

Covid-19: A Double Edged Sword-Rise in Complicated Ureteric Stone Disease

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Abstract

Introduction: Healthcare is facing one of the biggest challenges in the form of Coronavirus-19 pandemic. Various measures are taken by the government to curb its spread in the form of lockdowns, travel bans, and restrictions upon non-covid admission to assimilate resources to tackle pandemic has affected non-covid patients in the form of delayed treatment. Ureteric calculus can present acutely and in sub-acute forms but without proper treatment in due time may have serious consequences. In our study, we aim to investigate the effect of pandemic upon patients of ureteric calculi.

Methods: Data from 65 patients suffering from ureteric calculi admitted during the pandemic period between 1st March to 30th September 2020 and 290 patients during the same period in 2019 were retrospectively analysed and statistically assessed.

Results: The mean age and stone characteristics of the two groups were not statistically significant but serum creatinine (1.5 +/- 0.95 vs 1.1 +/- 0.46) and total leucocyte count (13.12 +/- 5.37 vs 9.28 +/- 4.67) at hospital admissions were higher and statistically significant (p=0.028 and 0.014 respectively) in the pandemic period. According to the recommendations of the European Urology Guidelines Office Rapid Reaction Group for priority classification of urolithiasis applicable during the COVID-19 pandemic, we found that more patients of complicated ureteric calculi were admitted in the COVID-19 period.

Conclusion: Delay in treatment due to government-imposed pandemic restrictions and inherent patient fears regarding covid infection lead to an increase in complications in patients of ureteric calculus. Thus, urologist needs to formulate protocols to prevent ureteric calculi from converting into a medical or surgical emergency due to delay in treatment while balancing the risk of pandemic spread.

Keywords: COVID-19; Ureteric calculus; Complications

Introduction

The Coronavirus 2019 (COVID-19) pandemic has become a global threat and a major source of human health concern in 2020 [1]. It also poses a huge challenge to healthcare infrastructure worldwide with a huge unprecedented impact been suffered by surgical specialities [2]. Every procedure had to be meticulously triaged depending upon the urgency. Due to the disruption of the smooth work environment, shortage of workforce and hospital supplies, patients were initially encouraged to minimize hospital contact, unless deemed urgent; as well as the fear among patients of contracting covid has led them collectively to prolong and ignore health concerns.

Renal and ureteric colic is one of the very common presentations in daily surgical and urological clinics [3]. Ureteric colic occurs as a result of obstruction of the urinary tract by calculi at the narrowest anatomical areas of the ureter: the Pelvi-Ureteric Junction (PUJ), near the pelvic brim at the crossing of the iliac vessels, and the narrowest

area, the Vesico-Ureteric Junction (VUJ). The location of pain may be related but is not an accurate prediction of the position of the stone within the urinary tract [4]. Although ureteric calculus is usually a non-emergent condition sometimes it can be life-threatening when complicated with superadded infection or renal impairment [5]. In cases with pyonephrosis or obstructing stones leading to acute kidney injury, immediate decompression is life saving [6]. While on the other hand, long-standing non-obstructing stones may lead to chronic renal impairment [7]. Thus, timely management is very important to preserve renal functions in cases of renal and ureteric calculi.

COVID-19 has been one of the most important variables leading to delay in treatment in 2020. The government imposed lockdowns, travel restrictions, restrictions upon admission of non-covid diseases to divert hospital resources primarily towards COVID-19 patients; all together lead to delay in proper management of non-covid disease patients.

We hypothesize that this delay in treatment would increase the rate of complicated ureteric calculus. We performed a retrospective study to analyse comprehensively the effect of COVID-19 upon ureteric calculus in 2020 when compared to last year.

Methods

After obtaining ethical committee clearance from our hospital; we retrospectively analyzed all those patients who were admitted to the Department of Urology, SCB Medical College and hospital, Cuttack between 1st March to 30th September, 2020 and a similar time period in 2019.

Selection of the Population

The priority of disease was classified according to the European Association of Urology (EAU) Guidelines Office Rapid Reaction Group (low priority, intermediate priority, high priority, and emergency) [8]. Low and intermediate were categorized as a non-complicated ureteral stone disease while high and emergency as complicated ureteral stones.

A total of 2 groups were selected: The complicated ureteral stone disease (CUSD) patients those who got admitted to the hospital for treatment during pandemic i.e., between 1st March to 30th September 2020.

The complicated Ureteral Stone Disease (CUSD) patients who came to the hospital during the same duration for treatment in 2019.

