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UROLOGICAL SYMPTOMS IN PATIENTS WITH COVID-19: EXPLORING CHANGES IN FREQUENCY BY PANDEMIC WAVES

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HYPOTHESIS / AIMS OF STUDY

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic erupted in December 2019. As the viral infection is driven by increased angiotensin-converting enzyme-2 (ACE2) expression, with the urothelial cells exhibiting a high expression, it is logical to think that there may be an increase in the frequency of lower urinary tract symptoms (LUTS) in patients diagnosed with coronavirus disease 2019 (COVID-19)(1,2). There does not a relationship between the presence of the virus in the urine and the presence of urological symptoms(3–6). The increase in inflammatory cytokines in the urine and bladder inflammation might be responsible for the presence of associated bladder dysfunction(2,7,8). This is a very little studied subject, and the few studies present a low sample size as well as quite disparate results.

This study aims to examine the effects of infection with SARS-CoV-2 on the male and female genitourinary tract, especially if there is a change in the frequency of genitourinary tract symptoms (consistent with urinary incontinence (UI), urinary tract infection (UTI), urinary retention (UR), hematuria, erectile dysfunction (ED) and neurogenic detrusor (ND) and acute kidney failure (AKF) in the different waves of COVID19, as well as a possible oscillation in the symptoms frequency related to comorbidities and demographic variables, using the medical records of patients who have been hospitalized for this infection.

STUDY DESIGN, MATERIALS AND METHODS

A retrospective study took place in our institution of COVID-19 admitted patients. Only patients with RT-PCR or antigen test confirmed SARS-CoV-2 infection were included, and demographic, clinical, and urological symptoms were explored. COVID-19 patients with LUTS were compared with those without LUTS. Statistical comparisons were conducted by parametric or nonparametric tests for quantitative variables, and χ^2 test for qualitative variables.

RESULTS

There were a total of 4,661 unique patients. Urological symptoms were found to be increased in COVID-19 patients, reaching 21,1% of them. The largest proportion of patients come from the first wave (1,492; 32.0%), followed by the second wave (1,062; 22.8%), third (903; 19.4%), fourth (391; 8.4%), fifth (246; 5.3%) and sixth wave (567; 12.2%). Of the 4,661 unique patients, 2,483 (53.3%) were men and 2,178 (46.7%) were women. The mean age of the patients was 69.1 (SD 17.2). Only 74 (1.5%) patients were foreigners.

The median age was statistically significant higher for those patients with urological diseases (Table 1). The gender proportion was very close. Additionally, this group presented a higher percentage of comorbidities (78.9% vs 57.5%) being the all comorbidities higher and statistical different for the group with urological diseases (excluding smoker and former smoker comorbidity), and for the urological history (except for urolithiasis).

The frequency of the different urological diagnosis varied between the waves (Table 2). We analyzed the distribution of demographic variables (sex and age), length of stay and comorbidities in each of the waves in order to explain the frequency change of the different urological diagnosis (Table 2). Male gender was higher in all waves except in the 6th wave, however this difference was not significant ($p > 0.05$). For age, we found that the median age was significantly higher for the 6th wave against the rest ($P \leq 0.001$). The median length stay was higher in the 2nd,3rd, 4th waves. For the comorbidities, we found that in the 6th wave the percentage was significantly lower to the other waves, followed to the 1st wave. Between these comorbidities we found that smokers and former smokers were more frequent in the 4thth wave (32.2%) and in the 6th wave the lowest frequency (15.2%). Mortality was higher in the 1st wave, reaching up to 17.4% of COVID-19 cases. The urological history was significantly lower in the 6th than in the other waves.

The AKF diagnosis showed a significant difference among the waves, with a higher presence in the 5th (16.7%) and 3rd wave (13.3%), and lower presence in the 6th (8.5%) and 2nd (9.3%) waves.

UTI also showed a significant difference along the waves, being more frequent in the 3rd (12.8%) and 5th (12.6 %) waves, and lower presence in the 6th (6.4 %) and 1st (7.0 %) waves. Finally, hematuria and ED also showed a varied significantly, being more frequent in the 5th (1.6%) and 3rd wave (0.5%), respectively.

The difference among gender in each wave showed that for males the diagnosis AKF was significantly higher for the 1st (14.2% vs 9.4%) and 2nd waves (11.3% vs 7.1%), and hematuria diagnosis in the 3rd wave (1.7% vs 0.0%). On the other hand, the presence of UI diagnosis and UTI was higher for females, being significantly higher for 1st (urinary incontinence diagnosis: 3.1% vs 1.0%) and 2nd wave (UI diagnosis: 3.0% vs 1.1%; UTI: 16.1% vs 6.3%).

INTERPRETATION OF RESULTS

This is the largest study about symptoms of an urological nature in patients with COVID19 and provides insights into the natural history of the disease in adults with a considerable frequency of urological symptoms during the first to the sixth pandemic wave. It suggests that UTI, UI, UR and an AKF might be related to a SARS-CoV-2 infection, and could predict a worse prognosis. On the other hand, we did not find statistical differences for hematuria, ED and NB diagnosis. The minimum of urological diseases was reached in the 6th wave most probably for the lower frequency of comorbidities recorded in that wave.

CONCLUDING MESSAGE

Clinicians should be aware of these symptoms of the disease, leading to a faster therapeutic procedure and consequently reducing the mortality rate.

