COVID-19 Pandemic and Patients with Urinary Stones. The experience of an Emergency Urological Covid Care Unit

A. Militaru[1,2], C. Bulai[1,2], C. Moldoveanu[1], D. Geogescu[1,2], C. Ene[1,2], S. Bălăcescu[1,2], A. Punga[1,2], P. Geavlete[1,2], R. Mulțescu[1], B. Geavlete[1,2]

[1] Department of Urology, "Saint John" Emergency Clinical Hospital, Bucharest, Romania
[2] 2University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania

ABSTRACT

Introduction and Objectives: Urinary lithiasis is one of the most common urological pathologies addressed in the emergency room in the COVID-19 era. This study evaluated urinary stones associated with SARS CoV-2 infection hospitalized in the Urology Clinic of St. John Emergency Clinical Hospital.

Materials and Methods: Patients with urinary stones and associated SARS-CoV-2 infection between October 2021 and February 2022 were included in the study. During this time, the unit was dedicated exclusively to Covid-positive patients. For a paraclinical evaluation, CT scans were performed of the thorax, abdomen, and pelvis, as well as a complete series of blood samples for SARS-CoV-2 infection.

Results: A total of 58 patients were studied. Of these, 44 had a mild form of SARS CoV-2 infection and 14 had moderate to severe disease. Of those with mild form, 6 patients benefited from expulsive medical treatment with anti-inflammatory, analgesic, and alpha-blockers, 3 cases with non-obstructive kidney stones were under observation, and 19 semi-rigid ureteroscopy were performed. In 13 cases, a JJ stent was fitted, and 3 patients underwent percutaneous nephrostomy, with urosepsis. Of the 14 cases with moderate/ severe form, 8 were fitted with a JJ stent, 3 with percutaneous nephrostomy, and in 2 patients with bladder stone, the hematuria was remitted with a vesical catheter. The evolution of patients with mild forms was favorable. Among the severe cases, 4 exhibited unfavorable evolution.

Conclusions: There is a tendency towards minimally invasive therapy for moderate and severe forms of SARS CoV-2 infection and at the same time the favorable evolution, without postoperative complications, for the mild form, in which complete primary treatment was practiced.

Keywords: COVID-19, Urinary stones, Renal colic, Double J stent, Ureteroscopy.

Correspondence to:
Dr. Catalin Bulai, M.D.
"Saint John" Emergency Clinical Hospital, Department of Urology
13 Vitan-Barzesti St., District 4, code 042122, Bucharest, Romania
Tel: +40749184205; Fax: +40213345970
e-mail: catalinandreib@gmail.com

Introduction and objectives

Urolithiasis, also known as kidney stone disease, is a common urological disorder that is one of the primary reasons patients come to the emergency room. Urolithiasis can have catastrophic repercussions for the patient if left untreated [1]. The frequency of developing stone disease in the United States is higher than in Europe. It is believed that the prevalence of stone disease is 13% among men and 7% among women in the United States [2], but in Europe, it is estimated to be between 5-9% [3].

Recent research shows urolithiasis prevalence is growing worldwide [4]. This trend can be attributed to various factors, including dietary choices, climate changes, socioeconomic conditions, and the co-occurrence of other diseases. After the initial episode of lithiasis, the recurrence rate for this condition was estimated to be around fifty percent after five years, and it could reach as high as seventy-five percent after twenty years [5,6].
The SARS-CoV-2 pandemic, a severe acute respiratory Coronavirus, is putting the world's healthcare system to an unprecedented test. Consequently, SARS-CoV-2 has a high death rate and infection rate.

In December 2019, Chinese officials announced the first COVID-19 case in Wuhan. After a month, researchers determined that SARS Coronavirus 2 (SARS CoV-2) was responsible for the illness [7, 8]. This virus, in turn, became global quickly. The World Health Organization (WHO) officially classified it as a pandemic on March 11, 2020 [9]. Since that time, there have been considerable cuts across the globe to the services provided by urology departments. In addition, there have been considerable cuts to the number of surgical procedures performed. This is with benign conditions suffering the most [10,11].

