



Optimize the management of urological tube-related emergencies during the coronavirus disease 2019 (COVID-19) pandemic

Yang Luan^{1,2}, Yan Zhang^{1,2}, Kai Cui^{1,2}, Fan Li^{1,2}, Baolong Qin^{1,2}, Yajun Ruan^{1,2}, Kun Tang^{1,2}, Hongyang Jiang^{1,2}, Hao Li^{1,2}, Xiaoyi Yuan^{1,2}, Zhuo Liu^{1,2}, Xiaming Liu^{1,2}, Gan Yu^{1,2}, Shengfei Xu^{1,2}, Ruibao Chen^{1,2}, Huan Yang^{1,2}, Xiaolin Guo^{1,2}, Xiaoyong Zeng^{1,2}, Zhong Chen^{1,2}, Zhiqiang Chen^{1,2}, Zhiquan Hu^{1,2}, Xiaodong Song^{1,2}, Zhihua Wang^{1,2}, Shaogang Wang^{1,2}, Jihong Liu^{1,2}, Tao Wang^{1,2}

¹Department of Urology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China; ²Institute of Urology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

Contributions: (I) Conception and design: Y Luan, Y Zhang, K Cui, F Li, B Qin, Y Ruan, K Tang, J Liu, T Wang; (II) Administrative support: X Guo, X Zeng, Z Chen, Z Chen, Z Hu, X Song, Z Wang, S Wang, J Liu, T Wang; (III) Provision of study materials or patients: Y Luan, Y Zhang, K Cui, F Li, B Qin, Y Ruan, K Tang, H Jiang, H Li, X Yuan, Z Liu, X Liu, G Yu, S Xu, R Chen, H Yang; (IV) Collection and assembly of data: Y Luan, Y Zhang, K Cui, F Li, B Qin, Y Ruan, K Tang; (V) Data analysis and interpretation: Y Luan, Y Zhang, KaCui; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Tao Wang. Department of Urology, Institute of Urology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, 1095 Jiefang Avenue, Qiaokou District, Wuhan 430030, China. Email: twang@tjh.tjmu.edu.cn.

Background: To introduce and determine the value of optimized strategies for the management of urological tube-related emergencies with increased incidence, complexity and operational risk during the global spread of coronavirus disease 2019 (COVID-19).

Methods: All emergent urological patients at Tongji Hospital, Wuhan, during the period of January 23 (the beginning of lockdown in Wuhan) to March 23, 2020, and the corresponding period in 2019 were recruited to form this study's COVID-19 group and control group, respectively. Tongji Hospital has the most concentrated and strongest Chinese medical teams to treat the largest number of severe COVID-19 patients. Patients in the control group were routinely treated, while patients in the COVID-19 group were managed following the optimized principles and strategies. The case incidence for each type of tube-related emergency was recorded. Baseline characteristics and management outcomes (surgery time, secondary complex operation rate, readmission rate, COVID-19 infection rate) were analyzed and compared across the control and COVID-19 periods.

Results: The total emergent urological patients during the COVID-19 period was 42, whereas during the control period, it was 124. The incidence of tube-related emergencies increased from 53% to 88% ($P < 0.001$) during the COVID-19 period. In particular, the incidence of nephrostomy tube-related (31% *vs.* 15%, $P = 0.027$) and single-J stent-related problems (19% *vs.* 6%, $P = 0.009$) increased significantly. The mean surgery times across the two periods were comparable. The number of secondary complex operations increased from 12 (18%) to 14 (38%) ($P = 0.028$) during the COVID 19-period. The number of 2-week postoperative readmission decreased from 10 (15%) to 1 (3%) ($P = 0.049$). No participants contracted during the COVID-19 period.

Conclusions: Urological tube-related emergencies have been found to have a higher incidence and require more complicated and dangerous operations during the COVID-19 pandemic. However, the optimized management strategies introduced in this study are efficient, and safe for both urologists and patients.

