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Impact of Sars-Cov-2 Infection in Multiparametric Prostate Mri

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1. Abstract

1.1. Background and Purpose: The COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, has spread worldwide since 2020. Manifestations of the disease are widely variable. Symptomatic infection is mainly characterized by severe acute respiratory syndrome but can lead to multiple organ failure and death. SARS-CoV-2 used angiotensin-converting enzyme 2 (ACE2) receptor and the cell surface transmembrane protease serine 2 (TMPRSS2) to enter into target host cells. In a recent study, it has been proved that TMPRSS2 and ACE2 are expressed in both lung and prostate tissues, with higher relative TMPRSS2 expression in prostate epithelial cells. This result leads the prostate to be a possible site of inflammation and localization of the virus. The aim of the present study is to compare prostate inflammation by mpMRI before and after Sars-Cov-2 infection in 20 men.

1.2. Materials and Methods: Our monocentric retrospective observational study includes 20 patients, divided in two groups: group I includes 10 patients who performed mpMRI before and after testing positive for SARS-CoV-2 nasopharyngeal swab. Group II includes 10 patients who performed two mpMRI 12 months apart, without contracting SARS-CoV-2 disease between the first and second examination, demonstrated by negative nasopharyngeal swab. mpMRI images were prospectively interpreted by 4 expert radiologists, with 10 and 5 years of experience in prostatic MRI, assigning a score of 1–5 for T2WI, a score of 1–5 for DWI, and positive and negative for DCE-MRI according to PIRADS v2.1 and determined the overall PIRADSv2.1 assessment category for PZ and TZ.

1.3. Results: After Sars-Cov-2 infection, 4 patients (40%) had one PIRADS 2 lesion at mpMRI; 1 patient (10%) had one PIRADS 3 lesion; 5 patients (50%) had one PIRADS 4 lesion. This parameter was statistically significant (p=0.033). The total evaluation of PIRADS lesion recognized by mpRMI after Sars-Cov-2 infection results statistically significant (p=0.033). 6 patients with positive NP swab (60%) had a PRECISE score 3 and 4 patients (40%) have a PRECISE score 4. The PRECISE score's media was 3.4 for the patients with positive NP swab and it was 3 for the patients with negative NP swab.

1.4. Conclusion: Our study indicates that patients after Sars-Cov-2 infection have an increase in PRECISE score. This suggests an increase in inflammation of the prostate, with the association of cli-

nical symptoms. Despite this, Sars-Cov-2 infection doesn't appear to be associated with an increased incidence of prostate cancers, although larger series are required to draft definitive conclusion.

2. Introduction

After its initial discovery in Wuhan, China, the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread throughout the world, and the consecutive coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization (WHO) shortly afterward. The COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has spread worldwide in 2020. Symptomatic infection is primarily characterized by a severe acute respiratory disease, however the clinical manifestations could be largely variable, up to multi-organ failure and death. All over the world a significant number of patients diagnosed with COVID-19 are asymptomatic [1], nevertheless elderly males are more susceptible to severe SARS-CoV-2 infection and significant clinical manifestations [2]. The most common comorbidities in COVID-19-positive patients are chronic lung disease, diabetes, and hypertension [2]. The transmission of SARS-CoV-2 is mainly driven by respiratory droplets [3]. Moreover, physical contact of contaminated surface, saliva, teardrops, urine and stool have been recognized as additional means for transmission [4]. The virus exhibits a strong infectivity with a low virulence compared to previous coronavirus strains, and a higher fatality rate in men than in women (COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU), 2020) [5]. Gender-related COVID-19 mortality is among the most frequently reported epidemiological data (19). Studies conducted in various countries show that males are more vulnerable to COVID-19 infections, and for this reason, the male gender is considered a poor prognostic factor by some authors [6].

