



ORIGINAL PAPER

UROLOGY

Treatment management of COVID-19 positive patients with renal colic secondary to distal ureteral stone

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Abstract

Objective: In this study, we aimed to contribute to the literature by sharing and evaluating the clinical characteristics and our treatment and follow-up approaches in patients in the COVID-19 positive treatment process who had presented to our hospital's emergency department with a distal ureteral stone and to examine the effects of the pandemic and disease in this group of patients.

Method: The study included 14 patients infected with COVID-19 who had presented to the Erzurum City Hospital Emergency Department between August 2020 and December 2020 with the complaint of renal colic in which distal ureteral stones were detected in the tests. The demographic and clinical characteristics of patients, laboratory and radiological examinations, characteristics of ureteral stones, details of treatments applied to patients, treatment procedures of patients who had undergone surgical treatment, patient files, visit and operation notes and the patient discharge reports were retrospectively reviewed and evaluated.

Results: The study included 14 patients. The average age of the patients was 35.7 (± 14.35). The average stone size was 6.2 (± 1.8) mm. Analgesic treatment and MET for distal ureteral stones were begun in 11 (78.6%) of the patients. Pain control was achieved in nine patients (64.2%) with analgesic treatment and MET, and the stone was removed without invasive intervention. Surgical intervention was performed in a total of five patients (35.7%).

Conclusion: In most COVID-19 infected patients with renal colic and a distal ureteral stone, results can be obtained using MET. Patients with a distal ureteral stone and persistent renal colic can be safely and effectively treated by endoscopic ureteral stone treatment after taking necessary precautions. Prospective, randomised, and controlled studies are required on this subject.

1 | INTRODUCTION

After pneumonia cases of unknown aetiology were reported in Wuhan, Hubei province of China, the cause of the disease was identified as a new coronavirus (2019-nCoV) previously undetected in humans.¹ This new virus was named the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses and as COVID-19 in association

with the World Health Organization (WHO).² The WHO classified the COVID-19 outbreak as an "International Public Health Emergency" on 30 January 2020. As COVID-19 cases occurred in 113 countries outside China where the outbreak first started, and because of the virus's spread and severity, it was defined as a global outbreak (pandemic) on 11 March 2020.^{3,4}

During the pandemic, as in all branches, profound changes have occurred in urology's routine practices. To answer the needs in

healthcare services and increase the health care system's utilisation, many national and international associations and organisations have published a series of studies and recommendations concerning urological care and services.⁵

Stone disease in the urinary system accounts for a significant portion of routine urology practice. Most of the symptomatic stones are ureteral stones.⁶ Nearly 70% of ureteral stones are distal ureteral stones.⁷ The management of treatment for distal ureteral stones is important because of the incidence of the disease and the fact that it may lead to severe mortality and morbidity. It includes treatment algorithms that may change based on the size of the stone, and the patient's clinical and laboratory characteristics. During the pandemic, the treatment planning of patients with distal ureteral stones, who are COVID-19 positive and constitute a particular urological group, should be considered specifically.

Although many studies and guidelines on the management of urinary system stone disease have been published during the pandemic, currently, there is an insufficient number of studies in the literature regarding the diagnosis and treatment of COVID-19 positive patients with stones. In this study, we aimed to contribute to the literature by sharing and evaluating the clinical characteristics and our treatment and follow-up approaches in patients in the COVID-19 positive treatment process who presented to our hospital's emergency department with a distal ureteral stone and to examine the effects of the pandemic and disease in this group of patients.

2 | METHOD

The local ethics committee approved this study with the decision numbered 2020/20-197 and dated 02.11.2020. The study was carried out in accordance with the Helsinki Declaration and written informed consent was obtained from each patient prior to the study. The study included 14 patients infected with COVID-19 who had presented to the Erzurum City Hospital Emergency Department between August 2020 and December 2020 with the complaint of renal colic in which distal ureteral stones were detected in the tests. The demographic and clinical characteristics of patients, laboratory and radiological examinations, the characteristics of the ureteral stones, details of treatments applied to patients, treatment procedures of patients who had undergone surgical treatment, the patient files, visit and operation notes, and the patients' discharge reports were retrospectively reviewed and evaluated.

Patients over the age of 18 who had presented to a healthcare institution because of symptoms associated with COVID-19 diagnosed with real-time PCR method by taking nasopharyngeal swabs and under treatment in accordance with the Ministry of Health's national COVID 19 guideline were included in the study. Patients without a nasopharyngeal swab real-time PCR verified COVID-19 diagnosis, patients that did not attend follow-ups, pregnant patients, and patients under 18 years of age were excluded from the study.

