ORIGINAL ARTICLE

Eastern Journal of Medicine

East J Med 27(4): 534-539, 2022
DOI: 10.5505/ejm.2022.90922

Evaluation Of Renal Colic Patients Attending The Emergency Department When The Covid 19 Pandemic Was First Announcement

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ABSTRACT

Renal colic cases, which have an important place among patients presenting to the emergency department with pain complaints, have an important place in urological emergencies. In this study, patients who applied to the emergency department with suspected renal colic diagnosis during the Covid-19 pandemic were compared with those in the pre-pandemic period.

Patients who applied to the Emergency Department with the colic type flank pain between March 2020 and May 2020 were included in the study. Diagnostic and treatment parameters of 1699 patients, including 199 pandemic and 1500 pre-pandemic control group, were evaluated in this study.

As a result of the evaluation made, it was seen that emergency physicians preferred ultrasonography less during the pandemic period, and mostly resorted to computer tomography method, and in this period, a decrease in the rate of observed kidney stones, an increase ureter stones were observed. During the pandemic period, there has been a considerable decrease in the rate of hospital admissions

As a result of postponing treatment of patients with urinary system stones, secondary pyonephrosis and pyelonephritis rates increased approximately 10 times compared to the pre-pandemic period.

Keywords: covid-19,renal colic, renal colic diagnosis, urological emergencies

Introduction

Renal colic (RC) is a common condition that often develops due to kidney stone disease, is diagnosed and treated in emergency departments, and presents with severe pain. The pain is typically at the costovertebral angle localization, blunt, continuous, and agonizing. Urinary stone disease has a long history in medical archives. Severe flank pain may be accompanied by nausea and vomiting, psychomotility, and costovertebral angle tenderness. Although there is not enough records and information about the prevalence of RC in our country, more than 1 million patients apply to emergency services in the United States of America due to RC. The reason for 7-9% of first aid emergency ambulance service calls made due to pain in Europe is renal colics. RC is described by patients as the most painful, debilitating experience they have ever experienced. The risk of having an episode of RC during a person's lifetime is between 1 and 10%. The main purpose of emergency treatment is to relieve and control pain effectively and to relieve urine obstruction without causing loss of renal function (1).

In RC, the increase in intraluminal pressure after ureteral obstruction stimulates the nerve endings in the mucosa by stretching and thus causes colic pain. Ureter smooth muscle fibers contract and try to push the stone distal to the ureter lumen. If the stone is large enough to completely fill the lumen, or if it is in one of the strictures of the ureter, the ureteral muscle fibers will be contract more then before. Lactic acid, which increases as a result of prolonged isotonic contractions, stimulates slow-type A and fast-type C nerve fibers. This stimulus is transmitted to the level of the T11-L1 spinal cord and spreads to the upper levels of the central nervous system. Pain can also be felt by the gastrointestinal and genitourinary system organs,

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Received: 17.02.2022, **Accepted:** 22.07.2022

which have the same innervation as the urinary system (2).

Various medical imaging methods are used in the diagnosis of RC. With the development of noninvasive radiological techniques, different methods have been used in the diagnosis of RC (3). If the sensitivity and specificity of these methods are evaluated in the diagnosis of renal RC, direct urinary system radiography (DUSG) sensitivity is 45-58%, specificity is 60-77%, the sensitivity of computational tomography (CT) is 94-100%, and specificity is 92-99.4%. magnetic resonance imaging (MRI) is used especially in pregnant women. In patients with suspected RC, imaging methods should be applied after a good history is taken and a detailed physical examination is performed. Typical RC pain is persistent in the flank and extending to the groin. Pain in upper ureteral stones can spread to the same side of the testicle. Pain can be confused with appendicitis in right ureteral stones and with diveticulitis in left ureteral stones. As the stones approach the bladder, irritative voiding symptoms develop. In many cases, microscopic hematuria, nausea and vomiting are added to the case. According to a clinical scoring system, it has shown that abdominal pain, low back pain or costovertebral angle tenderness and hematuria (> 10 erythrocytes / microscope area) lasting less than 12 hours are the most important findings of acute RC (4).

In summary, although the diagnostic methods in RC differ from center to center, the examination in patients with a previous history of kidney stone disease or RC is started with DUSG and ultrasonography (USG). Non-contrast computed tomography , intravenous pyelography (IVP), doppler USG in pregnant women, MRI and magnetic resonance urography (MRU) in pregnant women and in some special cases are performed in patients who do not have such a history or have a typical complaints (3).