Rocco et al pointed out the importance of early recognition of symptoms by urologists for proper triage of patients and to prevent missing possible SARS-CoV-2 infection because of an overlap of COVID-19 and classical urological symptoms. Additionally, fever and increased urinary frequency should be considered as important symptoms overlapping with urosepsis in the differential diagnosis of COVID-19 in ambulatory care and emergency rooms [7]. Considering that the COVID-19 pandemic affects older and male patients more, it is obvious that the elderly male population with LUTS will be seriously affected by this pandemic. Recent studies have suggested that one of the reasons for the increased vulnerability of men could be androgen-mediated mechanisms [6]. Moreover, a recent study [8] has demonstrated the presence of the SARS-CoV-2 genome in the sperm of sexually active men recovered from COVID-19, and that semen features can be affected by SARS-CoV-2 and the disease driven inflammation. Despite this, the correlation with a definitive fertility impairment is still debated [5,8]. SARS-CoV-2 used angiotensin-converting enzyme 2 (ACE2) receptor and the cell surface transmembrane protease serine 2 (TMPRSS2) for entry into target host cells [9]. As the virus binds its spike protein to ACE2 receptors, it is primed by the host surface protease transmembrane serine protease 2 (TMPRSS2). Cellular entry by endocytosis then occurs and the viral genome is released intracellularly. ACE2 and TMPRSS2 are integral for viral replication, so host cells that express these surface proteins at higher concentrations are potential targets for SARS- CoV-2 infection [10]. ACE2 is expressed in respiratory, digestive, cardiovascular and urinary systems [11]. Therefore, the virus may localize in the testis owing to the elevated expression of ACE and TMPRSS2 in the organ. TMPRSS2 is also an androgen-regulated gene in the prostate [9]. A recent study indicates that TMPRSS2 and ACE2 are expressed in both lung and prostate tissues, with higher relative TMPRSS2 expression in prostate epithelial cells [9].

Only a few studies have shown a potential relationship between SARS-CoV-2 infection and prostate inflammation [12], moreover there is a lack of evidence regarding pathologic evaluation. It is hypothesized that elderly male patients with severe Lower Urinary Tract Symptoms (LUTS) may be more exposed to severe SARS-CoV-2 syndrome, as more susceptible than general population, and that COVID-19 may exacerbate prostatic inflammation and therefore also clinical symptoms [12]. In Urology, the use of Magnetic Resonance Imaging (MRI) has progressively grown due to its critical role in the evaluation of prostate disease. Indeed, multiparametric MRI (mpMRI) is an excellent tool for prostate cancer diagnosis, but also to assess prostatic inflammation [13]. On multiparametric MRI, prostatitis is identified most frequently in the peripheral zone and demonstrates focal or diffuse low T2 signal intensity with patchy enhancement. Less commonly, prostatitis can occur in the transitional zone where the homogeneous low signal intensity can appear identical to the "erased charcoal" sign of prostate carcinoma [14]. The apparent diffusion coefficient (ADC) values have been highlighted as a useful parameter in distinguishing the two; restricted diffusion with ADC values of >900 mm2 /s have been reported to be a useful indicator for prostatitis; however, there is a degree of overlap in ADC values of prostatitis and prostate cancer [14]. Although there are certain radiological features that may point to one diagnosis over another, biopsy is often required for a definitive diagnosis. The rationale of this study is that, after Sars-Cov-2 infection, the prostate has a greater amount of inflammation both in the individual lesions analyzed and in the entire gland evaluated with mpMRI, related to the use of ACE2 receptor and TMPRSS2.