Routine biochemical tests and complete blood count were ordered for COVID-19 patients who had presented to the emergency department

What's known

- European Association of Urology (EAU) has shared a separate guideline on the management of urinary stone disease during the COVID-19 pandemic.
- In this guideline, although there is no additional recommendation for patients infected with COVID-19, medical expulsive therapy (MET) is recommended for non-obstructive ureteral stones.
- However, there is an insufficient number of studies in the literature regarding the diagnosis and treatment of COVID-19 positive patients with urinary stones.

What's new

- Although the number of cases is limited, preliminary results suggest that MET including tamsulosin is effective and safe in COVID-19 positive patients with distal ureteral stones.

with distal ureteral stone and renal colic. These patients were first evaluated by Urinary System Ultrasonography (USG). In the presence of direct or indirect radiological findings of distal ureteral stones such as stone and hydronephrosis on USG, the diagnosis was made by performing non-contrast-mediated computed tomography (NCCT). After diagnosing the stone, the stones were classified as opaque or non-opaque by kidney-ureter-bladder (KUB) radiography. In the European Association of Urology (EAU) 2020 guideline, it is stated that medical expulsive therapy (MET) can be used in distal ureteral stones without an indication for invasive intervention unless complications such as infection, refractory pain, and impaired renal function develop.⁸ In line with the recommendations of the guideline, patients with a stone smaller than 1 cm at presentation whose renal colic could be relieved by paracetamol as an analgesic (1 vial containing 10 mg/ml of infusion solution), who did not require hospitalisation for reasons such as kidney failure or sepsis, were included in a follow-up programme with MET including tamsulosin 0.4 mg a day as an alpha-blocker. In the follow-ups of patients who received MET, history of stone passing, pain relief, no stone being visualised on KUB radiography, and no hydronephrosis on USG under polyclinic conditions, was accepted as stonelessness for opaque stones. In non-opaque stones, history of stone passing, pain relief, and the absence of hydronephrosis on USG under polyclinic conditions were accepted as stonelessness. Urology outpatient clinic control was recommended and planned for all patients in which stonelessness was achieved at the end of the treatment and isolation process for COVID-19.

Pain assessment for patients presenting with renal colic was performed using the Visual Analogue Scale (VAS). It was accepted that patients with a VAS score of 4 and higher had moderate and severe pain. These patients were started on MET and analgesic treatment, and the VAS score dropping under four was accepted as pain control.

In cases where pain could not be controlled by analgesic treatment and MET, the paracetamol treatment was discontinued in

patients without any comorbid disease, and non-steroid anti-inflammatory drug (NSAID) (diclofenac potassium 50 mg once a day) treatment was started. The patients were evaluated weekly with kidney function tests, infection markers, renal dilatation follow-up with USG and KUB radiography for opaque stones.

The patients were hospitalised if pain control was not achieved and complications such as acute renal failure developed. In these patients, ureterorenoscopy was performed to break the stones. The stones were pulverised using a holmium laser. When it was technically impossible to reach the stone, it was planned to insert a DJ stent alone for decompression. During the preoperative and perioperative period, it was ensured that all personnel use appropriate personal protective equipment and take all necessary measures to prevent COVID-19 transmission. In patients in whom a stent had been inserted after the endoscopic intervention, the localisation of the stent was visualised and recorded using perioperative fluoroscopy. Stonelessness was accepted as no residual stone being left in direct sight in the ureter intraoperatively.

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) 22.0 statistics programme. While identifying the descriptive statistics, frequency and percentage were used for the categorical data, and average and standard deviation (SD) were used for the continuous variables. The Chi-Square and the Fisher Exact tests were used to compare the categorical variables. Pre and post-intervention scores were compared with the dependent sample *t* test. The tests were examined at a 95% confidence level. Statistically, values of *p* of <.05 were considered significant, and the *p*-value was written directly to indicate the level of significance in the findings.

3 | RESULTS

The study included 14 patients infected with COVID-19 and followed-up during the treatment process, who had presented to the Erzurum City Hospital Emergency Department between August 2020 and December 2020 with the complaint of renal colic in which distal ureteral stones were detected in the tests.