Keywords: Coronavirus disease 2019 (COVID-19); urological tube-related emergency; surgery time; readmission; secondary complex operation

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Introduction

According to the latest data from Johns Hopkins University, more than 43 million individuals in 189 countries, including many medical professionals, have been diagnosed with coronavirus disease 2019 (COVID-19). More than 1.15 million patients had died by October 26, 2020. During the pandemic, medical resources are being fully used to ensure the prevention and control of COVID-19. Urology practices, including specialist clinics, outpatient procedures, and the use of operating theatres, have dramatically decreased (1,2). It tends to result in ignorance and the delayed treatment of urological problems. Emergent urological problems need to be concerned and treated immediately; otherwise, they will cause serious renal failure or even worse. Common urinary emergencies include urinary retention, renal colic, hydronephrosis and anuria, urological tubes obstruction and dislodgment during the COVID-19 period. Most of these urological emergencies are directly related to or could be effectively solved by urological tubes.

However, routine management strategies may be not suitable at this time given the high exposure risk and operation complexity. Difficult urological tube-related emergent operations may be increasing due to the inconvenience of seeing a doctor and complicated operations caused by treatment circumstances, protective measures, and the possibility of infection with COVID-19 during the pandemic. Therefore, it is important to pay closer attention to the management of tube-related urological emergencies. Common problems include: (I) difficulty inserting urinary catheter caused by severe prostatic hyperplasia, urethral stricture, and urinary tract damage; (II) failure to drainage urine due to bladder clots clogging; (III) difficulty dredging or replacing nephrostomy/cystostomy tube; (IV) difficulty dredging or replacing single-J stent; (V) double-J stent retention-induced sickness. How to prepare a safe and effective plan to improve urological tube-related operations and how to balance COVID-19 prevention measures and emergency treatment during the pandemic merit investigation. To date, Tongji Hospital has the most concentrated and strongest medical teams from the whole country to treat the largest number of severe COVID-19 patients in Wuhan. Here, we investigate the case incidence changes in urological emergencies during the COVID-19 period. In addition, based on clinical practice, we optimize the management principles, strategies, and procedures for urological tube-

related emergencies and evaluate their safety as well as effectiveness during the COVID-19 pandemic.

We present the following article in accordance with the TREND reporting checklist (available at <http://dx.doi.org/10.21037/tau-20-1194>).

Methods

Patient population and data collection

All emergent urological patients at Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology from January 23 (the beginning of lockdown in Wuhan) to March 23, 2020, and the corresponding period in 2019 were recruited to form this study's COVID-19 group and control group, respectively. Patients in the control group were routinely treated for urological tube-related emergencies, while patients in the COVID-19 group were managed according to the optimized principles and strategies, as described in this article.

Data including baseline characteristics (gender, age, underlying diseases, tube retention time), emergent cases number and proportion, and management outcomes (surgery time, secondary complex operation rate, two-week postoperative readmission rate, COVID-19 infection rate) for urological tube-related emergencies were compared across groups to evaluate the value of the optimized strategies.

The study was conducted in accordance with the Helsinki Declaration (as revised in 2013) and approved by institutional research committee of Tongji Hospital (IRB Approval No. 215207-100). Written informed consent was obtained from all the patients.

Optimized principles and strategies for the management of urological tube-related emergencies

General principles

Evaluate the emergent situation in a non-contact way

Communicate with emergency doctors and patients to understand patients' medical histories and examination results using either voice or video call (e.g., WeChat). Evaluate the severity of each emergency by performing thorough examination. Develop preferred and alternative treatment plans before the preparation of the operating materials and entering the emergency department.

Screen for COVID-19 before performing any treatment

Conduct routine severe acute respiratory syndrome

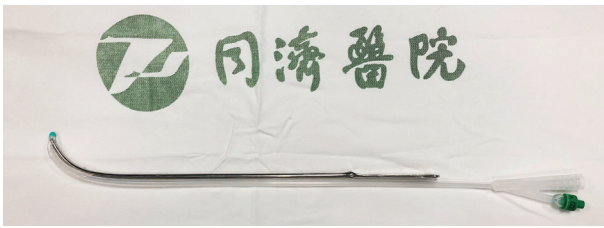


Figure 1 Arrangement of urethral probe and catheter in the integration method. Insert the front end of probe (8 or 10 Fr) into the side hole of catheter lubricated with sterile paraffin oil, and then insert them together into the urethra, which possess the smooth and tough features. Dilatation and insertion can be completed in one step.

coronavirus 2 (SARS-CoV-2) nucleic acid and antibody tests before performing any necessary urological inspections. Only life-threatening situations should be considered for immediate management.

