



COVID-19 IN UROLOGICAL PATIENTS: EFFECTS ON BPH DEVELOPMENT, LUTS OCCURRENCE, AND PREDICTORS OF ACUTE URINE RETENTION

Urology

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ABSTRACT

Introduction: The paper aims to research how the Covid-19 infection affects BPH patients, whether their PSA, prostate volume, residual urine, and quality of life have changed. Additionally, to examine whether any of these variables are a predictive factor for acute urinary retention (AUR). **Methodology:** The study comprised 80 patients with clinical manifestations of LUTS, an aggravation of previously diagnosed BPH, and who recovered from COVID-19. IPSS, QoL, PSA, prostate volume, and postmicturition residual urine were studied before and after COVID-19. **Results:** The IPSS score, PSA, prostate volume, and residual urine were significantly higher after recovering from COVID-19. Additionally, greater IPSS-QoL scores were discovered. Nine patients (mostly older than 60) suffered acute retention during or after the COVID-19 infection. Residual urine was found to be a significant predictor of AUR. **Conclusion:** COVID-19 infection is caused by aggravating LUTS symptoms associated with BPH. Consequently, the increase postmicturition residual urine can be considered a predictive factor for the occurrence of AUR.

KEYWORDS

LUTS, Covid-19, BPH, Acute urinary retention, PSA

INTRODUCTION

The SARS-CoV-19 virus was presented as a virus that primarily manifests with respiratory symptoms, but moderate and severe forms of SARS-CoV-19 infection also display symptoms of the lower urinary tract. (1,2) SARS-CoV-2 infects host cells with angiotensin 2 (ACE2) and TMPRSS2 conversion enzymes detected in other organs and can infect them. (3)

Frequent urination is one of the most common symptoms of urologic disorders. However, Mumm et al. reported that urinary frequency is also a common symptom in patients with COVID-19 (1).

In benign prostatic hyperplasia (BPH) patients, COVID-19 worsens lower urinary tract symptoms (LUTS). (4)

The bladder urotel is a tissue at high risk for viral invasion with an ACE2 expression rate of 2.4%, which may be the reason for the increase in IPSS, the worsening of BPH, and the presentation of LUTS after COVID-19. (5)

Older patients with a clinically severe form of COVID-19 are hospitalized longer, they move less, which leads to worse bladder emptying, additional superinfection, worsening of BHP, IPSS, and LUTS, larger residual urine, and the need for permanent catheterization.

Through this research, we attempted to determine which of these monitored parameters could be considered predictive factors for AUR.

MATERIALS AND METHODS

Study included 80 patients from the Urology Clinic of the Mostar University Clinical Hospital diagnosed with BPH who, during the COVID-19 illness, had LUTS and exacerbation of BPH. Patients with inoperable prostate cancer, an earlier diagnosis of urethral stricture, and oncological patients were excluded.

Two doctors measured residual urine and prostate volume by ultrasound, and the mean was taken. The patients had their PSA (total) determined and filled out The International Prostate Symptom Score (IPSS). The source of data were medical records and the last

examination. Patients who volunteered to participate in the study were informed about its methodology and goals.

Data were analysed in IBM SPSS Statistics, Version 25.0 (Armonk, NY: IBM Corp.). The Kolmogorov-Smirnov test tested the normality of quantitative variables. The results are expressed as median and quartile, frequencies, and percentages. The significance was tested by Wilcoxon Signed Ranks Test. Predictors were investigated by logistic regression. The significance limit was $P = 0.05$.

RESULTS

The patients' age ranged between 47 and 88, and the mean age was 66.4 ($SD=8.2$). 38 patients (47.5%) were between 60 and 70 years old, 18 (22.5%) were younger than 60, and 24 (30.0%) were over 70.

All parameters were significantly higher after recovering from COVID-19 (Table 1).

All three age groups of patients after COVID-19 had a higher IPSS score, QoL, PSA, and residual urine (Table 1). Patients between 60 and 70 had a significantly larger prostate volume after COVID-19.

Table – 1 Parameters Before And After Covid-19, In Total And By Age

Age			C [Q1-Q3]	P*
	IPSS Score	B	8.5 [5.5-12.0]	<0.001
		A	12.0 [8.0-15.0]	
	IPSS-QoL	B	2.0 [2.0-3.0]	<0.001
		A	3.0 [3.0-4.0]	
	PSA	B	1.2 [0.6-3.1]	<0.001
		A	1.6 [0.7-3.3]	
	PV	B	61.0 [45.2-88.5]	<0.001
		A	62.5 [48.0-90.0]	
	RU	B	30.0 [20.0-40.0]	<0.001
		A	40.0 [20.0-50.0]	
-60	IPSS Score	B	5.0 [2.0-7.0]	<0.001
		A	9.0 [7.0-12.0]	
	IPSS-QoL	B	2.0 [2.0-2.0]	0.003
		A	3.0 [3.0-3.0]	

