et al., 2020*] reported limited persistence of SARS-CoV-2 nucleic acid in urine. Until now, there has not been a single fact of the transmission of the disease through urine, however, drainage of the bladder and/or ureter during laparoscopic or robot-assisted operations should be performed with caution, especially in the presence of pneumoperitoneum. Particular care should also be taken when working with the urine of convalescent patients [*IGSG, 2020*], given the isolation of coronavirus from the urine of the latter, any contact with biological fluids of patients should be carried out in conditions of increased safety measures (with the protection of the mucous membranes and skin of the contact). Although until today in the literature has not been described a single case of the fecal-oral route of transmission, it is known that SARS-CoV-2 is present in the stool of patients with COVID-19 [*Ficarra V et al., 2020*]. It is preferable to minimize the various manipulations with the intestine, as well as its opening during urological procedures, to reduce the risk of diffusion of the virus in CO2 insuf-

TABLE 1.

The diseases that can be treated promptly during the COVID-19 pandemic

Oncourology		
Disease	**Surgery recommended**	**Basis**
Bladder Cancer (BC)	Cystectomy for muscle-invasive bladder cancer, regardless of neoadjuvant chemotherapy; Cystectomy for in situ BC resistant to 3rd-line therapy	Delaying cystectomy by 90 days for muscle-invasive BC increases pN + frequency, decreases overall survival and progression-free survival, and increases pathologic staging
	TUR of the bladder for suspected cT1 + tumor	The stage of cT1 tumors is underestimated in more than 50% of cases, which is why there is a risk of missing muscle-invasive cancer
Testicular cancer	Orchiectomy for suspected testicular tumor; Retroperitoneal lymph node dissection (RPLND) after chemotherapy (CT); CT or radiation therapy (RT), not RPN, when clinically appropriate	There are limited data on survival with delayed orchiectomy; Orchiectomy is an outpatient procedure that has a positive impact on overall survival and should be a priority; After orchiectomy, RT may be performed if follow-up is not possible; Use CT based on immunosuppression and increased risk of infection/ complications from COVID-19
Renal cell carcinoma	Nephrectomy for cT3 + RCC, including all patients with renal vein and/or inferior vena cava thrombosis; Planned resection or radical nephrectomy for cT1 tumors should be delayed or other ablative therapies considered in selected patients; Consider postponing planned resection or radical nephrectomy for cT2 tumors, depending on the patient's somatic status and age, symptoms, and tumor growth rate	Kidney tumors at a later stage, especially with venous thrombosis, are prone to rapid progression, which can significantly complicate surgery and adversely affect overall survival and/or morbidity; For cT1-2 (stage I-II) tumors, delay 3 months of surgery was not associated with a decrease in cancer or overall survival
Prostate cancer (PCa) (according to the National Comprehensive Cancer Network (NCCN))	In most cases, radical prostatectomy (RP) should be postponed; Sharing decision on RT for high-risk diseas Surgery for high-risk PCa if RT is not possible; Surgical treatment of some high-risk, moderate, or low-risk PCa patients may be delayed; Ablative treatment may be considered in some patients	Surgery for high-risk PCa should be considered based on age and existing risks; The incidence of biochemical recurrence may be higher in patients with high-risk PCa for whom surgery has been delayed, although no clear timing is specified
Urothelial cancer of the upper urinary tract	Nephroureterectomy for high-grade and / or cT1 + tumors; Nephroureterectomy with possible simultaneous lymphadenectomy	A three-month postponement of surgery for upper urinary tract is associated with disease progression in all patients, and in the case of muscle-invasive cancer, with oncological survival; At an early stage, especially in invasive cancer, there is a high risk of underestimating the stage of the tumor
Tumors of the adrenal glands	Adrenalectomy for suspected adrenal adenocarcinoma or tumor> 6 cm; Consider delaying adrenalectomy for adrenal masses <6 cm	Adrenal masses> 6 cm are more likely to be malignant; Adrenal adenocarcinoma progresses rapidly and pathologic R0 stage suggests better survival; Delay may affect complete resection and survival
Urethral/penile cancer	Clinically invasive or obstructive cancer	There is little data on these rare tumors; Prevention of lymph node metastasis can save patients from recurrent disease; Outpatient resection can reduce the burden on hospital resources.