The demographic, clinical characteristics of the patients, and the characteristics of the stone on presentation are summarised in Table 1. The average age of the patients was 35.7 (± 14.35). Of the 14 patients, 9 (64.2%) were female and 5 (35.7%) were male. The average stone size was 6.2 (± 1.8) mm.

All stones were unilateral. Nine (64.2%) of the stones were on the right and 5 (35.7%) were on the left. Eleven (78.6%) of the patients had not received any treatment for stone disease previously. In one patient with a hypoplastic contralateral kidney, high creatinine (3.7 mg/dl) and acute kidney failure were detected at presentation. This patient was hospitalised and treatments for COVID-19 were adjusted according to the kidney doses. Four (28.6%) patients had an additional non-obstructive stone other than the distal ureteral stone in the urinary system. Ten (71.4%) patients only had a distal ureteral stone. On KUB radiography, the distal ureteral stone was opaque in six (42.8%) and non-opaque in eight (57.1%) patients.

TABLE 1 The demographic and clinical features of the patients and characteristics of the stone

| | |
|---|------------------------------|
| Age (year) (Mean \pm SD) (n = 14) | 35.7 (± 14.35) |
| Stone size (mm) (Mean \pm SD) (n = 14) | 6.2 (± 1.8) |
| Preop. serum creatinine (mg/dl) (Mean \pm SD) (n = 14) | 1.1 (± 0.76) |
| Preop. WBC ($10^3/\mu\text{L}$) (Mean \pm SD) (n = 14) | 8107.1 (± 2754.4) |
| Preop. platelet ($10^3/\mu\text{L}$) (Mean \pm SD) (n = 14) | 252 857.1 ($\pm 68 129.8$) |
| VAS before treatment (Mean \pm SD) (n = 11) | 8.27 (± 1.10) |
| VAS after treatment (Mean \pm SD) (n = 11) | 2.63 (± 2.80) |
| Time of stone passing (Day) (Mean \pm SD) (n = 9) | 9.77 (± 6.86) |
| Hospitalisation duration (Hour) (Mean \pm SD) (n = 5) | 30.8 (± 11.90) |

Abbreviations: VAS, visual analogue scale.

Analgesic treatment and MET for distal ureteral stones were begun in 11 (78.6%) of the patients. The average VAS score of these patients who had no surgery planned at presentation was 8.27 (± 1.10). The average VAS score after treatment was 2.63 (± 2.80) (*P* = .0001). Urinary infection was detected in three patients (21.4%) at presentation. No complications developed in eight (72.7%) patients started on analgesic treatment and MET; pain control was achieved successfully and these patients passed their stones without requiring surgery. In three (27.1%) patients, pain control could not be achieved with analgesic treatment and MET. The paracetamol treatment was discontinued and NSAID treatment (50 mg diclofenac potassium once a day) was started. Pain control was achieved with the adjustment of the medical treatment in one of these patients. Surgical treatment was planned for the other two patients as pain control could not be achieved.

In total, pain control was achieved in nine patients (64.2%) with analgesic treatment and MET, and the stone was removed without invasive intervention. With this treatment, the average stone passing time was determined as 9.77 (± 6.86) days.

Surgical intervention was performed in a total of five patients (35.7%). These included one patient with a hypoplastic contralateral kidney, high creatinine and acute renal failure at presentation, two patients in whom pain control could not be achieved at presentation, and two patients in whom pain control was not achieved, while being followed with analgesic therapy and MET.

Complete stonelessness was achieved in four patients by performing ureteroscopy + laser lithotripsy + DJ stent insertion, and the procedure was ended in one patient by only placing a DJ stent for decompression, since engagement from the ureteral orifice could not be achieved. Spinal anaesthesia was preferred in all patients undergoing surgery. No complications were observed in any patient according to the modified Dindo-Clavien Classification because of preop and postop anaesthesia or the surgical procedure. All patients were discharged without any complications. The average hospitalisation duration of patients undergoing surgery was determined as

30.8 (± 11.90) hours. The diagnosis and treatment processes of the patients are summarised in Figure 1.