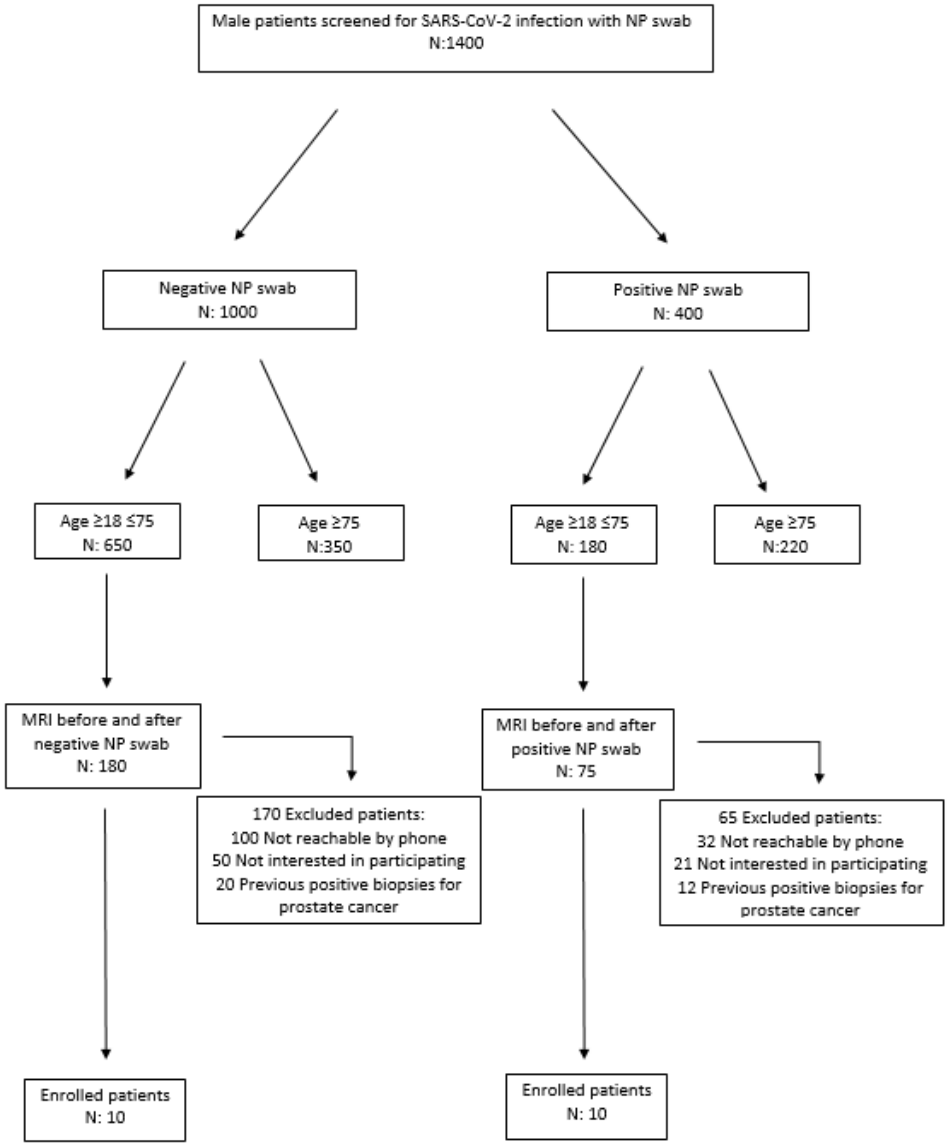
In 2016, a panel of experts in urology, radiology and oncology developed the Prostate Cancer Radiological Estimation of Change in Sequential Evaluation (PRECISE) recommendations in order to standardize reporting and to facilitate data collection regarding the

natural history of mpMRI findings in men on active surveillance [15]. The PRECISE system is based on a 5-point scale: (1) resolution of suspicious MRI features (e.g. previous area with restricted diffusion no longer shows it), (2) reduction in volume/conspicuity of MRI features (e.g. reduction in the size of previously seen lesion which remains suspicious for clinically significant cancer), (3) stable MRI appearance (either no suspicious features or all lesions stable in size and appearance), (4) significant increase in the size/conspicuity of features suspicious for prostate cancer (PCa) (e.g. significant increase in the size of the previously seen lesion or new area of restricted diffusion) and (5) definitive radiologic stage progression (features of extracapsular extension, seminal vesicle involvement or lymph node/bone involvement) [16]. Aim of the present study is to compare prostate inflammation by mpMRI before and after Sars-Cov-2 infection in 20 men.

3. Materials and Methods

3.1. Population

Our monocentric retrospective observational study includes 20 patients, divided in two groups: group I includes 10 patients who performed mpMRI after testing positive for SARS-CoV-2 nasopharyngeal swab; all patients of group I performed mpMRI in our institution, prior the infection. Group II includes 10 patients who performed two mpMRI 12 months apart, without contracting SARS-CoV-2 disease between the first and second examination, demonstrated by negative nasopharyngeal swab. The inclusion and exclusion criteria are indicated in the (Flowchart 1). In relation to the outcome of the MRI, all patients with PIRADS≥ 3 lesions underwent prostate biopsy. No patients in either group underwent prostatic surgery. The mpMRI was performed at the Uro-Nephrologic Unit of Radiology Department of Azienda Ospedaliero-Universitaria Careggi of Firenze from April 2018 to February 2021.



Flowchart 1: Inclusion and exclusion patients' criteria.