In particular, data was collected (Table 1) incorporating age of the admitted patients, symptoms upon admission, Total leucocyte count, serum urea/creatinine, characteristics of ureteral stones (number, location, size), and degree of hydronephrosis.

Treatment received by the patient-emergency divergent procedures like DJ stent, percutaneous nephrostomy or definite treatment such as endoscopic stone surgeries.

Patients in 2020 were also telephonically enquired (Table 2) whether they felt that pandemic led to any delay in getting treatment, the reasons for their delay, whether they tried or were forced (because of COVID-19 restrictions or individual fear) to look for locally available non-expert doctors or health workers before visiting our hospital.

Statistical analysis

Statistical analysis was conducted to evaluate the null-hypothesis that “there is no change in the rates of complicated ureteral stone during the COVID-19 pandemic restriction period.” Unpaired Student’s t-test will be used to compare continuous variables. The categorical data will be assessed using chi-square test.

Results

On examining the data acquired, it was found that the mean age of pre and post covid periods didn’t have any significant difference. Stone characteristics such as the size of the ureteric calculus, location of the calculus also remained indifferent. Although analysis of the serum creatinine and total leucocyte count on admission was statistically higher in COVID-19 group (p=0.028 and 0.014 respectively). The degree of hydronephrosis was found to be statistically insignificant, but a greater percentage of COVID-19 period patients presented with higher grades of hydronephrosis.

Patients’ admission was categorized according to EAU priority classification [8]. We found that there was a statistically significant proportion of patients admitted in COVID-19 period classified into high and emergency priority groups when compared to last year’s non-covid group (p=0.025).

Table 1: Patient characteristics included in the study.

	COVID-19 period (n=65)	Non-COVID-19 period(n=290)	p-value
Age	37 ± 13.26	45 ± 11/08	0.392 ^a
Max Diameter of stone (mm)	7.86 ± 3.12	7.28 ± 3.34	0.630 ^a
WBC on admission (1000 × UI/ml)	13.12 ± 5.37	9.28 ± 4.67	0.014 ^a
Ser. Creat on admission (mg/dl)	1.5 ± 0.95	1.1 ± 0.46	0.028 ^a
Stone Location			
Upper ureter(including PUJ)	24.61%(n=16)	30.34(n=88)	0.738 ^c
Middle ureter	18.46%(n=12)	21.37%(n=62)	
Distal ureter	58% (n=37)	48.27%(n=140)	
Grade of Hydronephrosis at admission (on USG)			
None	12.3%(n=8)	15.86%(n=46)	0.455 ^c
Grade1	26.15%(n=17)	40.0%(n=116)	
Grade2	36.92%(n=24)	33.79%(n=98)	
Grade3	15.38%(n=10)	6.89%(n=20)	
Grade4	9.2%(n=6)	3.44%(n=10)	
Prior antibiotic taken before admission Prescribed by	84.61%(n=55)	94.82%(n=275)	0.005 ^c
Self/non-medical health care personnel	23.07%(n=15)	15.51%(n=45)	
Alternative medicine/ Local practitioner	33.84%(n=22)	27.58%(n=80)	
Telemedicine	7.69%(n=5)	0	
Urologist	20%(n=13)	51.72%(n=150)	
Medical expulsion therapy given prior to admission	73.84%(n=48)	54.82%(n=159)	0.001 ^c
EAU priority group			
Low priority	7.69%(n=5)	19.65%(n=57)	0.025 ^c
Intermediate priority	23.07%(n=15)	40.34%(n=117)	
High priority	38.46%(n=25)	31.03%(n=90)	
Emergency	30.76%(n=20)	8.9%(n=26)	
Intervention on 1 st admission			
Double J-stent placement	27.69%(n=18)	15.17%(n=44)	0.005 ^c
Nephrostomy placement	18.46%(n=12)	10.34%(n=40)	
Definitive treatment (URSL/Ureterolithotomy/ PCNL/Pyelolithotomy)	53.84%(n=35)	71.03%(n=206)	

a=Student t-test, c=Chi-square test; URSL= Ureteroscopic lithotripsy; PCNL= Percutaneous nephrolithotripsy

It was observed that patients in COVID-19 group were more conservatively treated (p=0.005) with a higher percentage of patients being managed with DJ stent and percutaneous nephrostomy while in the non-covid group they were planned with more definitive procedures as per disease per sec. Also greater number of patients were attempted to be treated with medical expulsion therapy in the COVID-19 group (p=0.001) even for stones more than 6mm in size.