	PSA	B	0.9 [0.6-3.7]	0.002
		A	1.1 [0.6-3.9]	
	PV	B	51.5 [44.6-70.0]	0.241
		A	55.5 [45.0-72.0]	
	RU	B	25.0 [10.0-30.0]	0.008
		A	22.5 [20.0-40.0]	
61-70	IPSS Score	B	8.0 [5.0-11.0]	<0.001
		A	10.0 [8.0-15.0]	
	IPSS-QoL	B	2.0 [2.0-3.0]	0.005
		A	3.0 [2.0-4.0]	
	PSA	B	1.2 [0.7-2.7]	0.003
		A	1.6 [0.8-3.4]	
	PV	B	58.5 [44.0-86.0]	<0.001
		A	59.5 [45.5-86.0]	
	RU	B	30.0 [20.0-40.0]	0.002
		A	40.0 [30.0-50.0]	
71-	IPSS Score	B	13.0 [10.5-14.0]	0.001
		A	14.5 [12.0-18.0]	
	IPSS-QoL	B	3.0 [2.0-3.0]	0.001
		A	3.0 [3.0-4.0]	
	PSA	B	1.4 [0.6-3.0]	0.012
		A	1.7 [0.8-3.0]	
	PV	B	71.0 [55.3-115.0]	0.083
		A	71.0 [56.0-115.5]	
	RU	B	40.0 [27.5-50.0]	0.001
		A	50.0 [30.0-60.0]	

* Wilcoxon Signed Ranks Test

B: before Covid-19; A: after Covid-19; C: median; Q1-Q3: first quartile-third quartile; PV: Prostate volume; RU: Residual urine

Source: authors' calculations

Two patients experienced macrohematuria following catheterization. Nine (11.3%) patients developed AUR during or after the COVID-19 infection: one under 60, two over 70, and six between 60 and 70. Residual urine was found to be a significant predictor of AUR. An increase in residual urine increases the likelihood of AUR (Table 2).

Table – 2 The Predictors Of Acute Retention

	OR	95% CI	P
Age	0.934	0.819-1.065	0.306
IPSS Score	1.038	0.793-1.359	0.785
IPSS-QoL	1.532	0.440-5.333	0.502
PSA	0.996	0.765-1.299	0.979
PV	0.997	0.971-1.024	0.808
RU	1.039	1.007-1.072	0.015
Constant	0.308		

PV: Prostate volume; RU: Residual urine; CI: confidence interval; OR: odds ratio

Source: authors' calculations

DISCUSSION

According to epidemiological studies, males are significantly more affected by Covid-19. (6) Current research indicates that the frequency of the Covid-19 disease is linked to the expression of androgenic hormones. (7) The frequency of BPH increases with age.

Therefore, older patients were more significantly affected by Covid-19 infection, which presented as LUTS associated with BPH. (9)

Research showed that inflammatory mediators play an important role in the progression and severity of BPH and LUTS. (8)

Hypothetically, the virus binds to ACE2 receptors in prostate cells, reducing ACE2 expression. Therefore, the progression of BPH and LUTS develops with the proliferation and activation of inflammatory mediators due to the upregulation of ACE2 (3). However, the exact mechanism is still not entirely clear.

Studies suggest that COVID-19 implies an increase in IPSS and may be associated with the onset of AUR. (9,10) LUTS is mainly considered a urological symptom of urinary tract disease, but despite this, some studies link it to COVID-19 during the outbreak period as the cause of its occurrence. (9)

As previously stated, older age is a risk factor for AUR. Our age-group analysis results confirm that older patients are more prone to BHP deterioration and AUR, even though there is no statistical significance when all individuals are considered together.

According to the findings, an increase in PSA, IPSS, and a decrease in the QoL, as well as an increase in the residual urine volume after recovering from Covid-19, become predictive factors for the occurrence of AUR. The increase in IPSS is certainly a consequence of LUTS exacerbation, which remains even after the negative PCR test. The increase in IPSS in the follow-up assessment after recovering from Covid 19 suggests a decrease in QoL. Analysed by age group, it is evident that the increase in PSA was more extensive in the age group 60-70. This can certainly be corroborated by the claim that BPH is much more prevalent in older age groups but that COVID-19 has certainly impacted the older population more.

The serum increase in PSA as a mediator of prostatic inflammation suggests that as part of Covid 19, the inflammatory change in prostatic acini occurs.

The increase in PSA in older age groups is certainly a consequence of the increased prostate gland volume, which secretes larger amounts of PSA in proportion to its size in the blood (8). What additionally supports the thesis of this research is certainly visible in the results, which, according to IPSS and QoL, suggest a worsening of symptomatology after Covid 19.

Prostate and residual urine volumes were higher in patients over 60 and 70 years old after recovering from Covid-19. Residual urine was found to be a significant predictor of AUR. An increase in residual urine increases the likelihood of AUR.

In this study, most patients between 60 and 70 developed AUR and needed catheterization. Mumm et al. found three patients with microhematuria, which may corroborate the hypothesis of viral cystitis caused by SARS-CoV-2 on urothelial cell infection causing irritative LUTS. (1)

Only two individuals experienced macrohematuria following catheterization, probably in the form of a urethral iatrogenic injury or bladder overflow. Our findings imply that there were worsening clinical signs of BPH in patients with an earlier diagnosis of the disease after recovery from a Covid-19 infection.

CONCLUSION

This study demonstrates that the Covid-19 infection exacerbated LUTS symptoms associated with BPH and contributed to the worsening of BPH in all patients, particularly the elderly. As a result, greater residual urine volume can be used to predict AUR.

Research limitations

This study's relatively small sample size and short follow-up duration are limitations. Furthermore, due to the Covid-19 pandemic, not all diagnostic investigations, such as microbiological studies, were performed, which could have influenced the emergence of symptoms. Longer-term follow-up, as well as follow-up of post-Covid-19 late issues and urogenital system ramifications, would indeed be recommended for future research.

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Conflict of Interest: Not declared.

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