3.2. Ethics

The study was carried out with the approval of the local Ethics Committee (CE: 17104) and registered on clinicaltrial.gov (Rif: NCT04446169), in compliance with the Declaration of Helsinki. All enrolled men provided written informed consent.

3.3. Multiparametric Mri

All mpMRI were performed using a 1.5 T MR scanner equipped with an anterior pelvic phased-array 18 channel coil and a posterior spine phased-array 32 channel coil (Magnetom Aera, Siemens Medical Systems, Erlangen, Germany) at Uro-Nephrologic Unit of Radiology Department of the University Hospital Careggi, Florence (Italy).

According to Prostate Imaging Reporting & Data System (PI-RADS) v2.1 standard operative procedure our acquisition protocol included:

- High-resolution T2-weighted fast spin-echo (FSE) or turbo spin-echo (TSE) sequences in the axial, sagittal and coronal planes (Slice Thickness 3 mm without gap; Matrix 272(P) x 320 (F); FOV (200mm x 200 mm)
- T1-weighted pre-contrast spin-echo (SE) or gradient echo (GE) sequence in the axial plane
- multi-b DWI (50, 500, 800, 1000 s/mm2) (EPI-DWI) sequence from which corresponding ADC maps were obtained.
- multi-b DWI (1400-1800 s/mm2) (EPI-DWI) sequence
- DCE assessment with fat suppression gradient-echo 3D T1W sequences with high time resolution (<7 sec) and time intensity curves evaluation.

mpMRI images were prospectively interpreted by 4 experted radiologists, with 10 and 5 years of experience in prostatic MRI, assigning a score of 1–5 for T2WI, a score of 1–5 for DWI, and positive and negative for DCE-MRI according to PIRADS v2.1 and determined the overall PIRADSv2.1 assessment category for PZ and TZ.

3.4. Statistics

Continuous and categorical variables were reported as median (interquartile range) and number (percentage), accordingly. Patients were then divided according to their mpMRI after Covid oropharyngeal swab. Statistical comparisons between groups were conducted with Mann-Whitney u-test for continuous variables, and with $\chi 2$ and Fisher's Exact test for categorical variables, as appropriate according to sample size. Intragroup comparison from baseline to follow-up were done with Wilcoxon test for continuous variables. Statistical significance was set with a p-value<0.05. All statistical analyses were performed using IBM SPSS version 20.0 (SPSS Inc, Chicago, IL, USA).

4. Results

In the present study, population median age was 64,15 years (range, 48-73 years). Median PSA level before and after Sars-Cov-2 infection is 5.25 ng/mL (range, 3.40- 8.01 ng/mL) and 6 ng/mL (range, 6-11 ng/mL), respectively. Median time between positive nasopharyngeal (NP) swab and mpMRI was 162 days (range 126-194 days) and median days between negative NP swab and mpMRI was 185 days (range, 138-241 days). Median time from first positive to negative NP swab was 23 days (range, 12-40 days) and median time from negative NP swab to mpMRI was 144 days (range, 128-187 days). Median prostate volume before and after Sars-Cov-2 infection was, respectively, 62.1 ml (range 36.4-89.4ml) and 62.5 ml (range, 42.0-83.7 ml). All the previously mentioned parameters were not statistically significant (Table 1). Fourteen patients (70%) referred LUTS, assessed with International Prostatic Symptoms Score (IPSS)(median 23,35; range 12-33); of these, 8 experienced LUTS after Sars-Cov-2 infection, 6 without LUTS (p=0.33). Before Sars-Cov-2 infection, 4 patients (40%) had one PIRADS 2 lesion at mpMRI; 2 patients (10%) had one PIRADS 3 lesion; 3 patients (30%) had one PIRADS 4 lesion; 1 patient (10%) had one PIRADS 5 lesion. After Sars-Cov-2 infection, 4 patients (40%) had one PIRADS 2 lesion at mpMRI; 1 patient (10%) had one PIRADS 3 lesion; 5 patients (50%) had one PIRADS 4 lesion. This parameter was statistically significant (p=0.033). The total evaluation of PIRADS lesion recognized by mpMRI after Sars-Cov-2 infection results statistically significant (p=0.033). 6 patients with positive NP swab (60%) had a PRECISE score 3 and 4 patients (40%) have a PRECISE score 4. The PRECISE score's media was 3.4 for the patients with positive NP swab and it was 3 for the patients with negative NP swab. 17 patients (85%) underwent prostatic biopsy and 6 patients (35.3%) resulted positive for neoplasia, of which 4 patients after Sars-Cov-2 infection (p=0.115) (Table 2).