In the treatment phase, it is mainly aimed at relieving and controlling pain effectively and eliminating obstruction without causing loss of renal function. Especially patients with solitary kidneys or stones causing bilateral urinary obstruction and anuria require urgent decompression.

In this article, current studies on the management of patients with RC in the emergency department and the pathophysiology of RC are reviewed, and how the diagnosis and treatment methods have changed in the covid-19 first pandemic period and pre-pandemic period, respectively.

Materials and Methods

This retrospective study, which was carried out with the permission of the ethics committee of University Faculty of Medicine, (dated 05/05/2020 and numbered 8), includes patients who applied to Van Yüzüncü Yıl University Dursun Odabaş Medical Center Emergency Service with the complaint of colic-type flank pain between march 2020-may 2020. The ages of these patients ranged from 18 to 91.These patients were analyzed as Covid-19 pandemic period patients. The patient group showing the same demographic characteristics was selected by examining the pre-pandemic period records. Diagnostic and treatment parameters of 1699 patients, including 199 pandemic and 1500 pre-pandemic control group, were evaluated in this study. In addition to the demographic characteristics of the patients, the history of urinary system stone disease, the medical imaging method used in the diagnosis of urinary system stone disease in the emergency room were evaluated.

After the localization and characteristics of the stone were determined, it was evaluated whether the treatment was medical or surgical.

After the control, which treatment method was applied was evaluated.

The SPSS version 21.0 for Windows was used for statistical analysis. The Chi-square test were used for the analysis of categorical data.

Results

During the study period, 199 patients who were clinically diagnosed with RC and who meet the inclusion criteria of the study were identified and formed the study group. A control group was formed from 1500 people who fit the demographic criteria of the patients in non pandemic period. The study group patients consisted of RC patients who were admitted to the emergency room during the Covid-19 pandemic period, while the control group patients represent RC patients who came to the emergency room in the same months before the Covid-19 pandemic period. Power analysis was performed to determine the number of samples to be used in the study. In the study including 1699 patient data, it was found that the power value of the statistic was 97% when chi-square statistics were applied (effect size: 0.18, β / α ratio 0.05, Df: 1, critical $\chi 2$: 0.39).

In the retrospective statistical study, 960 of 1500

Table 1. Demographic Characteristics of Study and Control Group Patients

Control					
Gender	Mean	N	Std. Deviation	Minimum	Maximum
Male	45,09	960	13,78	21	74
Female	45,33	540	16,72	20	89
Total	45,18	1500	14,74	20	89
Pandemy					
Gender	Mean	N	Std. Deviation	Minimum	Maximum
Male	44,03	126	17,89	18	91
Female	39,24	73	17,62	18	78
Total	42,27	199	17,90	18	91

people included in the control group were male and 540 were female. In the records of 199 people obtained from the pandemic period, it was seen that 126 men and 73 women. In the control group, it was observed that the average age of men was 45.00 (min.:21, max.:74, std.dev.:13.78) and the average age of women was 45.33 (min.:20, max.:89, std.dev.:16.72). In the pandemic period, the average age of men was 44.03 (min.:18, max.:91, std.dev.:17.89), and the average age of women was 39.24 (min.:18, max.:78, std.dev.:17.62). was seen (Table 1).