TABLE 1. (CONTINUATION)

The diseases that can be treated promptly during the COVID-19 pandemic

Oncourology		
Disease	**Surgery recommended**	**Basis**
Endourology / Urolithiasi		
Urolithiasis	In case of obstruction / infection, consideration should be given to: - placement of a ureteral stent; - placement of nephrostomy drainage; - placement of a ureteral stent under local anesthesia	If necessary, ureteral stents can be placed in the ward; Nephrostomy drainage can be placed under local anesthesia. If none of these options is possible, obstruction and/or infection of the upper urinary tract is an emergency, requiring surgical intervention.
Permanent ureteral stent	In most cases, surgery should be postponed.	Most stents, the duration of which in the ureter varies from 6 to 12 months, can be removed without hindrance, and endoscopic removal of stents is possible in most patients, including patients. with installed long-playing stents (up to 30 months)
Prostatic hyperplasia	Surgical treatment of PCa should be postponed (transurethral resection of the prostate, Holmium laser enucleation of the prostate, laser photoselective vaporization of the prostate, etc.))	The risk of urinary retention can be mitigated by placing a urethral catheter or installing cystostomy drainage without the need for surgical treatment under anesthesia
Female urology . Urinary incontinence		
Stress urinary incontinence, interstitial cystitis, overactive bladder, neurogenic bladder	Any surgical treatment should be postponed	
Installing a neurostimulator	The second stage of installing or removing a neurostimulator	Neurostimulants carry a high risk of infection. Installation (second stage) or removal can be done under local anesthesia
Reconstructive surgery		
Urogenital fistulas with pelvic infection	In case of systemic inflammation, urine diversion with catheters or colostomy placement is indicated; Operative reconstructive treatment should be postponed if the clinical picture does not require immediate intervention	Fistula repair requires significant resources, so surgical treatment should be postponed as much as possible
Implanted artificial Urinary Sphincters	Surgical treatment is indicated only when the sphincter is infected.	Infected sphincters can quickly lead to the development of sepsis and must be urgently eliminated.
Transplantation		
Kidney transplant	Only organ transplant from a deceased donor; Organ transplant from a living donor should be postponed	Organ transplants from a deceased donor should be undertaken without delay; Organ transplants from living donors should be postponed to save resources and postpone immunosuppressive therapy, which in turn may lead to greater exposure to COVID-19 infection

Table 1. *(continuation)*

The diseases that can be treated promptly during the COVID-19 pandemic

Oncourology		
Disease	**Surgery recommended**	**Basis**
General urology		
Infections	Acute infections only; Scrotal abscesses, Fournier's gangrene	
Ischemia	Bypass surgery for priapism; Orchipexia, the descent of the testicle	
Bleeding	Evacuation of a clot	
Trauma	Surgical restoration of damage to the penis, organs scrotum, ureteral injury, bladder perforation	
Urethral stricture	All surgeries should be postponed	Placement of cystostomy drainage or placement of a urethral catheter in combination with urethral dilation or urethrotomy is urgent when there is partial or complete urethral obstruction.
Erectile dysfunction	Surgical treatment is indicated only if the implant is infected	Infected implants can quickly lead to the development of sepsis and must be urgently eliminated
Torsion of the spermatic cord	Revision of the scrotal organs, orchiopexy	

flation mode.

Precautions and additional safety measures during the performance of robotic-assisted interventions should be carried out in strict accordance with recommendations of the Robotic Surgery Section of the European Association of Urology (Table 2).

Working with elective patients

Careful selection and examination of patients are essential to prevent the spread of infection [*Yeo C et al., 2020*]. Examination of planned patients should include a thorough collection of an epidemiological history, identification of characteristic complaints, thermometry, complete blood count, coronavirus test, and CT scan of the lungs before hospitalization. After surgical treatment, the patient should receive maximum medical care, and all follow-up examinations should be performed in a hospital in order to reduce the number of follow-ups, outpatient visits to the doctor. For the same purpose, it is recommended to maintain telephone contact with the patient, and send all research results and written recommendations to the patient by e-mail or via messengers.

Working with emergency patients

As in the case of planned hospitalizations, the number of emergency hospitalizations should be minimized as much as possible in order to reduce the social contact of hospitalized patients [*Pryor R et al., 2021*]. In this regard, when deciding on hospitalization, one should be guided by strict indications:

- the need for emergency surgery
- the need for intensive therapy and continuous follow-up in a potentially life-threatening condition.

When examining emergency patients in the emergency room, measures should also be taken to identify patients with CVI. Examination of emergency patients should also include a thorough collection of epidemiological history, identification of characteristic complaints, thermometry, complete blood count, coronavirus test, and CT scan of the lungs before hospitalization. Also, the maximum amount of examination at the admission department level will identify situations that do not require emergency hospitalization. In addition, special boxes should be equipped in the admission depart-

Table 2.