4 | DISCUSSION

The COVID-19 pandemic has increased the burden on the health system and hindered non-COVID-19 health services. In addition to the

decrease in the bed capacity allocated to non-COVID-19 patients, delayed presentation to health institutions with fear of contracting the infection and the increase in complications have also contributed to this.^{9,10} Needs such as the burden of the pandemic on the health system, ensuring that COVID-19 patients sufficiently benefit from the facilities of modern medicine, protecting the health workers from infection, and preventing non-COVID-19 patients from being infected have been assessed by institutions, organisations,

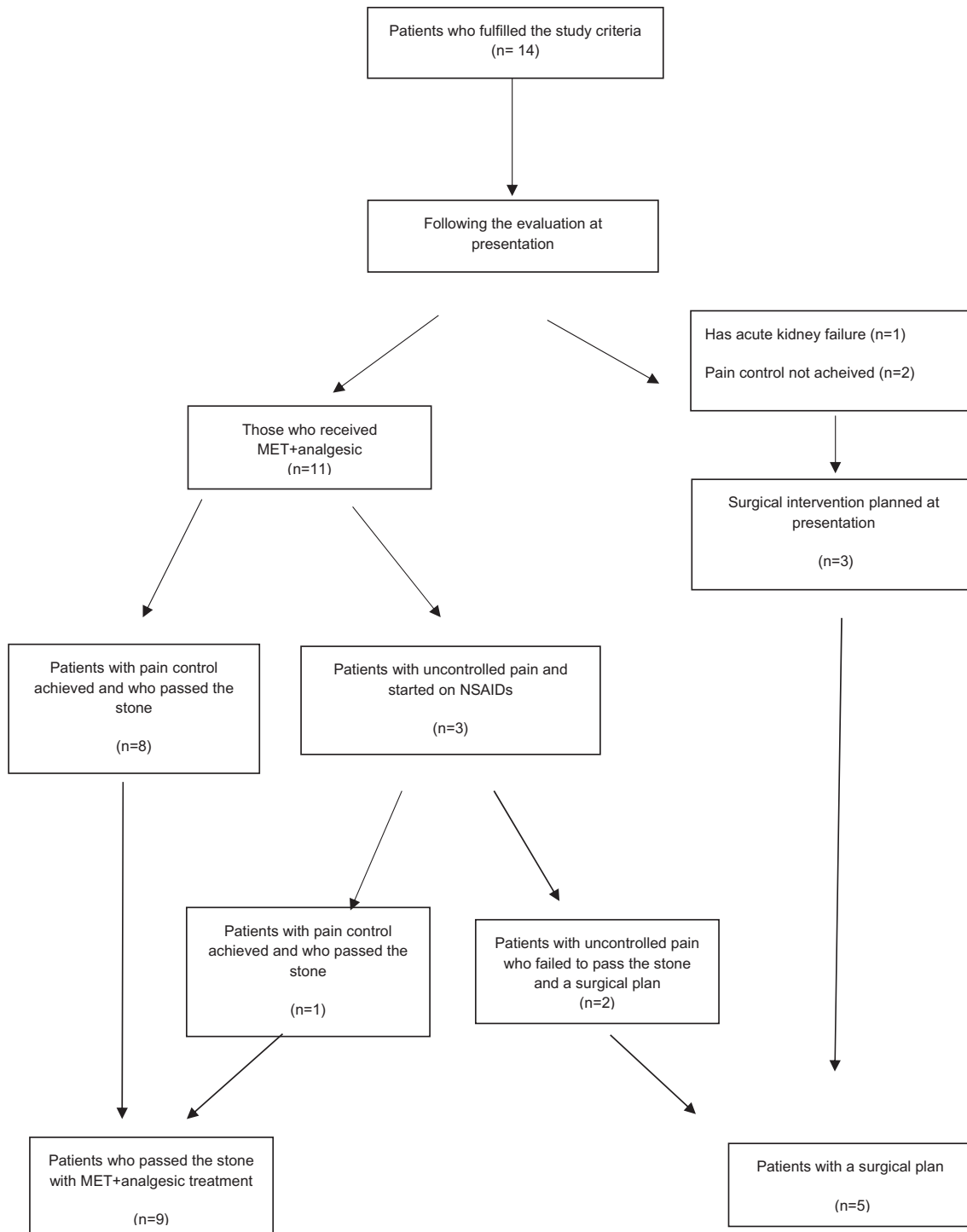


FIGURE 1 The treatment management of COVID-19 positive patients with a distal ureteral stone. MET, medical expulsive therapy

professional organizations, and associations. This has led to a deviation from routine practices and the implementation of certain precautions by performing some regulations during this process.

