IMPACT OF COVID–19 ON UROLOGICAL INTERVENTIONS AT TERTIARY REFERRAL HOSPITAL

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ABSTRACT

Objective: *This study aims to identify and evaluate the impact of COVID-19 on urological interventions at Soetomo general-academic hospital as the tertiary referral center.* ***Material & Methods:*** *This study is a descriptive-retrospective, single-center study that included all confirmed cases of COVID-19 in urological patients from March 1, 2020 until December 31, 2021 at Soetomo general-academic hospital. We investigated these patients' characteristics, focusing on the demography, clinical data, and eventual outcome. Patient's gender, age, primary urological presentation, COVID-19-related symptom, comorbidity, chest x-ray result, and laboratory value were among the involved variables. The patient's outcome was categorized into death, delayed intervention, or intervention as scheduled.* ***Results:*** *Seventy-seven patients were enrolled, with a mean age of 44.2 years. Fever was found in 42 (54%) patients and respiratory symptoms in 32 (41.5%) patients. An NLR value of >6 was found in 55.8% of patients. A total of 18 patients experienced LUTS (23.4%), 33 patients presented with hematuria (42.9%), and 30 patients had urinary tract infections (39%). Nineteen out of 77 patients (27.3%) died before intervention. On the other hand, surgical intervention in 37 (66%) patients were delayed due to self-isolation, while intervention in 19 (34%) patients was performed as scheduled due to their emergency nature.* ***Conclusion:*** *Urological patients infected with COVID-19 were impacted by the delay of surgical procedures and mortality in the first 22 months of the pandemic.*

Keywords: *COVID-19, urological intervention.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk mengidentifikasi dan mengevaluasi dampak COVID-19 pada intervensi urologis di rumah sakit rujukan pendidikan tersier RSUD Dr. Soetomo.* ***Bahan & Cara:*** *Penelitian ini merupakan penelitian retrospektif deskriptif single-center yang mencakup seluruh kasus COVID-19 yang terkonfirmasi pada pasien urologi dari 1 Maret 2020 hingga 31 Desember 2021 di RSUD Dr. Soetomo. Dilakukan evaluasi karakteristik pasien yang berfokus pada demografi, data klinis, dan outcome. Jenis kelamin, usia, manifestasi urologis primer, gejala terkait COVID-19, komorbiditas, hasil foto toraks, dan nilai laboratorium termasuk dalam variable penelitian. Outcome pasien dikategorikan menjadi kematian, intervensi tertunda, atau intervensi sesuai jadwal.* ***Hasil:*** *Tujuh puluh tujuh pasien yang terdaftar memiliki usia rata-rata 44.2 tahun. Demam ditemukan pada 42 (54%) pasien, dan gejala pernapasan pada 32 (41.5%) pasien. Nilai NLR >6 ditemukan pada 55.8% pasien. Sebanyak 18 pasien mengalami LUTS (23.4%), 33 pasien mengalami hematuria (42.9%), dan 30 pasien mengalami infeksi saluran kemih (39%). Sembilan belas dari 77 pasien (27.3%) meninggal sebelum dilakukan intervensi. Di sisi lain, intervensi bedah pada 37 (66%) pasien tertunda karena isolasi mandiri, sedangkan intervensi pada 19 (34%) pasien dilakukan sesuai jadwal karena sifatnya yang darurat.* ***Simpulan:*** *Infeksi COVID-19 pada pasien urologi berdampak pada penundaan prosedur operasi dan mortalitas dalam 22 bulan pertama masa pandemi.*

Kata kunci: *COVID-19, intervensi urologi.*

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a disease caused by a novel virus known as Severe Acute Respiratory Syndrome Coronavirus-2 or SARS-CoV-2.[1] This virus is among a group of the beta coronavirus genus and sarbecovirus subgenus, which is also the same viral genus that previously causes Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS)[1].

This disease has spread throughout the world and, since December 2019, has been classified by WHO as a global pandemic.[2]

The mechanism of transmission of SARS-CoV-2 is primarily through droplets. Notably, the virus is most contagious when the patient exhibits active symptoms. However, there is sufficient evidence to suggest that human-to-human transmission can occur during the estimated asymptomatic incubation period of COVID-19, which is approximately 2-10 days.[3] SARS-CoV-2 infection can be either asymptomatic or cause various symptoms, from mild upper respiratory tract infection to potentially life-threatening sepsis. Common symptoms include fever, cough, and dyspnea or shortness of breath.[1]

The increasing number of COVID-19 cases has resulted in a decline in health services in various fields. Many hospitals separate care wards into two patient categories, i.e., confirmed and negative COVID-19 patients. Consequently, there has been a change in the overall healthcare service system, including in the field of urology. Several studies have shown a drastic reduction in the number of visiting patients with urological symptoms, and many urological procedures were delayed during the recent pandemic.4 Numerous urological centers in Italy documented an intervention rate of only 50% less than the pre-pandemic period.