FIGURE 1

Parameter	Result (n = 4,661)	Urology diseases ¹		P-value ²
		Yes (n = 982)	No (n = 3,679)	
Median age, yr (range)	71.0 [17-105]	80.0 [20-105]	68.0 [17-104]	<0.001
Male, n (%)	2,483 (53.3%)	527 (53.7%)	1,956 (53.2%)	0.808
Female, n (%)	2,178 (46.7%)	455 (46.3%)	1,723 (46.8%)	
Comorbidity, n (%)	2,882 (61.8%)	765 (77.9%)	2,117 (57.5%)	<0.001
Obesity	338 (7.3%)	86 (8.8%)	252 (6.9%)	0.048
Diabetes	892 (20.4%)	289 (29.4%)	603 (17.8%)	<0.001
Hypertension	1,620 (34.8%)	418 (42.8%)	1,202 (32.7%)	<0.001
Smoker and former smoker	1,140 (24.5%)	223 (22.7%)	917 (24.9%)	0.163
Heart disease	368 (7.9%)	132 (13.4%)	236 (6.4%)	<0.001
Chronic Kidney Disease	413 (8.9%)	207 (21.1%)	206 (5.6%)	<0.001
Urological history	446 (9.6%)	155 (15.8%)	291 (7.9%)	<0.001
Benign prostatic hyperplasia	346 (7.4%)	109 (11.1%)	237 (6.4%)	<0.001
Urogenital implants	30 (0.6%)	23 (2.3%)	7 (0.2%)	<0.001
Prostate cancer	135 (2.9%)	46 (4.7%)	89 (2.4%)	<0.001
Urothelial cancer	10 (0.2%)	6 (0.6%)	4 (0.1%)	0.008
Urolithiasis	39 (0.8%)	8 (0.8%)	31 (0.8%)	1.000
Urinary system abnormalities	41 (0.9%)	17 (1.7%)	24 (0.7%)	0.002
Urethral disorder	4 (0.1%)	4 (0.4%)	0 (0.0%)	0.002

¹Patients with positive diagnosis for acute kidney failure, urinary incontinence, urinary tract infection, urinary retention, hematuria, erectile dysfunction, neuromuscular dysfunction of the bladder/ neurogenic bladder.

² Significant differences ($p < 0.05$) are indicated by bold text.

FIGURE 2

Table 2. Urological diagnosis depending on COVID-19 waves.

	1st wave (n = 1,492)	2nd wave (n = 1,062)	3rd wave (n = 903)	4th wave (n = 391)	5th wave (n = 246)	6th wave (n = 567)
Demographic variables						
Gender						
Male	819 (54.9%)	558 (52.5%)	483 (53.5%)	215 (55.0%)	128 (52.0%)	280 (49.4%)
Female	673 (45.1%)	504 (47.5%)	420 (46.5%)	176 (45.0%)	118 (48.0%)	287 (50.6%)
Age range						
	70 [19-101]	70 [22-105]	72 [21-104]	71 [19-102]	71 [18-102]	77 [17-101]
Length of stay						
	7 [0-178]	8 [0-163]	9 [0-341]	8 [1-130]	7 [0-127]	7 [0-79]
Comorbidities						
	926 (62.1%)	683 (64.3%)	625 (69.2%)	273 (69.8%)	170 (69.1%)	205 (36.2%)
Diabetes	293 (19.6%)	215 (20.2%)	195 (21.6%)	79 (20.2%)	39 (15.9%)	71 (24.8%)
Smoker and former smoker	370 (24.8%)	232 (21.8%)	257 (28.5%)	126 (32.2%)	69 (28.0%)	86 (15.2%)
Death	259 (17.4%)	136 (12.8%)	148 (16.4%)	41 (10.5%)	26 (10.6%)	81 (14.3%)
Urological history	142 (9.5%)	112 (10.5%)	91 (10.1%)	42 (10.7%)	27 (11.0%)	32 (5.6%)
Diagnosis						
Acute kidney failure	179 (12.0%)¹	99 (9.3%)	120 (13.3%)	49 (12.5%)	41 (16.7%)	48 (8.5%)
Urinary incontinence	29 (1.9%)	21 (2.0%)	14 (1.6%)	11 (2.8%)	7 (2.9%)	10 (1.8%)
Urinary tract infection	105 (7.0%)	116 (10.9%)	116 (12.8%)	41 (10.5%)	31 (12.6%)	36 (6.4%)
Urinary retention	32 (2.1%)	30 (2.82%)	24 (2.7%)	11 (2.8%)	12 (4.9%)	9 (1.6%)
Hematuria	10 (0.7%)	1 (0.1%)	8 (0.9%)	0 (0.0%)	4 (1.6%)	2 (0.4%)
Erectile dysfunction	0 (0.0%)	1 (0.1%)	5 (0.5%)	0 (0.0%)	1 (0.4%)	0 (0.0%)
Neurogenic bladder	1 (0.1%)	1 (0.1%)	0 (0.0%)	1 (0.3%)	1 (0.4%)	0 (0.0%)
Total	296 (19.8%)	215 (20.2%)	227 (25.1%)	87 (22.3%)	73 (29.7%)	84 (14.8%)

¹ Significant differences ($p < 0.05$) are indicated by bold text.

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