Urinary system stone disease is the third most common urinary tract disease after urinary tract infection and benign prostatic hyperplasia.¹¹ The majority of symptomatic stones are ureteral stones, and nearly 70% of these are distal ureteral stones.^{6,7} Acute renal colic is one of the most frequently encountered problems in the emergency department.¹² Considering this information, patients with distal ureteral stones, which are common and serious problems in urology practice, and patients infected with COVID-19, in particular, were examined in the light of the guidelines and literature on this subject under the conditions brought by the pandemic.

The first radiological method to be used in renal colic is USG. EAU 2020 strongly recommends the use of NCCT to confirm the stone diagnosis after the initial evaluation. It is recommended to use KUB radiography to classify opaque and non-opaque stones and for comparison during follow-up after NCCT.⁸ In our study, we also evaluated COVID-19 positive patients presenting with renal colic with USG first, and then we used NCCT to diagnose the distal ureteral stone. We obtained a KUB radiograph after NCCT to use in the follow-up of opaque stones. We did not detect any transmission to the practitioner in USGs performed on COVID-19 positive patients with the use of personal protective equipment. However, as the process advanced, because of factors such as the increased number of patients in this group, the strength of NCCT in making a definitive diagnosis, and the increased contact time between the patient and the doctor during USG, we believe that NCCT may be the first imaging method to be preferred initially for clinicians and radiologists.

The treatment of distal ureteral stones includes treatment algorithms that may vary based on the size of the stone and the clinical and laboratory characteristics of the patients. In the EAU 2020 guideline, it is stated that MET can be used as long as complications such as infection, refractory pain, impaired renal function do not develop in patients with distal ureteral stones with no indication for invasive intervention.⁸ The EAU 2020 guideline states that there are data supporting the use of MET until spontaneous stone passing or for up to four weeks. The EAU 2020 guideline strongly recommends the use of alpha-blockers in MET in distal ureteral stones larger than 5 mm. Tamsulosin, used in MET, contributes to treatment by increasing the stone passing rate and decreasing the stone passing time and the analgesic need, particularly in distal ureteral stones larger than 5 mm.⁸ EAU 2020 has shared a separate guideline on the management of urinary stone disease during the COVID-19 pandemic. In this guideline, although there is no additional recommendation for patients infected with COVID-19, MET is recommended for non-obstructive ureteral stones.¹³

In our study, we also administered tamsulosin for MET in 11 (78.6%) COVID-19 positive patients, who had distal ureteral stones at presentation, with no indication for emergency intervention after evaluation and no complications. In follow-ups, nine (64.2%) of these patients passed their stones without any complications with no need for surgical intervention in an average of 9.77 (± 6.86) days. Although the number of cases is limited, preliminary results suggest that MET including

tamsulosin is effective and safe in COVID-19 positive patients with distal ureteral stones. Because of the fact that the guideline states that appropriate patients can be followed with MET for up to four weeks and considering the results of our study, we believe that rather than early surgical intervention, follow-up with MET is an appropriate approach that could reduce contact and transmission to health workers and protect patients from complications related to anaesthesia and surgery in patients infected with COVID-19 with a distal ureteral stone.

One other important issue in distal ureteral stones is acute renal colic and its treatment. The EAU 2020 guideline states that NSAIDs and paracetamol are effective in the treatment of renal colic. The guideline strongly recommends using paracetamol as the first choice as an alternative to NSAIDs in the treatment of renal colic.⁸ Some studies conducted since the date the COVID-19 pandemic started show that COVID-19 has nephrotoxic properties with direct and indirect effects and may cause kidney failure. In a study conducted, Kerget et al¹⁴ shared a case of acute renal failure associated with impaired renal perfusion and endothelial damage secondary to cytokine storm in a COVID-19 positive patient. Besides, in a study in which they evaluated COVID-19 related kidney damage in 26 autopsies performed on patients who had died of COVID-19,¹⁵ Su et al reported that acute kidney failure had developed because of the direct invasion of COVID-19 into the kidney tissue via a mechanism that involved the SARS-CoV-2 receptor and Angiotensin-Converting Enzyme 2 and also rhabdomyolysis associated with disease-related systemic hypoxia, abnormal coagulation, a possible response to a medication or hyperventilation. In light of these studies, it is seen that COVID-19 has a nephrotoxic potential. At this point, the nephrotoxic properties of medications preferred in the treatment of renal colic should be considered in patients infected with COVID-19 with distal ureteral stones. NSAIDs are commonly used in drugs associated with nephrotoxicity. Old age and comorbidities increase the risk of nonsteroid-related nephrotoxicity. NSAIDs may show their effects in the form of acute kidney damage by decreasing the glomerular filtration rate, acute interstitial nephritis with proteinuria at the nephrotic level, and chronic renal failure.¹⁶ Furthermore, ureteral stones, even when unilateral, may cause acute renal failure on their own.¹⁷ When the direct and indirect nephrotoxic effects of ureteric stones and COVID-19 are evaluated together, choosing NSAIDs, which are a nephrotoxic drug group as pain relief in COVID-19 positive patients with renal colic with distal ureteral stones, may increase the nephrotoxic effects and cause kidney damage. In this group of patients, no contraindications for the use of NSAIDs have yet been defined. However, we think that paracetamol, which is recommended by the guideline as an alternative to NSAIDs, should be used in the forefront in appropriate patients, considering the existing nephrotoxic potential and risks until sufficient evidence is available. In cases where pain control cannot be achieved with paracetamol, the controlled use of NSAIDs may be an appropriate treatment approach in COVID-19 positive patients with renal colic with distal ureteral stones. We think that studies on this subject will reveal the most appropriate approach in the future.