Table 1: Patient parameters and clinical parameters before and after Sars-Cov-2 infection.

Age (years) (median, IQR)		64.15 (48-73)
Time between positive NP swab and mpMRI (days) (median, IQR)		162 (126-194)
Days between negative NP swab and mpMRI (days) (median, IQR)		185 (138-241)
Time from first positive to negative NP swab (days) (median, IQR)		23 (12-40)
Time from negative NP swab to mpMRI (days) (median, IQR)		144 (128-187)
PSA level (ng/ml) (median, IQR)	Before COVID-19	5.25 (3.40- 8.01)
	After COVID-19	6 (6-11)
Prostate volume (ml) (median, IQR)	Before COVID-19	62.1 (36.4-89.4)
	After COVID-19	62.5 (42.0-83.7)

Table 2: mpMRI parameters.

		Negative NP swab	positive NP swab	P value
Not urological symptomatic patients (n,%)		4 (40%)	2 (20%)	0.33
Urological symptomatic patients (n,%)		6 (60%)	8 (80%)	
First lesion at mpMRI before COVID-19 infection (n,%)	PIRADS 2	6 (60%)	4 (40%)	0.17
	PIRADS 3	4 (40%)	2 (20%)	
	PIRADS 4	0 (0%)	3 (30%)	
	PIRADS 5	0 (0%)	1 (10%)	
First lesion at mpMRI after COVID-19 infection (n,%)	PIRADS 2	7 (70%)	4 (40%)	0.03
	PIRADS 3	3 (30%)	1 (10%)	
	PIRADS 4	0 (0%)	5 (50%)	
Total evaluation of PIRADS lesion at mpRMI before COVID-19 infection (n,%)	PIRADS 2	6 (60%)	4 (40%)	0.06
	PIRADS 3	4 (40%)	1 (10%)	
	PIRADS 4	0 (0%)	4 (40%)	
	PIRADS 5	0 (0%)	1 (10%)	
Total evaluation of PIRADS lesion at mpRMI after COVID-19 infection (n,%)	PIRADS 2	7 (70%)	4 (40%)	0.03
	PIRADS 3	3 (30%)	1 (10%)	
	PIRADS 4	0 (0%)	5 (50%)	
Localization of lesions at mpRMI before COVID-19 infection (n,%)	Right apex	0 (0%)	0 (0%)	0.54
	Right mid	0 (0%)	0 (0%)	
	Right base	1 (10%)	1 (10%)	
	Left apex	2 (20%)	1 (10%)	
	Left mid	1 (10%)	4 (40%)	
	Left base	3 (30%)	1 (10%)	
	Diffused	3 (30%)	3 (30%)	
Localization of lesions at mpRMI after COVID-19 infection (n,%)	Right apex	0 (0%)	0 (0%)	0.85
	Right mid	0 (0%)	1 (10%)	
	Right base	1 (10%)	2 (20%)	
	Left apex	2 (20%)	1 (10%)	
	Left mid	1 (10%)	1 (10%)	
	Left base	2 (20%)	1 (10%)	
	Diffused	4 (40%)	4 (40%)	
Affected prostate zone at mpRMI before COVID-19 infection (n,%)	TZ	1 (10%)	1 (10%)	1
	PZ	9 (90%)	9 (90%)	
Affected prostate zone at mpRMI after COVID-19 infection (n,%)	TZ	1 (10%)	1 (10%)	1
	PZ	9 (90%)	9 (90%)	
Precise Score (n,%)	1	0 (0%)	0 (0%)	0.27
	2	2 (20%)	0 (0%)	
	3	6 (60%)	6 (6%)	
	4	2 (20%)	4 (40%)	
	5	0 (0%)	0 (0%)	
Biopsy (n,%)		10 (100%)	7 (70%)	0.27
Not biopsy (n,%)		0 (0%)	3 (30%)	
BPH (n,%)		8 (80%)	3 (42.9%)	0.11
Cancer (n,%)		2 (20%)	4 (57.1%)	