OBJECTIVE

In light of these circumstances, the present work aims to identify and evaluate the impact of COVID–19 on urological interventions at a tertiary academic referral hospital. This study is expected to provide valuable insight into the characteristics and outcomes of urological patients affected by COVID-19 to reduce patient morbidity and mortality.

MATERIAL & METHODS

This study was a descriptive retrospective cohort study from March 2020 to December 2021. The sample in this study was the medical records of all Urology patients diagnosed with COVID-19 infection that meets the inclusion and exclusion criteria. The sampling technique is total sampling. The data required in this study was entirely sampled from all urological patients with COVID-19 infection in Dr. Soetomo General Hospital. The endpoint was to identify and evaluate the impact of COVID-19 on urological interventions at a tertiary academic referral hospital.

The inclusion criteria were patients treated by or with the Department of Urology Dr. Soetomo Hospital for March 2020 to December 2021; the patient was diagnosed with COVID-19 infection from the RT-PCR Swab results patient underwent laboratory and radiological examinations. Patients were excluded if they were active/post-pulmonary TB patients with COPD history and incomplete medical record data. Confirmed COVID-19 cases served as the independent variables.

The data taken were the number of patients, gender, age, male-to-female ratio, types of diseases in the field of urology, comorbidities, clinical symptoms of COVID-19 infection, laboratory values, chest x-ray results, and patient outcomes. The patient's outcome as the dependent variable was categorized into death, delayed intervention, or intervention as scheduled. The collected data are grouped and displayed descriptively in tables and narratives. The hospital ethical committee approved this study (070/742/102.6.3.3/Litb/2022).

RESULTS

This study involved 77 patients comprising 47 and 30 male and female patients. The mean age of all enrolled patients was 44.2 ± 18.9 years old. The most common clinical presentation is hematuria, with 42.9% of patients presenting with symptoms suggestive of hematuria at the first encounter. Genitourinary infection was found in 39% of patients. Urgency, frequency, and post-voiding lower urinary tract symptoms (LUTS) were the primary symptoms of 23.4% of patients. Fever is a more common occurrence than respiratory symptoms. Cough or shortness of breath was present in 41.6% of patients.

Malignancy is the most common comorbidity associated with the patient population. A total of 51.9% of patients were diagnosed with malignancy. Hypertension and diabetes mellitus (DM) were found in 37.7% and 23.4% of patients, respectively. Chronic kidney disease (CKD) was also prevalent comorbidity with 33.8%. Chest x-ray results of particular concern are the appearance of pulmonary inflammation. Twenty-six patients (33.8%) had pneumonia obtained from chest x-ray imaging. The patients' profile is shown in Table 1.

Table 1. Clinical characteristics data of urological patients co-infected with COVID – 19

Patients' Profile	N (%)
Demographic data	
Male	47 (61.0)
Female	30 (39.0)
Age (mean ± sd)	44.2 ± 18.9
Clinical presentations	
LUTS	18 (23.4)
Hematuria	33 (42.9)
UTI	30 (39.0)
Co-infection COVID-19 symptoms	
Fever	42 (54.5)
Respiratory symptoms	32 (41.6)
Comorbidities	
DM	18 (23.4)
Hypertension	29 (37.7)
Malignancy	40 (51.9)
CKD	26 (33.8)
Chest x-ray	
Pneumonia	26 (33.8)

The hemoglobin level of the patient population was 9.9 ± 2.9 mg/dL. Leukocytosis was prevalent, with a mean value of 14.87 ± 11.13 (x 109/L). An NLR value of > 6 was found in 55.8% of patients. Moreover, the NLR value of > 6 was reported in all but one patient. The serum creatinine value, categorized with a cut-off value of 1.5 mg/dL, showed that 36.4% of the population had a value above 1.5 mg/dL. There was a substantial difference in serum creatinine change, with 74% of patients having an elevated serum creatinine level. Liver function tests result were categorized with the cut-off value of 40 U/L and 30 U/L for SGOT and SGPT, respectively. 22.1% and 26% of the study population showed an increase in SGOT and SGPT. The laboratory profile of the patients is summarized in Table 2.

Outcomes at the end of the study follow-up were divided into patients who died, patients whose surgery was postponed or undergoing self-isolation, and patients who underwent surgery as scheduled, either surgery with the COVID-19 protocol or surgery after the patient tested negative for COVID-19 (Table 3, Figure 1). During the COVID-19 pandemic, surgical interventions in 24.7% of the admitted patients were performed as scheduled. Surgical interventions in 48% of patients are delayed because of self-isolation.