During the pandemic period, it is recommended to minimise or temporarily postpone elective operations.⁵ Studies recommend using

conservative treatment options whenever possible for patients with renal colic and careful selection of patients scheduled for surgery based on surgical priority.¹⁸ The EAU 2020 has categorised patients for the treatment of stone disease according to the priority status in the guide published for the management of urinary system stone disease during the COVID-19 pandemic. The EAU 2020 recommends invasive intervention and decompression in patients with sepsis, anuria because of an obstructive stone, kidney failure (kidney failure, bilateral obstruction, solitary kidney), and obstructive/symptomatic ureteral stone (not suitable for MET).¹³ In our study, surgical intervention was performed in five (35.7%) patients. These included one patient with a contralateral hypoplastic kidney, high creatinine and acute kidney failure at presentation, and four patients in which pain control could not be achieved at presentation or during follow-up. All patients were discharged without any complications. There is insufficient information in the literature about the effect of DJ stent insertion after active stone removal in COVID-19 positive patients with distal ureteral stones who undergo surgical treatment on the clinic and transmission of COVID-19. In patients in the COVID-19 treatment process, we inserted DJ stents in all patients undergoing invasive interventions intending to prevent early period obstructive complications and reduce contact of patients with health professionals by preventing the need for rehospitalisation or repeat interventions. We postponed DJ stent removal and other procedures until after the COVID-19 treatment and isolation process.

The type of anaesthesia to be preferred in surgical planning for patients who are COVID-19 positive is an important issue in reducing the anaesthesia and surgical team's exposure to the virus and minimising the risk of transmission. To minimise exposure, procedures that produce aerosols should be avoided. In general, in anaesthesia that uses the airway, aerosol formation places the healthcare worker at risk of COVID-19 transmission.¹⁹ In patients with suspected COVID-19 infection, neuraxial nerve blocks and peripheral nerve blocks are recommended as the first choice if possible.²⁰ In the study they conducted, Çiççi et al²¹ reported that regional anaesthesia techniques were important during the pandemic to protect healthcare workers from COVID-19 transmission. In our study, spinal anaesthesia was preferred in all patients undergoing a surgical procedure. No complications relating to anaesthesia or the surgical procedure were observed in any patient in the preoperative and postoperative period. In light of this information, spinal anaesthesia could be considered as a reliable method in COVID-19 positive patients with distal ureteral stones.

The fact that our study is retrospective and that the number of patients was limited to 14 are important limitations of our study. There is a need for high-volume, prospective, randomised, and controlled studies on this subject.

5 | CONCLUSION

In most COVID-19 infected patients with renal colic and distal ureteral stone, good results can be obtained using MET. Patients with a distal ureteral stone and persistent renal colic can be safely and effectively

treated by endoscopic ureteral stone treatment after taking necessary precautions. Prospective, randomized controlled studies are required on this subject.

DISCLOSURE

There is no conflict of interest of any authors in relation to the submission.

AUTHOR CONTRIBUTIONS

Saban Oguz Demirdogen (writer, design, analysis), Ahmet Emre Cinislioglu (supervision, design), Nazan Cinislioglu (design), Mehmet Sefa Altay (data collection, design), Ibrahim Karabulut (data collection, design), Ozkan Polat (design), Senol Adanur (design).

DATA AVAILABILITY STATEMENT

As authors, we declare that you can use our data.

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