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Case report

## Underactive Bladder as a Complication of Coronavirus Disease: A Case-Series Study

Farzaneh Sharifiaghdas, Sana Ahmadi, Fateme Guitynavard\*

*Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

### HIGHLIGHTS

- We presented four patients that recently recovered from COVID-19 infection and who still suffer from voiding problems.
- We know that, theoretically, the bladder can be infected by the COVID-19 virus; however, there is no clear pathogenesis for COVID-19-induced LUTS.
- All four patients were suffering from detrusor underactivity.

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#### \*Corresponding Author:

Fateme Guitynavard

Email: [f\\_guitynavard@ymail.com](mailto:f_guitynavard@ymail.com)

Address: Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

### ABSTRACT

#### Introduction

Calcium oxalate, phosphate, struvite, uric acid, and cysteine make up the majority of urinary stones. Moreover, only 0.5 -3.5 percent of urinary stones have a different composition. A thorough history, physical examination, along with urinary stone analysis helps to diagnose the cause of rare urinary stones.

#### Case presentation

We report here the case of a 68-year-old patient with a history of radical We herein report a case of pancreatic cancer with the unusual presentation of renal colic and ureteral stones. After removing the stones with ureterolithotripsy, the stone analysis revealed bilirubin crystal composition. Upon further follow-up, the patient has diagnosed with adenocarcinoma of the head of the pancreas.

#### Conclusions

This case highlights the importance of stone analysis, while many urologists do not consider this, and this is my result in miss diagnosis of some dangerous diseases that may present with the uncommon presentation.

**Keywords:** Underactive Bladder; COVID-19 ; Lower Urinary Tract Symptoms ; Case Series

#### Introduction

In the last days of 2019, a cluster of acute pneumonia from an unknown recourse occurred in Wuhan, Hubei Province, China. The disease has rapidly spread all around the world. World Health Organization (WHO) declared this condition a public health emergency of international concern. The pathogen has been identified as a type of coronavirus, and the disease is described as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1, 2). Most of the patients experience mild symptoms. Fever,

fatigue, and cough are the most common symptoms, but there are some rare extra-pulmonary presentations (2-4). Although the respiratory and immune systems are the most commonly affected, there is evidence of other systems' involvement, such as the nervous and urinary systems (5-8).

Lower Urinary Tract Symptoms (LUTS) describe storage, voiding, and post-voiding problems (9). Voiding problems can be due to various causes, such as underactive bladder and bladder outlet obstruction, that can end in

urinary retention (UR). The UR is an inability to wholly or partially empty the bladder and is classified into acute and chronic (9, 10). There are reports of voiding problems through the course of some viral diseases, such as HIV and HSV infection. Here we presented a report of four cases with newly onset bladder emptying problems and confirmed COVID-19 infection.

### Case Presentation

**Case 1:** A 32-year-old man with confirmed COVID disease in April 2021 came to our medical center with a chief complaint of urinary hesitancy. The urinary symptoms started after the COVID-19 infection. During the disease period, he experienced respiratory symptoms and loss of smell, and he received outpatient treatment.

The ultra-sonographic exam showed the normal condition of both kidneys. The post-voiding residue (PVR) was about 300ml. The bladder wall thickness was within the normal range. The urodynamic study performed in June 2021 revealed an underactive bladder with an interrupted voiding pattern and a Qmax of 3ml/s (Table 1). Bethanechol, tamsulosin, and baclofen were prescribed. Clean intermittent catheterization (CIC) was offered, but he refused. In the last follow-up (October 2021), the ultra-sonographic exam showed a PVR of 150ml. The patient claimed that his urinary functions got better.

**Case 2:** A 36-year-old man with confirmed COVID disease in June 2021 came to our medical center with a chief complaint of acute urinary retention. In the beginning, the urinary symptoms started concurrently with COVID symptoms. He suffered from severe respiratory symptoms that led to hospitalization. He received antiviral medications (such as remdesivir). The ultra-sonographic exam showed the normal condition of both kidneys. The post-voiding residue was about 400 ml, and the bladder wall thickness was within the normal range. The urodynamic study performed in October 2021 revealed an acontractile bladder with no void (Table 1).

Bethanechol, tamsulosin, and baclofen were prescribed, and he underwent CIC. In the last follow-up (1st of November 2021), there were no changes in his urinary symptoms, and he was yet on CIC.

**Case 3:** A 27-year-old man with confirmed COVID disease in May 2021 was referred to our medical center from Iraq for Sacral neuromodulation (SNM) implantation. He had an episode of acute urinary retention just after recovery from COVID disease. During the disease, he suffered severe respiratory symptoms that led to hospitalization.

The ultra-sonographic exam showed the normal condition of both kidneys, a bladder volume of about 450 ml, and an increased bladder wall thickness. The urodynamic study performed in August 2021 revealed an acontractile bladder with no void (Table 1). The CIC has been offered, and he was on medical treatment (bethanechol, tamsulosin, and baclofen). In the last follow-up (1st of November 2021), he was on CIC and a candidate for SNM.