5. Discussion

This study demonstrates that, after Sars-Cov-2 infection, the prostate has a greater amount of inflammation both in the individual lesions analyzed and in the entire gland evaluated with mpMRI. The whole prostate volume (PV) is determinated by central gland (CG) and peripheral zone (PZ), which are important for differentiating different prostate pathologies. Turkbey et al. found that CG and PV volumes were shown to increase with age; however, PZ volume had no correlation with age. MRI was able to confirm our understanding that BPH is primarily a CG problem [17]. A standardized reporting technique is currently recommended to identify prostatic lesions. For the prostate, this technique is the PIRADS (Prostate Imaging Reporting And Data System) score. A revised edition has been published in January 2015 and is referred to as PIRADSv2. Lesion scoring is based on a five-point scale [18].

The normal appearance of the prostate on T1WI MR Images is homogenously isointense. On DWI MR Images, the normal tissue appears as low signal intensity or unrestricted due to Brownian movement of water molecules. Apparent diffusion coefficient (ADC) map can be calculated from DWI MR Images because it is inversely proportional to the degree of diffusion. The peripheral zone of prostate appears as low signal intensity on the DWI MR Images and high ADC values [19]. Due to the high cellular density and high nucleus to cytoplasm ratio than the normal prostate tissue, and infiltration of the glandular parenchyma with cancerous cells, the prostate cancer shows lower ADC values comparative to the normal tissue [20](Figure 1-3). Lesions of inflammation, on T2WI MR imaging, present with unilateral or bilateral diffuse or flaky areas in the peripheral zone of the prostate [19]. Shakur et al. and demonstrates focal or diffuse low T2 signal intensity with patchy enhancement. There is mild to moderate diffusion restriction due to the increased inflammatory cellular infiltrates, with associated signal loss on ADC maps. Morphological characteristics that can guide the diagnosis of prostatitis include a diffuse, band-like or wedge-like shape in comparison to the more commonly rounded, oval or irregular appearance of prostate cancer [14].

On T2WI, the hypointense T2 signal areas in prostatitis are usually geographic and illdefined and generally do not exert mass effect on the adjacent normal prostate tissue in contrast with prostate carcinoma. Although both diseases demonstrate diffusion restriction, in prostatitis it is usually to a lesser degree than seen in prostate carcinoma. Similarly the ADC values tend to be higher in prostatitis patients compared with prostate carcinoma patients [14]. Prostate cancer, on T2WI MR Images, present as a region of low signal intensity in the peripheral zone of the prostate [21]. It typically appears as a rounded, mass-like, contiguous low-signal intensity, with an irregular or indistinct margin, visible against the normal T2-bright surrounding glandular tissue (30). On DWI, prostate cancer foci show restricted diffusion at high b values (800–1000 s/mm2), usually depicted as a higher signal abnormality, and by convention, corresponding low-signal intensity on maps of absolute diffusion coefficients (ADC maps) [22]. Naryanmurthy et al. indicate that MRI is an accurate, safe, and non-invasive method for guiding benign prostatic hyperplasia (BPH) treatment [23]. The absolute disadvantage of using multiparameter MRI in the BPH evaluation is the high cost of the technique. Granville et al. described a two-factor model for the onset of LUTS, those factors being bulk growth (hyperplasia and hypertrophy) and adrenergically-driven smooth muscle tone; the presence of a third factor, inflammation, has been proposed [25]. Several systemic disease processes, which are associated with increased inflammation, have been suggested to be associated with BPH/LUTS, including metabolic syndrome, diabetes, and especially the hormonal changes that accompany obesity. If an increase of systemic inflammation induces a worsening of the LUTS and a volumetric increase of the prostate, we believe that the Sars-Cov-2 infection also determines these conditions.

Nabeeh and al. [25] describe that Sars-Cov-2 infection determinate an increase of LUTS in BPH patients. Their study demonstrated that medical treatment for COVID-19 involving intravenous fluids and corticosteroids increases LUTS. Furthermore, they believed that viral cystitis induced by hematuria and replication of SARS-CoV-2 in endothelial cells causes local inflammation with increasing of irritative LUTS [25]. 80% of our patients presented an increase of LUTS after Sars-Cov-2 infection, assessed with the IPSS questionnaire, according with literature. The correlation between BPH and Sars-Cov-2 infection is not yet known. As previously descripted, SARS-CoV-2 use angiotensin-converting enzyme 2 (ACE2) receptor for entry into the cells. These receptors are expressed throughout the metabolic organs such as adipose tissue and pancreatic beta cells, therefore it's supposed that Sars-Cov-2 infection determinate a new onset or exacerbation of pre-existing metabolic conditions [12]. The association between diabetes and BPH has been extensively studied and it's explained with proliferation induced by insulin and sex steroid hormonal change, that determinates inflammation and oxidative stress [26].