Determine the timing of treatment cautiously

Regular replacement of urological tubes can be appropriately postponed until the pandemic is over as long as no obvious tube-related emergencies have occurred within the longest tube retention time. In case of tube obstruction, a patient can first try to flush the tube with sterile saline at home under the guidance of doctor by video call. For other tube-related problems, resolve current emergencies quickly and remove the etiologies when the pandemic is over.

Select simple and low-exposure operations, prioritizing operations with high success rates and the avoidance of multiple operations

Treatments should aim to rapidly relieve emergent conditions, provide urinary drainage, and protect renal function with minimally invasive methods. Treatments with simple steps, low accuracy requirements, short durations, and little body fluid contact are suggested to reduce potential exposure to the coronavirus. We suggest avoiding trying one method more than three times to prevent a prolonged operation. Operation methods and equipment with high success rates, rather than low cost, should be the first line of consideration. Carefully select procedures and check drainage patency postoperatively to reduce the need for multiple operations in the near future. Urological specialists with more than 5 years' work experience are best suited for performing these operations.

Perform operations at emergency bedside when possible

Perform operations in the emergency department to reduce

transfers. Minimizing endoscopic and surgical procedures as far as the circumstances allow will help reduce the probability of cross-infection and excessive consumption of medical resources.

Meet criteria for second-level protection

Surgeons should wear second-level protective equipment before entering the emergency department and making contact with the patients. Minimize the number of surgeons and take only the necessary instruments into the operating area. Patients should wear medical protective masks if available.

The detailed management procedures for difficult urinary catheterization (*Figures 1,2*), bladder clot clogging (*Figure 3*), dislodgment or obstruction of nephrostomy/cystostomy tube (*Figure 4*), dislodgment or obstruction of single-J stent (*Figure 5*), and sickness caused by double-J stent retention are listed in the [Supplementary method section](#).

Statistical analysis

The case numbers (constituent ratio) across the two groups were statistically analyzed and compared using a two-tailed chi-square test. The age and time indices were presented as the mean \pm standard deviation (SD) and analyzed using the Student's *t*-test in Prism 6. A two-sided *P* value <0.05 was considered statistically significant.

Results

We gathered and analyzed all 2-month urological emergent clinic visit data from Tongji Hospital from January 23, 2020 (the beginning of lockdown in Wuhan) to March 23, 2020, and the corresponding period in 2019 (*Table 1*). The total number of urological emergent patients dropped to 42, barely the one-third of the number in 2019. The incidence of tube-related emergencies reached 88% in 2020, which is significantly higher than that of 53% in 2019 [relative risk (RR) 1.7, 95% CI: 1.4–2.0, $P<0.001$]. The percentage of non-tube-related emergencies, such as urinary tract injuries and testicular torsion, was dramatically decreased from 47% to 12%.

Apart from the higher mean age seen during the COVID-19 period (69 ± 13 vs. 55 ± 8 years old, $P=0.042$), the baseline characteristics of patients with tube-related emergencies across the two periods were unchanged. In terms of management outcomes, the mean surgery times (17.7 ± 4.2 vs. 18.4 ± 10.5 min, $P=0.950$) were comparable.