**Case 4:** A 38-year-old man with confirmed COVID disease in February 2021 came to our medical center complaining of urinary hesitancy. The urinary symptoms showed up during the COVID infection period. He experienced severe respiratory symptoms that led to hospitalization. He took antiviral medications (remdesivir).

The ultra-sonographic exam showed the normal condition of both kidneys, a PVR of about 250ml, and the bladder wall thickness was within the normal range. The urodynamic study performed in April 2021 revealed an underactive bladder with an interrupted voiding pattern and a Qmax of 5ml/s (Table 1). Bethanechol, tamsulosin, and baclofen were prescribed, and he offered to do clean intermittent catheterization (CIC). The patient's symptoms improved in the last follow-up (1st of November 2021), and the ultra-sonographic exam showed a PVR of 150ml. Interestingly, all four cases had no medical history or risk factors predisposing them to voiding problems.

**Table 1.** Urodynamic results

Case number	Capacity (ml)	Compliance (mm/mm H2O)	Detrusor	Sensory Function	Voiding Pattern and Qmax (ml/sec)	Residue (ml)
Case 1	550	30	Stable	Normal	-Qmax:3ml/sec -Interrupted -Underactive Bladder	250
Case 2	600	100	Stable	Weak	-No voiding -Acontractile Bladder	600
Case 3	650	120	Stable	Weak	-No voiding -Acontractile Bladder	650
Case 4	450	35	Stable	Weak	-Qmax:5ml/sec -Interrupted -Underactive Bladder BCI: 50	280

## Discussion

In early 2020 a life-threatening respiratory disease called COVID-19 spread worldwide. Today, almost all countries are struggling with different variants of the virus. More than five million deaths have been recorded till now. Although the patients experience fever, fatigue, myalgia, and cough in most cases, a broad spectrum from asymptomatic to severe pulmonary or extra-pulmonary symptoms has been reported (3, 11, 12).

Urinary retention (UR) is a situation of disability of urinating voluntarily. The causes of urinary retention include anatomic obstruction, infections, inflammations, neurological or Pharmacological causes, trauma, etc. The most common cause of UR in men is a benign prostatic obstruction (BPO) (13-14).

Evidence shows that viral infections can affect lower urinary tract function (15, 16). Studies on the COVID-19 virus showed a specific spike protein characterized by its strong binding affinity to angiotensin-converting enzyme 2 (ACE2) receptors. Then the virus would like to attack the organs which express ACE2, such as the lungs, heart, gastrointestinal tract, and urinary system (16-18). Some reports of myelitis due to COVID-19 infection in patients with acute urinary retention (19-23). Furthermore, some studies showed that urinary symptoms related to BPH are also affected by COVID-19 infection (7, 8). Also, some studies found relations between COVID-19 infection and hyponatremia and LUTS (24, 25).

In this case series, we report four gentlemen who suffered from obstructive LUTS following COVID-19 infection. Two were treated with anti-viral drugs during hospitalization due to respiratory symptoms. All were younger than 40 years old with no history of voiding problems. The ultra-sonographic exam, in all cases, showed normal anatomy of the urinary system.

In the urodynamic study, all had an average cytometric capacity and stable detrusor. Two were unable to void at all. All cases had a significantly high volume of post-void residue.

Detrusor underactivity (DU) is a decreased strength or duration of detrusor contraction needed to empty the bladder (9). effectively. So, all four patients were suffering from detrusor underactivity. We know that theoretically, the bladder can be infected by the COVID-19 virus (26); however, there is no clear pathogenesis for COVID-19-induced LUTS (27, 28). Since there was no history of any underlying disease or predisposing risk factors relevant to detrusor underactivity, we suggest that decreased detrusor activity contributed to COVID-19 infection.

## Conclusions

It is about a two-and-a-half-year period since the day the COVID-19 outbreak began in China. COVID-19 started as a respiratory disease with flu-like symptoms, but a list of extra-pulmonary symptoms and complications can

soon develop. In this study, we presented four recently recovered from COVID-19 infection, which still suffer from voiding problems. However, more studies are warranted regarding the pathogenesis, risk factors, and treatment options of detrusor underactivity as a manifestation of COVID-19 infection.

## Authors' contributions

All authors contributed equally..

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## Conflict of interest

The author declares that there is no conflict of interest.

## Funding

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## Ethical statement

This case series study is based on CARE guideline and signed written informed consent.

## Data availability

Data will be provided on request.

## Abbreviations

ACE2	Angiotensin-converting enzyme 2
BPO	Benign prostatic obstruction
CIC	Clean intermittent catheterization
DU	Detrusor underactivity
LUTS	Lower urinary tract symptoms
PVR	Post-voiding residue
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SNM	Sacral neuromodulation
UR	Urinary retention
WHO	World health organization

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**Author (s) biosketches**

**Sharifiaghdas F**, Assistant Professor, Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: [f.sharifiaghdas@gmail.com](mailto:f.sharifiaghdas@gmail.com)

**Ahmadi S**, MD, Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: [sanaahmadi750525@gmail.com](mailto:sanaahmadi750525@gmail.com)

**Guitynavard F**, Assistant Professor, Urology and Nephrology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: [f\\_guitynavard@ymail.com](mailto:f_guitynavard@ymail.com)

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