Table 2. Laboratory parameters of urological patients co-infected with COVID – 19

Laboratory Parameters	N (%)	
NLR[a]	43 (55.8)	34 (44.2)
NLR in mortalities[a]	20 (95.2)	1 (4.8)
Creatine Serum in Covid-19 positive[b]	28 (36.4)	49 (63.6)
Creatine serum changes[c]	57 (74)	20 (26)
SGOT[d]	17 (22.1)	60 (77.9)
SGPT[e]	20 (26)	57 (74)
Hemoglobin (mean ± SD)	9.9 ± 2.9	
Leukocyte (mean ± SD)	14.87 ± 11.13	

Left to right column with clustered laboratory value: a. above and below 6 x 109/L; b. above and below 1.5 mg/dL; c. elevated and stagnant/decreased; d. above and below 40 U/L; e. above and below 30 U/L.

Table 3. Patients' outcome of urological patients co-infected with COVID – 19.

Patients' Outcome	N (%)
Death	21 (27.3)
Delayed surgical interventions	37 (48.0)
On-time surgical interventions	19 (24.7)

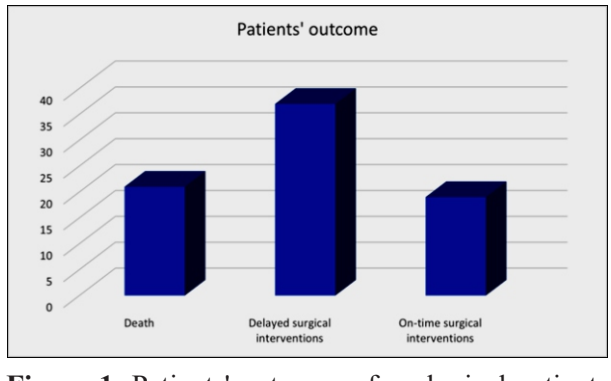

Figure 1. Patients' outcome of urological patients co-infected with COVID – 19.

DISCUSSION

The new virus that causes COVID-19 was first reported in Wuhan, China, in late December 2019, and the World Health Organization (WHO) declared the COVID-19 pandemic in March 2020. The COVID-19 pandemic is testing healthcare systems around the world. As most urology departments treat patients with COVID-19, the number of surgeries in the field of urology is also decreasing.[5]

During the two years of the pandemic, there was a decrease in the number of visits to the Urology Polyclinic at Dr. Soetomo General Hospital, which is aligned with the decline in elective surgeries. The number of emergency room patients who experienced urology emergencies decreased by > 50% during 2020-2021. Most of the cases were COVID-19 cases and consultations from another department. From several healthcare centers in the world, it is known that there has been a decrease in cases of patients visiting with urological complaints. In a study conducted in the Tessin region, Switzerland, evaluating the number of patients admitted with urological complaints for two years, the number decreased by 39% annually.[6] Another study in Porto, Portugal, also showed the same results. There was a decrease in the number of patient visits with urological complaints by 46.4%, from 263 patients in 2019 compared to 122 patients during the pandemic.[7]

Urology patients with confirmed COVID-19 visiting Dr. Soetomo General Hospital from March 2020 to December 2021 were predominantly male, 61%, compared to 39% female patients. Currently, available data from most countries in the world report higher disease severity and mortality rates in males than females.[8] Factors influencing this difference include immune function, sex hormones, hygiene, and habits such as higher smoking rates.[9]

We evaluated the clinical presentation of the study sample, lower urinary tract symptoms (LUTS) were found in as many as 23.4% of urological patients infected with COVID-19. De novo urinary symptoms associated with COVID-19 infection, such as increased frequency and nocturia, have been reported in a previous study.[10] Another study said that in the acute stage of COVID-19 disease, IPSS scores were significantly higher than before in patients aged > 50 years.[11]

Symptoms of COVID-19 co-infection shown in urological patients included fever in 54.5% of patients and respiratory symptoms in the form of shortness of breath or cough in 41.6% of patients. This is in accordance with the clinical presentation of COVID-19 infection, where most of the infected population will experience symptoms such as fever, headache, cough, and diarrhea, while a small proportion of the population progresses to severe and life-threatening acute respiratory insufficiency.[12]

Normal blood parameters in COVID-19 may show abnormal values. This study reported that the average hemoglobin level was within normal limits while the mean leukocyte level significantly increased. Several studies have shown that levels of lymphocytes, platelets, hemoglobin, and albumin decrease in COVID-19 patients. Meanwhile, blood sugar, LDH, IL-6, CRP, ESR, creatine kinase, d-dimer, and procalcitonin showed an increase. However, routine examination of the laboratory above parameters can only offer an indication of infection and has low specificity, so these parameters cannot be used to confirm the diagnosis of COVID- 19.[13-14]