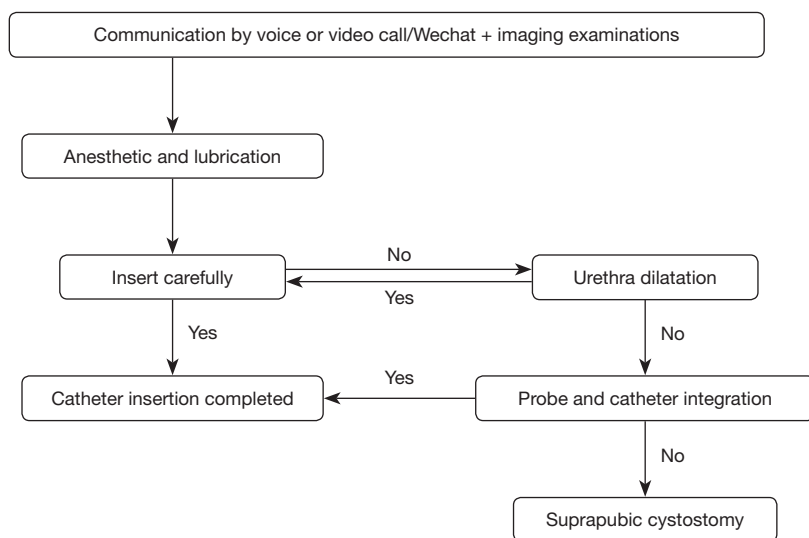


Figure 2 Medical procedures for difficulty inserting urinary catheterization. Fully understand patients’ basic condition and medical history and judge the filling degree of bladder by ultrasonography. Anaesthetize and lubricate urethral mucosa before careful insertion of silica gel catheter with suitable size. If fail, urethra dilatation, probe and catheter integrative insertion, or suprapubic cystostomy can be chosen step by step.

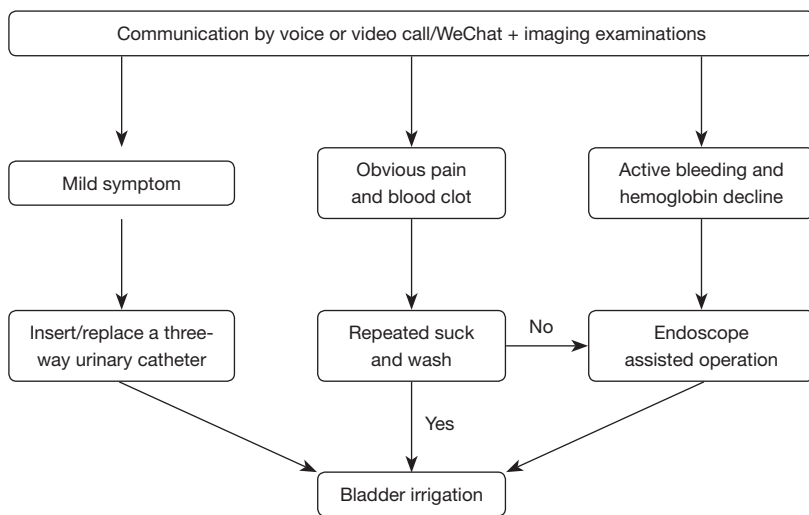


Figure 3 Medical procedures for bladder blood clots clogging. Judge the bleeding severity and source of blood clot by medical history, blood test and urinary imaging examination. Insert/replace a three-way urinary catheter and choose to suck and wash or endoscope assisted operation according to the severity of bleeding and obstruction.

The secondary complex operation rate, which reflects the difficulty of operation and includes all operations except direct tube/stent insertion or bladder irrigation, was higher in the COVID-19 group (38%) than it was in control group (18%) (RR 2.1, 95% CI: 1.1–4.0, P=0.028). This mainly resulted from the increased complexity of replacing

nephrostomy/cystostomy/single-J tubes/stents during the COVID-19 period, although none of the specific tube-related emergencies had statistical significance. However, the 2-week postoperative readmission rate was significantly lower in the COVID-19 group (3%) than it was of control group (15%) (RR 0.18, 95% CI: 0.02–1.30, P=0.049). Most