Upper urinary tract lithiasis is not a "benign" illness in the traditional sense because a blocked kidney can lead to serious complications such as acute renal failure, infection, and sepsis. In addition, the latter scenario might be extremely dangerous if emergency decompression of the collecting system is not carried out as quickly as possible [11, 12].

Due to a lack of operating rooms and the potential for SARS-CoV-2 infection among hospitalized patients [13, 14], many urology centers prioritize patients needing urgent surgical intervention. Even though most centers prioritize major uro-oncological surgery during the initial and second phases of SARS-CoV-2, it is impossible to indefinitely postpone surgeries for benign diseases like obstructing and/or symptomatic urolithiasis [13, 15].

Material and Methods

This publication is a retrospective study that was carried out based on the information obtained from a single center, specifically, the Urology Department of the Clinical Emergency Hospital "Saint John" that aims to evaluate patients with urinary stones and associated SARS CoV-2 infection between October 2021 and February 2022 were included in the study, during which time the unit was dedicated exclusively to Covid-positive patients. A complete series of specific blood samples for SARS CoV-2 infection, including a CT scan of the thorax, abdomen, and pelvis, and a urine culture were performed as part of the paraclinical evaluation. All patients' clinical observation sheets and electronic health data were reviewed to extract all pertinent information. Age, gender, hospitalization duration, and urological disease were the variables analyzed.

In addition, we looked at how urinary lithiasis was managed. Depending on the size of the stones, their location, their resonance on the urinary tract, the performance status of each patient, the values of the paraclinical parameters, as well as the degree of lung damage, we decided on conservative treatment, minimally invasive intervention by inserting a double J stent or a nephrostomy for urinary tract decompression, or elective treatment to remove the stone primarily.

Results

In this retrospective study, we evaluated 58 patients with urinary stones associated with SARS CoV-2 infection, during the period between October 2021 and February 2022. These patients were admitted to the Urology Department of "Saint John" Emergency Hospital. Of these, 38 (65.5%) were males, and 20

were females (34.5%). As for the age of the participants, it varied between 19 and 92 years, with an average age of 55.5. Regarding the degree of lung damage 44 (75.9%) were mild forms of SARS CoV-2 infection and 14 (24.1%) had moderate to severe disease (Table 1).

	Men	Women
58 patients	38 (65.5%)	20 (34.5%)
Mean age	55.5 (19-92)	
Mild form	44 (75.9%)	
Moderate to severe form	14 (24.1%)	

Table 1 – Distribution per age and form of disease

As regards the management of the stones, from those with mild forms, six patients (13.6%) benefited from expulsive medical treatment with anti-inflammatory, analgesic, and alpha-blockers, three cases (6.8%) with non-obstructive kidney stones were under observation, and 19 (43.2%) semi-rigid ureteroscopy was performed. In 13 cases (29.5%), a double J stent was fitted and three patients (6.8%) with urosepsis underwent percutaneous nephrostomy. Of the 14 cases with moderate/ severe form, eight (57.1%) were fitted with a JJ stent, 4 (28.6%) with percutaneous nephrostomy, and in two patients (14.3%) with bladder stones, the hematuria was remitted with placement of a vesical catheter (Figure 1, 2). The evolution of patients with mild forms was favorable. In four severe cases (28.6%), unfavorable evolution and exitus were observed (Table 2, Figure 3).

	Mild form	Moderate to severe
Expulsive medical treatment	6 (13.6%)	-
Observation	3 (6.8%)	-
Ureteroscopy	19 (43.2%)	-
Double J stent insertion	13 (29.5%)	8 (57.1%)
Nephrostomy	3 (6.8%)	4 (28.6%)
Vesical catheter	-	2 (14.3%)
Evolution	Favorable 44(100%)	Exitus 4 (28.6%)