Comparing the pandemic and pre-pandemic control periods, it was found that the demographic characteristics, gender ratios and average ages of the patients who came to the emergency department with a diagnosis of RC were very close to each other (male: control 64%, pandemy 63%, female: control 36%, pandemy 37%) were seen. It was found that the rate of uriner system stone disease diagnosis before admission to the emergency department was similar in the pandemic and pre-pandemic periods, and the difference was at the level of 2%. The methods used by physicians to diagnose RC in the emergency department in the period before the pandemic and the pandemic were found to be statistically significant (chi-square test statistic p value is 0.00) between these periods. In addition, according to the proportional comparison of these two time periods (USG: control 62%, pandemy 32%, CT: control 38%, pandemy 68%), there is a 30% difference between them. Excessive contact time may be the reason why healthcare workers will be worried about getting COVID 19 infection during the pandemic period and therefore they prefer CT in the diagnosis of urinary system stone disease. According to the results of the diagnostic examinations performed on patients admitted to the emergency department with RC, the probability of having stones in patients in the pandemic and pre-pandemic periods are similar. The rate of stone presence in patients is 58% in the control group and 49% in the pandemic group. According to the chi-square test comparing these two periods, there is no significant difference between these two periods (chi-square test statistic p value is 0.34). When the types of stones detected from the patients are examined according to their localization, there is no statistical difference (chi-square test statistic p value is 0.12) between pre-pandemic and pandemic period. But there is a difference in rates. Kidney stones were detected at a rate of 38% in the pre-pandemic period and 21% in the pandemic period. On the other hand, 62% of ureteral stones were detected in the pre-pandemic period and 79% in the pandemic period. This proportional increase in the diagnosis of stones in the urinary system in the distal localization may cause patients to hesitate to apply to emergency services and hospitals due to the pandemic. This may cause damage to the renal function in the future. It was found that there was no difference between the periods ($\chi 2$, $p = 0.747$), the difference between the rates was almost the same ($\pm$ 1.2). The control imaging approach performed after the planned treatment was quite different before and during the pandemic ($\chi 2$, $p = 0.00$) and computer tomography method was used more (64% / 26%) before the pandemic, and the preference of DUSG and USG increased during the pandemic period (57% / 36%) / (0% / 17%) is understood. The reason for this situation was thought to be due to the fact that healthcare professionals now consider providing healthcare services under the covid 19 pandemic as a routine procedure. 26% / 26%) ($\chi 2$, $p = 0.00$) (Table 2).

Secondary pyonephrosis developed as a result of obstruction caused by ureter stone in 6 patients out of 199 patients who were admitted during the pandemic period, and pyelonephritis was observed

Table 2. Demographic Characteristics of Study and Control Group Patients and Proportional, Statistical Comparison of The Number of Study and Control Group Patients and Chi-Square Test Results

		Control (n)	Pandemy (n)	Control (%)	Pandemy (%)	Percentage increase	χ2	p
Gender	Male	960(%64)	126(63)			-1	0,00	1,00
	Female	540(36)	73(37)			1		
Total		1500	199			0		
Pre-Existing Stone	Present	240	36	16	18	2	0,02	0,88
	Absent	1260	162	84	82	-2		
Total		1500	198			0		
Pre-Exist Stone surgical	Present	150	15	10	8	-2	0,07	0,79
	Absent	1350	183	90	92	2		
Total		1500	198			0		
Medical examination	USG	930	64	62	32	-30	13,84	0,00
	CT	570	135	38	68	30		
Total		1500	199			0		
Stone	Present	870	98	58	49	-9	0,90	0,34
	Absent	630	101	42	51	9		
Total		1500	199			0		
Stone Type	Kidney Stone	330	21	38	21	-17	2,42	0,12
	Ureter Stone	540	77	62	79	17		
Total		870	98			0		
Planned treatment	Medical	1200	144	80	81	1	0,37	0.747
	Surgical	300	32	20	18	-2		
Total		1500	177			0		
Control Med. Imaging	DUSG	450	60	36	57	21	25,27	0,00
	USG	0	18	0	17	17		
	CT	810	28	64	26	-38		
Total		1260	106			0		
Performing treatment	Medical	930	79	74	74	0	7,73	0,00
	Surgical	330	28	26	26	0		
Total		1260	107					

in 4 patients. In addition, a nephrostomy catheter was placed in 3 patients who were admitted to the hospital during the pandemic period, and a double-j stent (DJ) stent was placed under antibiotic pressure in another 3 patients. Secondary pyonephrosis developed in 5 out of 1500 patients admitted in the pre-pandemic period (Table 3).

It was determined that secondary pyonephrosis occurred due to obstruction caused by ureter stone, 8 out of 1500 patients admitted to the hospital in the pre-pandemic period, pyelonephritis was observed, during this period, 3 patients who applied to the clinic were placed with a nephrostomy catheter and inserted DJ stent to 2 patients under antibiotic pressure (Table 3).