Proposed intraoperative measures to reduce the risk of viral contamination during laparoscopic and robot-assisted operations

1.	The earliest possible cleaning of instruments from the patient's blood or biological fluids
2.	Avoid the formation of accumulations of blood (or other body fluids of the patient) at the level of laparoscopic trocars, due to possible gas leakage and the formation of tiny liquid particles
3.	Use aspiration to remove surgical smoke
4.	Avoid 2-way insufflators to create pneumoperitoneum
5.	Maintain the lowest abdominal pressure and insufflation
6.	Maintain minimum tilt angle at Trendelenburg position
7.	Minimize the effect of pneumoperitoneum on the patient's cardiopulmonary function
8.	Set the minimum values of electrocautery
9.	Avoid lengthy surgical dissections to reduce the production of surgical fume
10.	Constantly check the integrity of the protective equipment of the instruments and the availability of personal protective equipment for the operating room personnel

ment, where a patient with an identified CVI will be placed until the issue of his transfer is resolved.

The main emergency conditions in urological practice include:

1. Renal colic
2. Acute obstructive pyelonephritis
3. Acute urinary retention
4. Macrohematuria
5. Trauma to the organs of the genitourinary system

Renal colic

When stopping renal colic in the emergency room, a complete examination of the patient is recommended, including thermometry, blood tests, urine tests, computed tomography of the urinary tract. In the absence of signs of obstructive pyelonephritis and a high probability of spontaneous stone discharge, it is recommended that the patient be discharged from the emergency room with recommendations. Anesthesia should take into account the undesirability of using NSAIDs in patients with COVID-19 [*IGSG, 2020*]. With the development of intractable renal colic, hospitalization is indicated to drain the upper urinary tract with a ureteral stent or nephrostomy.

Acute obstructive pyelonephritis

All patients with acute obstructive pyelonephritis should be admitted to the hospital for upper urinary tract drainage with a ureteral stent or nephrostomy.

Macrohematuria

With signs of moderate macrohematuria without signs of anemia in the patient and hemodynamic stability, discharge of the patient at the admission department with a recommendation for taking hemostatic drugs and (if indicated) performing cystoscopy and computed tomography with contrast enhancement at the place of residence is indicated. Considering the potential need for large-scale surgical interventions aimed at stopping ongoing bleeding in patients with hematuria, it is recommended to route these patients to hospitals, where, along with urology departments, there is a possibility of endovascular embolization of vessels in order to stop acute bleeding.

Acute urinary retention

Patients with acute urinary retention without signs of bladder hyperextension and retention changes in the upper urinary tract, without signs of renal failure and active hematuria may be offered method of self-catheterization at home with the discharge of the patient from the admission department and solving the question (in case of non-restoration of urination) about another method of drainage at the place of residence. For patients in whom self-catheterization is impossible, drainage of the bladder with a Foley urethral catheter and discharge under the supervision of a urologist at the place of residence with recommendations for taking alpha-blockers is recommended. A further attempt to restore independent urination can be carried out either on an outpatient basis at the place of residence or in a short-term hospital. Patients with signs of chronic urinary retention are recommended hospitalization, trocar cystostomy with prompt discharge from the hospital.

Organization of work of the urology department

During the pandemic, it is recommended to impose a complete ban on visiting patients with relatives and friends. To this end, medical institutions should organize hotline telephones for communication with patients' relatives and the service of medical nurses. Given the reduced flows of urological patients, it is recommended that patients be placed in single wards in order to maximize their isolation. If it is impossible to accommodate patients in single rooms, it is recommended to allocate one room for an isolation box. If CVI is detected, the patient should be transferred to an isolation ward before deciding on his transfer to a specialized hospital, any movement of the patient in the department should be limited to a minimum, medical personnel in contact with the patient should take full precautions under established standards. After the transfer or discharge of the patient, the room in which he was located must be sanitized by the established procedure. Patients who were in the same ward with the infected should remain in the ward for observation until the issue of transfer to the place of quarantine is decided. Medical personnel in contact with this category of patients must take full precautions. After the transfer or discharge of patients, the room in which they were located must also be sanitized following the established procedure. The head of the department is obliged to draw up a list of employees who have been in contact with the infected patient and provide it to the administration of the medical institution to organize the examination of the personnel and resolve the issue of their isolation. In the absence of cases of detection of CVI, the sanitation of the premises should be carried out in the prescribed manner. All patients are instructed to comply with generally accepted safety measures (wearing masks and washing hands) while in the hospital. In order to identify cases of infection among medical personnel, all employees are recommended to conduct daily thermometry.

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