Table 2 – Management and evolution depending on the SARS CoV-2 forms



Fig. 1 - Bilateral Ureteral Lithiasis



Fig. 2 – Double J stent for ureteral lithiasis

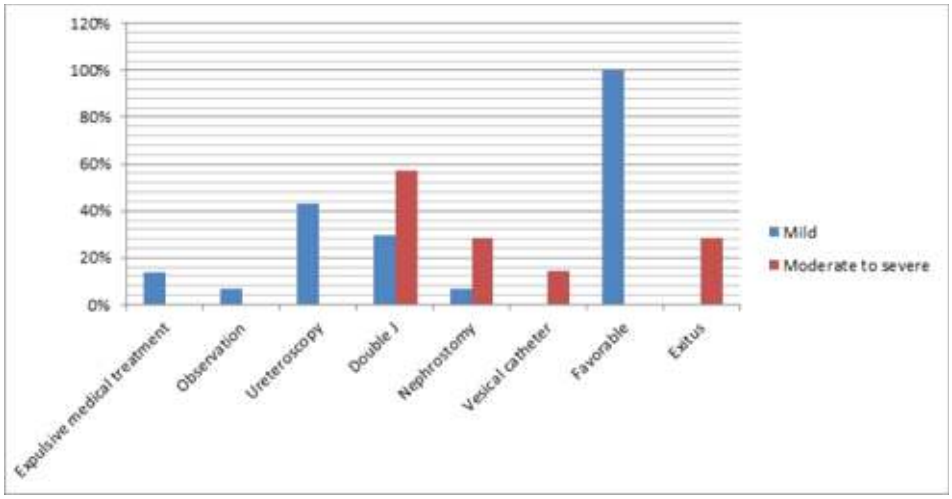


Figure 3 – Comparison of urological intervention regarding the SARS CoV-2 forms

The length of time spent in the hospital ranged from 7 to 32 days, with 12.5 days being the median stay. Among the total number of cases, 13 (22,4%) patients received positive results for SARS CoV-2 for at least 14 days. There was a wide variety in the length of time spent in the hospital, anywhere from seven to thirty-two days, with twelve and a half days representing the median duration of stay. At least 14 days after their initial diagnosis, 13 patients, or 22.4% of the total number of SARS cases, had test results positive for the SARS-CoV-2 virus.

Introduction

The first flexible ureteroscopes were developed about three decades ago by Lyon, Huffman and Bagley [1].
Technical developments and miniaturization fueled a remarkable advancement in these instruments, transforming them in more performant and durable tools for diagnosis and treatment of upper urinary tract pathology and especially pyelocaliceal lithiasis.
The latest development in this field was the introduction of single use or disposable flexible digital ureteroscopes who have become an attractive option with many advantages. Lately, single-use flexible ureteroscopes seem to overcome the main limitations of conventional reusable ureteroscopes in terms of acquisition costs, maintenance as well as eventual malfunctions.
The aim of this study was to analyze the efficacy and safety of two models of Pusen (Zhuhai Pusen Medical Technology, Guangdong, China) disposable ureteroscopes used in our activity: PU3022A and PU3033A.

Material and method

We performed a retrospective analysis of cases operated with this technology from February 2019 to March 2023. A number of 132 ureteroscopies were performed with these two models of ureteroscopes: 79 of them with PU3022A and 53 cases with PU3033A.
Pusen PU3022A model (Fig.1) has a 9 F diameter at the tip and 9.2 F diameter of the shaft, a 3.6 F working channel, 275/275 degrees deflection and a field of view of 90 degrees.