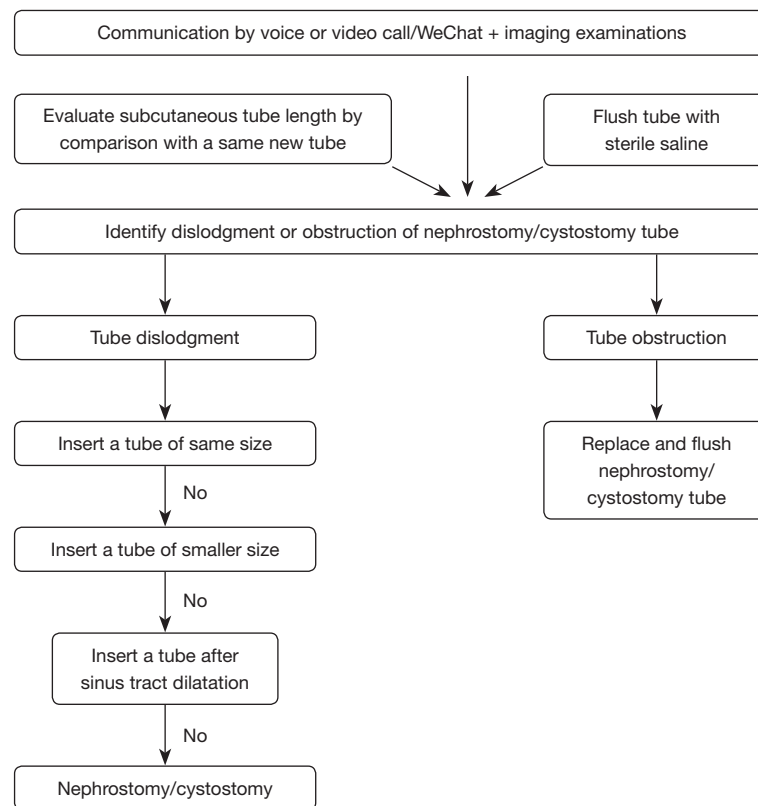


Figure 4 Medical procedures for dislodgment or obstruction of nephrostomy/cystostomy tube. Detect hydronephrosis, urine retention and the position of nephrostomy/cystostomy tube by medical history and imaging examination. Then, Identify the dislodgment or obstruction of nephrostomy/cystostomy tube. Insert a same or small size tube when nephrostomy/cystostomy tube is dislodged. If failed, try sinus tract dilatation with the guidance of a stiff guidewire or puncture again. Replace and flush nephrostomy/cystostomy tube when obstruction occur.

of readmissions that occurred in the control group were due to the recurrence of tube obstruction after a simple rinse of blocked tubes. Neither the surgeons nor the enrolled patients were found to be infected by SARS-CoV-2 within two weeks postoperatively.

Of all of the tube-related emergencies, nephrostomy tube-related (31% *vs.* 15%, RR 2.0, 95% CI: 1.1–3.7, $P=0.027$) and single-J stent-related (19% *vs.* 6%, RR 3.4, 95% CI: 1.3–8.7, $P=0.009$) problems were the most significantly elevated in the COVID-19 group. In the COVID-19 group, the obstruction rates for nephrostomy (46% *vs.* 11%, $P=0.022$) and cystostomy tubes (43% *vs.* 0%, $P=0.014$) increased, while their dislodgment rates decreased. The incidence and complexity of difficult urinary catheterizations, bladder clots, and sickness caused by double-J stent retention were similar across both groups.

Of the 27 patients who experienced tubes obstruction (urinary catheter, nephrostomy tube, cystostomy tube, or

single-J stent), 13 patients (48%) successfully dredged their tubes using sterile saline with video guidance from medical staff and did not need to visit the hospital. The remaining 14 patients (52%) had especially severe or prolonged tube obstruction and were unable to dredge their tubes themselves. These patients ultimately went to emergency department for further management.

Discussion

Although COVID-19 seems to have a distant relationship with urinary diseases, most of urological patients are elderly individuals with relatively lower immunity and multiple underlying diseases. This makes them highly susceptible to SARS-CoV-2, and severe cases of it at that. In addition, COVID-19 is likely to cause renal failure once urinary obstruction occurs, and failure to promptly protect against or treat this condition could be life-threatening (3).