The neutrophil-to-lymphocyte ratio is also one of the most studied predictive parameters in COVID-19 patients. The study population showed an average NLR value of 10.53. Patients admitted in 2020 showed a higher mean NLR of 12.15 compared to 9.00 in 2021. The study by Rose reported that a high baseline NLR was associated with increased disease severity and unfavorable outcomes. An NLR > 6.11 at baseline has been associated with a high risk for mortality, although available data are strongly influenced by age, gender, and comorbidities. Not only NLR at admission, but longitudinal NLR during hospitalization can provide an overview of the risk of disease progression. NLR can offer a cost-effective screening tool to detect patients at high risk of worsening.[15]

Serum creatinine is one indicator of kidney health, which describes the incidence of Acute Kidney Injury (AKI). The results showed higher serum creatinine after COVID-19 infection. A study by Ebner reported that AKI is common in COVID-19 patients, and the incidence increases with disease severity.[16] AKI can affect the treatment choice in patients and the outcome of urological patients with COVID-19.

During the pandemic, there was a progressive and significant decrease in overall access to urgent urological care and cases which required emergency surgical treatment at Dr. Soetomo Hospital compared to before the pandemic. The reduction in the number of accesses might be justified because of the restriction implemented in Surabaya. Restrictions on movement except for necessities, work, and health conditions (the so-called lockdown) in response to the pandemic may explain the reduction in patients accessing "non-essential" urgent urology consultations. In addition, staying home, resting, and avoiding sports/outdoor activities may lower the risk of certain urology conditions.[4] Urological surgery was performed in 24.7% of cases, with the most common urological

disease including hydronephrosis, renal and ureteral stones, benign prostatic obstruction, blood clot retention, and renal or perirenal abscess. Surgical procedures for emergency urological trauma and urological infections (Fournier's gangrene, abscess requiring drainage, infected implant, etc.) are the top priority. Given this rare condition's "emergency" nature, this surgical condition should not be postponed.[17]

On the other hand, this study revealed that 37 (48%) patients had postponed surgical intervention, and 21 (27.3%) cases resulted in death. A study by Heinze reported that COVID-19-positive patients were operated on only in the urgent situation in 57.9% of centers surveyed by EAU, while only 8.4% of centers performed surgery for elective cases.[18] The recommendation by 11 (85%) European national and international urological associations/societies at the start of the COVID-19 pandemic was to postpone surgical procedures for functional/reconstructive conditions, urogynecology, and andrological diseases (including infertility). Urology elective surgeries should be delayed in areas with a high COVID-19 caseload due to the limited availability of ventilators, manpower, and hospital beds.[17,19]

In this study, the mortality rate for urological patients co-infected with COVID-19 is 27.3% (21 out of 77 patients), and malignancy is the most common comorbidity (51.9% of all study samples). A study suggests that delayed onco-urological surgery may have an impact on short-term progression and mortality.[5,19]

COVID Collaborative study reported 30-day postoperative outcomes from a cohort study in 24 countries and found 71.5% (806 out of 1,128) of SARS-CoV-2 infection and 51.2% of pulmonary complications in the postoperative period with an overall mortality rate of 23.8%. The complication rates were higher in older age (>70 years), male gender, emergency surgeries, and malignant surgeries.[20-21] The worldwide mortality rate for COVID-19 ranges from 2.3 to 5.6% and is significantly higher in the age group >80 years (8%).[21-22]

Cancer patients are more susceptible to infectious disease with a 3.5-fold increased risk of COVID-19-related severe events (39% vs. 8%, $P < 0.001$) in intensive care admission, need for mechanical ventilation, or mortality due to their immunocompromised state related to the nature of their malignancy and anti-cancer management (chemotherapy, radiotherapy, or surgery).[17,19]

Based on previous experience in China, the recommendation is to postpone elective cancer surgery or adjuvant chemotherapy in patients with stable cancer, increase protection for patients with cancer or cancer survivors, and surveillance or treatment in patients with cancer with COVID-19.[19]

Clear clinical pathways should be developed for healthcare professionals to perform surgery on COVID-19-positive patients. Patients with suspected COVID-19 requiring surgical intervention should be treated as positive until proven otherwise.[18] All healthcare workers, including urologists, must implement adequate protective strategies to guard against infection when treating patients with COVID-19.[4]

CONCLUSION

Based on our findings, we conclude that urological patients with COVID-19 were impacted by delay of surgical procedures and mortality in the first 22 months of the pandemic. Malignancy was the most common found comorbidity, whereas NLR value and leukocytosis were higher among deceased patients.

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