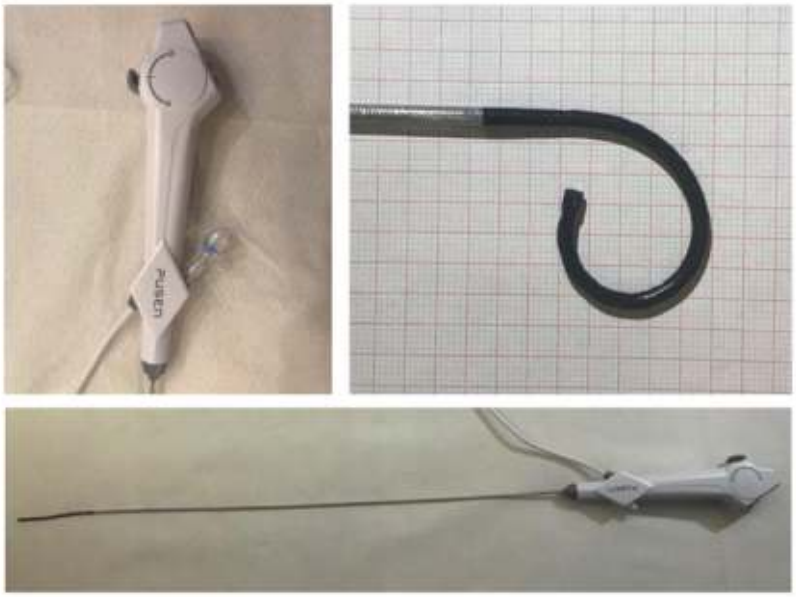


Fig. 1 PU3022A single-use flexible ureteroscope

The Pusen PU3033A model has a much thinner 7.5 F diameter at the tip, 7.5 F diameter of the shaft, a 3.6 F working channel, 275/275 degrees deflection and a field of view of 90 degrees.
Both offer a maximum 1080p (high-resolution) image, settings for different resolutions and different zoom values, with automatic color adjustment. For both models the operating capacity is limited to 4 hours.

Lithotripsy was performed with Dornier Medilas H Solvo 30W laser. For dusting we used low energy (around 0.5J) and high frequency (around 17Hz), for pop-corning we used high energy (>1J) and medium frequency (around 10Hz), and for fragmenting high energy (>1J) and low frequency (<10Hz).

Discussions

The widespread presence of the COVID-19 pandemic has caused a lot of dread and concern among people about the possibility of catching the virus. This is especially relevant to remember when considering the risks associated with contracting the virus while in a medical facility. Based on reports, as the virus spread over the globe, there was a significant decrease in the number of patients who presented to the emergency department with normal and frequent ailments. Patients delayed their visits to the emergency department (ED) until they reached a more advanced stage of their illness and experienced intolerably severe conditions [16]. According to a study conducted in Portugal by Madanelo et al., urology emergency department visits dropped by nearly half during the pandemic compared to the same period a year prior. Patients may have been diagnosed later and sicker because of the pandemic, as indicated by a rise in the percentage of cases requiring emergency hospitalization in their study [17]. In the same way, a study in Italy revealed a decrease of more than 50 percent in the number of presentations to the emergency room. However, there is an increase in the percentage of admissions and more complex cases [18].

An emergency case of bilateral urolithiasis was documented by Romantini et al. That called for two sessions of hemodialysis and bilateral draining of the collecting system to save the patient's life. The patient experienced prolonged anuria for 7 days but delayed medical attention out of concern about infection [19].

Patients with suspected stone disease should undergo a triage process to determine their surgical urgency. In their study, Metzler et al. classified patients into five groups, ranging from the most urgent (life-threatening) instances that require immediate drainage of the collecting system to the least urgent (asymptomatic, non-obstructing stone) cases that could be deferred to minimize unnecessary hospitalizations [20].

When an interventional procedure is planned, low-dose CT is the most appropriate diagnostic test since it can identify an asymptomatic COVID-19 infection if it exhibits ground-glass lesions near the base of the lungs [21].

Patients with confirmed or suspected COVID-19 cases require special care during urgent endourological stone surgery and must be treated in a separate, negative-pressure operating theater [22]. To shorten the duration of the procedure, ureteroscopy and stone fragmentation should be avoided in favor of a percutaneous nephrostomy or the placement of a ureteral stent. If you want to avoid using ventilation and making aerosols, spinal anesthesia is the way to go [22].

This study has some limitations, including its retrospective design and performed at a single center. This results in a small sample size. For us to know what to do in the event of an upcoming pandemic wave, complementary studies are necessary.

Conclusions

There is a tendency towards minimally invasive therapy for moderate and severe forms of SARS-CoV-2 infection. At the same time a favorable evolution, without postoperative complications, for the mild forms, in which the complete primary treatment was practiced.
SARS-CoV-2 infection has led to increased hospitalization days and mortality rates.

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