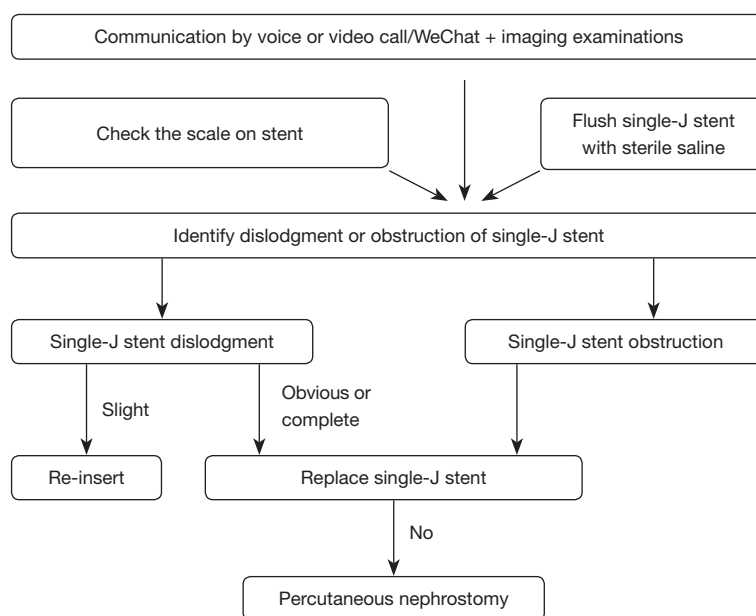


Figure 5 Medical procedures for dislodgment or obstruction of single-J stent. Detect hydronephrosis and the position of single-J stent by medical history and imaging examination. Then, identify dislodgment or obstruction of single-J stent. Slight dislodgment can be re-inserted, while obvious/complete dislodgment or obstruction should replace a new single-J stent. If fail to insert a guidewire to pelvis, try to fix a bilateral open-ended ureteral catheter and detect the ureteral lumen with a hydrophilic guidewire. If all methods above do not work, percutaneous nephrostomy is suggested.

Our data showed an increased incidence of tube-related emergencies compared to other emergent problems during the COVID-19 period. In addition, the higher secondary complex operation rate suggests the increased complications associated with tube-related emergent operations during the pandemic, a finding which is in accordance with a recent report (4). These situations may be attributed to the delayed replacement of tubes, less social activity, the postponement of treatment due to a fear of infection as well as the inconvenience of traveling to the hospital, and interference with operational accuracy caused by protective equipment. Therefore, these patients merit attention.

The optimized strategies give priority to operation success rates and the avoidance of multiple operations. Many optimized procedures, such as the direct replacement of obstructed tubes instead of simple rinses, the thoroughly flushing out of clots or sediment, and the checking of patency after operation, ensured operational effectiveness and lower readmission rates within a short period of time postoperatively. This in turn reduce the exposure risk for both doctors and patients. It is important to note that when doctors followed the optimized operation principles and strategies, the mean surgery time during the COVID-19

period was comparable to that of the control period, although the doctors' vision and movement were greatly impacted by the protective equipment and the operational complexity was elevated. The optimized strategies compensated for surgery time by promoting adequate evaluation and preparation, the selection of simple and reliable operations, and reduced attempts to use methods with low success rates. These data demonstrated that the optimized strategies can guarantee the success rate and efficiency of urological tube-related emergent operations.

SARS-CoV-2 is known to be transmitted through the respiratory tract, close contact, and aerosolized particles (5,6). Recently it has been isolated from the urine of COVID-19 patients, suggesting that contact with patients' urine may also become a potential route of infection (7). Some studies have shown that 30–60% of the SARS-CoV-2-infected population may be asymptomatic and tested negatively during the early phase of infection; however, these individuals may still be capable of infecting others (7-11). Operational urologists are exposed to a high infection risk by coming into contact with patients' breath/blood/urine while performing urological tube-related procedures. Therefore, the optimized strategies

Table 1 Contemporary comparison of urological emergencies in Tongji Hospital during COVID-19 and control period

Urological emergencies	COVID-19 period (2020.01.23–2020.03.23)	Control period (2019.01.23–2019.03.23)
Overall		
No. of total urological emergencies	42	124
No. [%] of non-tube-related emergencies	5 [12]*	58 [47]*
No. [%] of tube-related emergencies	37 [88]*	66 [53]*
Male [%]	23 [62]	39 [59]
Female [%]	14 [38]	27 [41]
Age, mean ± SD, years	69±13*	55±8*
No. [%] of underlying diseases	15 [41]	18 [27]
Total tube retention time, mean ± SD, years	3.1±2.9	2.2±1.5
Last tube retention time, mean ± SD, months	1.8±1.1	1.1±0.4
Surgery time, mean ± SD, min	17.7±4.2	18.4±10.5
No. [%] of secondary complex operation [†]	14 [38]*	12 [18]*
No. [%] of postoperative readmission [‡]	1 [3]*	10 [15]*
No. [%] of operator infection [§]	0 [0]	–
No. [%] of patient infection [¶]	0 [0]	–
Specific emergency		
No. [%] of difficult urinary catheterization	7 [17]	22 [18]
No. [%] of secondary complex operation [†]	3 [43]	4 [18]
No. [%] of bladder clot	1 [2]	1 [1]
No. [%] of secondary complex operation [†]	1 [100]	1 [100]
No. [%] of nephrostomy tube	13 [31]*	19 [15]*
No. [%] of obstruction	6 [46]*	2 [11]*
No. [%] of dislodgment	7 [54]*	17 [90]*
No. [%] of secondary complex operation [†]	6 [46]	5 [26]
No. [%] of cystostomy tube	7 [17]	12 [10]
No. [%] of obstruction	3 [43]*	0 [0]*
No. [%] of dislodgment	4 [57]*	12 [100]*
No. [%] of secondary complex operation [†]	2 [29]	1 [8]
No. [%] of single-J stent	8 [19]**	7 [6]**
No. [%] of obstruction	6 [75]	5 [71]
No. [%] of dislodgment	2 [25]	2 [29]
No. [%] of secondary complex operation [†]	2 [25]	1 [14]
No. [%] of double-J stent	1 [2]	5 [4]