Table 3. Comparison of Pandemic and Pre-Pandemic Period According To Causing Uriner System Stones Complications

	Pre - Pandemy Period			Pandemy Period		
	n	Group total	%	n	Group total	%
Secondary pyonephrosis	5	1500	0,333	6	199	3
Pyelonephritis	8	1500	0,533	4	199	2
Applying nephrostomy catheter	3	1500	0,2	3	199	1,5
Using DJ stent	2	1500	0,133	3	199	1,5

Discussion

RC often develops due to kidney stone disease and is the most common urological application to Emergency Departments (5). It is described by the patients as the most painful and debilitating experience they have experienced (3). When the stones are large enough to cause flank pain or hematuria, they become symptomatic. RC attacks are frequently mentioned in the literature in the 3rd and 5th decades (6). In the database search made by Chauhan et al. Consisting of 3.5 million cases and including 30.358 RC diagnosis, the mean age was found to be 44 ± 14 (7). In our study, similar to the literature, the mean age was found to be 42.17 ± 17.90. According to the literature, RC is 3 times more common in men. Held in Turkey and the incidence of urinary stone disease in a study identifying 15%, male / female ratio was found as 1.5 (8-12). Similarly, in our study, this rate was found to be 1.72 times in the pandemic period and 1.77 times in the pre-pandemic period.

DUSG have limited sensitivity (45-58%) and specificity (60-77%) in the diagnosis of RC due to ureteral stones (13). Therefore, it is not a safe method alone in the diagnosis of acute RC. The reliability of this method can be increased with CT. Stones between uretero-pelvic and uretero-vesical junctions are difficult to visualize. USG may not be able to visualize 20-30% of ureteral stones causing acute obstruction (14). However, USG has become an ideal method for the initial evaluation and follow-up of patients with RC due to its many features such as being a non-invasive, fast and easy method.

The edge finding caused by edema in the tissue around the stone allows the distinction of distal ureter stones from phlebolites. Because of this feature, it is easier to detect stones by CT method. Even very small and non-opaque stones can be detected with the CT method. CT is the most accurate and reliable method for kidney stone disease and its sensitivity is 94-100% and specificity is 92-99% (15-19).

Kılınç et al (2007) detected kidney stones in 28 (68%) of 41 patients who applied to urology and emergency services. They were able to see 18 (64%) of these cases by USG and 27 (97%) by CT. Similarly, in this study, 58% of kidney stones were detected in the pre-pandemic period and 49% in the pandemic period. In this study, USG was used at a rate of 62% in the pre-pandemic period and 32% in the pandemic period, while CT was used at a rate of 38% in the pre-pandemic period and 68% in the pandemic period.

In other study , DUSG was performed to all 1500 patients, USG to 182 and CT to 194 were performed. Stone image, which is a finding to support the diagnosis of RC in 38 patients, was obtained with DUSG. Stone presence was detected in 122 cases who were performed USG (20). He detected stones in 160 patients (80%). In this study, this rate is 49% in the pandemic group and 58% in the control group.

Result

In our study, demographic and clinical data about patients who were admitted to the emergency department and diagnosed clinically with RC were obtained. According to the results of the study, no difference was observed in the ratio of women and men who presented to the emergency department before and during the pandemic period, in the average age, in the rate of patients with a history of kidney stones. The treatment approach planned and applied by emergency physicians for RC patients was the same in both periods. In addition, in this study, where we had the opportunity to evaluate the effectiveness of diagnostic methods in patients with RC, emergency physicians preferred USG less as an imaging method during the pandemic period, and then the control time was more preferred by USG and CT was less. It was determined that they used it. It can be say that during the approach of

healthcare professionals to patients, the concern of contact with the patient caused by COVID 19 infection has gradually disappeared and healthcare professionals are more experienced in pandemic management. In addition, a decrease in the rate of kidney stones and an increase in the rate of ureteral stones were observed during this period. Since the transition of the stones from the kidney to the ureter takes time, it can be considered as a situation that occurs as a result of the late admission of patients to the hospital.

During the pandemic period, it was observed that patients postponed their admission to the hospital due to their reservations about getting an infection. Therefore, it was observed that urinary tract stones, whose treatment were delayed, caused obstruction and stricture. It was observed that this situation caused more and more severe complications in patients (Table 3).

In this study, recognizing the characteristics of this group of patients will facilitate emergency physicians in terms of both preventive and therapeutic approaches during the pandemic period. The reservations of both patients and healthcare professionals while receiving and providing health services due to the pandemic may lead to delayed diagnoses and even loss of organ function in patients.

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