Table 2: Questionnaire asked from patients during COVID-19 period.

Did you feel treatment got delayed due to pandemic	Yes= 81.53%(n=53)
What was the major reason for the delay?	
Lockdown	46.15%(n=30)
Fear of getting infected with covid	20%(n=13)
Fear of being diagnosed covid positive	33.84%(n=22)
Was it difficult to get treatment compared to non-covid days?	Yes = 92% (n=60)

Another observation was that higher percentage of patients had already taken antibiotics on admission ($p=0.005$) during COVID-19 before visiting our hospital. Patients from the rural areas due to covid restrictions attempted more locally available resources consulting local health workers and alternative medicine practitioners in a greater percentage. Although very few patients had access to it, telemedicine proved a big help in rural areas to avail proper advice from expert doctors.

Patients in the COVID-19 group responded to questionnaires that approximately 82% felt their treatment got delayed because of government protocol of lockdown and travel restrictions (46%), many avoided going to the hospital especially those who had fever out of fear that they may get diagnosed with COVID-19 and will be kept in quarantine centers and others out of fear of catching COVID-19 at the hospital from other patients.

Discussion

Renal and ureteral stone diseases are quite prevalent in our society. Many of the ureteric calculus are diagnosed post ureteric colic pain episode. Few calculi which are non-obstructing presents with various symptoms such as fever, flank pain or lower abdominal pain, strangury, urinary complaints, or hematuria. Sometimes they become a life-threatening issue when they present with sepsis or acute kidney injury and decompression becomes a life-saving procedure in such circumstances [6].

Given the pandemic there was consensus that benign urological surgeries must be deferred considering that hypertension, chronic kidney disease may increase the risk of COVID-19 related serious events [9-12]. In our study, we demonstrated how the COVID-19 pandemic had an impact upon patients with ureteric calculus. There was an increase in complicated ureteric calculus owing to a delay in proper treatment.

Although stone characteristics were quite similar in both the covid and non-covid groups, former group presented with a higher percentage of patients with grade 2/3 hydronephrosis, probably due to delayed presentation. Gul M, et al. [13] performed a similar study where they had derived similar conclusions of increase in the complicated ureteric stones and increase in serum creatinine and leucocyte counts in the covid group. Flammia, et al. [14] performed a similar study and found out that serum creatinine and leucocyte count was higher in the covid group, degree of hydronephrosis wasn't significantly increased, but on the contrary, to our study, they didn't find any significant increase in the complicated ureteric stone disease when compared to last year. Also, they concluded that the plan of management in both the groups was unchanged in COVID-19 times while our study showed that patients, in general, were more conservatively treated with decompression procedures than definitive treatment on the first admission.

Patients didn't have resources and were more reluctant to visit hospitals. Government protocol during the pandemic in the form of lockdown, travel restrictions, and patients fearing of contracting covid, all corroborated into the delay in getting treatment. Patients in rural areas primarily were more dependent upon locally available resources such as village health care workers, alternative medicine practitioners, and many with a history of similar complaints in the past attempted at self-prescription of drugs based of earlier treatments.

Owing to all this delay in consultation there was a significant increase in the complications due to ureteric calculus. Also because of the pandemic protocol in place in hospitals patients were treated more conservatively with diversion procedures rather than definitive procedures to decrease the number of admissions/number of days of admission and also to reduce the risk for transmission of the pandemic from patients to the medical staff.

Telemedicine although is still in preliminary stages in our country but can prove to be very helpful for distant patients with no specialist in their areas and needs to be made available to an increasing number of patients.

Conclusions

As every surgical specialty was deeply affected by the pandemic, surgeons should try to inculcate various guidelines to continue to provide vital due care to the non-covid patients safely and effectively manner. We must balance the risks and benefits of any perceived delay in treatment, with the costs of utilizing limited personal protective equipment (PPE) and potential exposure of health care workers and/or patients to the deadly virus.

Flammia, et al. [15] formulated a framework to provide a structure for case-by-case consideration to prioritise kidney stones during COVID-19. Similarly, other guidelines balancing the risk of COVID-19 spread vs complications due to treatment delay need to be introduced.

Learning from the recent pandemic of COVID-19 and understanding that such situations can present anytime in near future too, we need to evolve our guidelines in a manner that non-covid uncomplicated cases get proper treatment in due time rather than turning them into complications. Telemedicine needs to be made more available in distant areas which have no specialist facilities nearby.

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Conflicts of Interest

There are no conflicts of interest.

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