*, P<0.05; **, P<0.01 of comparison between the COVID-19 and control period. [†], all operations except direct tube/stent insertion or bladder irrigation (including dilatation, wire or endoscope guidance, puncture, clot suck, bladder hemostasis, etc.); [‡], readmission to emergency department within two weeks after operations; [§], suspected or confirmed COVID-19 infection of operator within two weeks after operations; [¶], suspected or confirmed COVID-19 infection of patient within two weeks after operations.

suggest standard second-level protection when entering the contaminated areas and making contact with patients during the pandemic. Performing simple and low-exposure operations, controlling surgery time, and decreasing the need for multiple operations also help to prevent surgeons and patients from becoming infected with SARS-CoV-2. The lack of COVID-19 infections among all participants in this study indicate the safety of the optimized strategies.

Some limitations existed in this study. First, in order to decrease the exposure risk of all of our participants, we did not set control group with patients under routine management during COVID-19 period. This prevented us from making additional comparisons. Second, the study focused on a single hospital and used a relatively small sample size and short follow-up period. Third, the cost effectiveness property of the optimized strategies was not evaluated.

Conclusions

Urological tube-related emergencies have been found to have a higher incidence and require more complicated and dangerous for operations during the COVID-19 period. However, the principles, strategies, and procedures of the optimized management introduced in this study are efficient, and safe for both urologists and patients during the COVID-19 pandemic.

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Footnote

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Data Sharing Statement: Available at <http://dx.doi.org/10.21037/tau-20-1194>

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Helsinki Declaration (as revised in 2013) and approved by institutional research committee of Tongji Hospital (IRB Approval No. 215207-100). Written informed consent was obtained from all the patients.

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References

1. Chan MC, Yeo SEK, Chong YL, et al. Stepping Forward: Urologists' Efforts During the COVID-19 Outbreak in Singapore. *Eur Urol* 2020;78:e38-9.
2. Ahmed K, Hayat S, Dasgupta P. Global challenges to urology practice during the COVID-19 pandemic. *BJU Int* 2020;125:E5-6.
3. Wang Y, Yang C, Xiao J, et al. Suggestions on the diagnosis and control of urology in the context of pneumonitis with new coronavirus infection. *Journal of Modern Urology* 2020;2:95-100.
4. Puliatti S, Eissa A, Eissa R, et al. COVID-19 and urology: a comprehensive review of the literature. *BJU Int* 2020;125:E7-14.
5. Ong SWX, Tan YK, Chia PY, et al. Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient. *JAMA* 2020;323:1610-2.
6. WHO Infection Prevention and Control Guidance for COVID-19. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control>
7. General Office of the National Health and Health Commission. Notice on Printing and Distributing the Pneumonia Diagnosis and Treatment Plan for the New

- Coronavirus Infection (Trial Version 7) [EB/OL]. Available online: <http://www.nhc.gov.cn>
8. Wang C, Liu L, Hao X, et al. Evolving Epidemiology and Impact of Non-pharmaceutical Interventions on the Outbreak of Coronavirus Disease 2019 in Wuhan, China. medRxiv 2020. doi: 10.1101/2020.03.03.20030593.
 9. Nishiura H, Kobayashi T, Suzuki A, et al. Estimation of the asymptomatic ratio of novel coronavirus infections (COVID-19). Int J Infect Dis 2020;94:154-5.
 10. Wölfel R, Corman VM, Guggemos W, et al. Virological assessment of hospitalized patients with COVID-2019. Nature 2020;581:465-9.
 11. He X, Lau EHY, Wu P, et al. Temporal dynamics in viral shedding and transmissibility of COVID-19. Nat Med 2020;26:672-5.

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