Another correlation is between metabolic syndrome (MetS) and BPH. MetS is a cluster of conditions that occur together, including increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels. The association is likely related with sex-related hormonal change, systemic inflammation, insulin resistance, and aberrant lipid profile [27]. Our meta-analysis showed that patients with MetS have higher although unimpressively different total prostate volume vs those without MetS (+1.8 mL, 95% CI 0.74–2.87; $P < 0.001$) [28]. As noted above, the proinflammatory state associated with central obesity may be associated with the inactivation of the SR-D5AR-2 gene promoter, leading to accelerated BPH progression. Currently, there aren't clear evidences of MetS association with increased prostatic inflammation assessable with mpMRI and PI-

RADS score. However, Tannenbaum et al. [29] prove that men with MetS have an increase of prostate volume, like our patients after Sars-Cov-2 infection.

Cardiovascular comorbidities are risk factors for developing LUTS and BPH [12]. Sars-Cov-2 infection causes venous thromboembolism, acute coronary syndrome and myocardial injury [30], thus it can be hypothesized that the Sars-Cov-2 infection exacerbates cardiovascular comorbidities and increases the incidence of LUTS and BPH. Although there is growing evidence of the association of cardiovascular comorbidities with the onset and clinical progression of BPH after Sars-Cov-2 infection, the molecular mechanisms remain unclear. More research is needed to better understand the role of COVID-19 and the increase of prostate inflammation. There are two possible explanations for the increase of LUTS and inflammatory prostatic lesions after Sars-Cov-2 infection: the first one is a specific viral activity within the prostate, which would be extremely important if confirmed, because of the repercussions on fertility; the second one is the indirect viral activity due to massive activation of systemic inflammatory cascades, whose end-products could elicit inflammatory patterns within the prostate. Our study presents some limitations. First of all, the limited number of patients. Another limitation is the single high experiences of the radiologist. The study was performed over a short time frame, and in a single centre: this allows us to minimize biases related to virus modifications or analytic procedures.

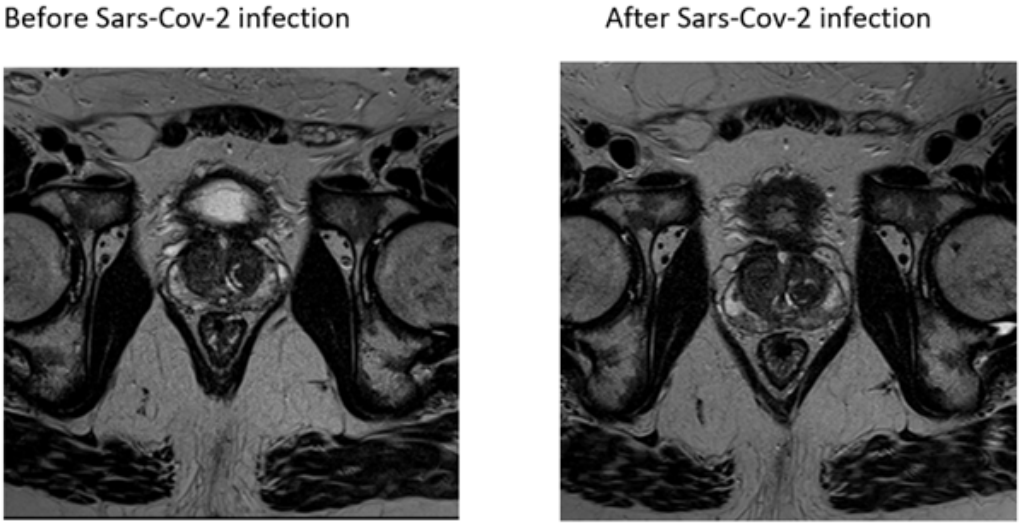


Figure 1: Patient X with PSA level 4.50 ng/ml and prostate volume 65 ml. T2: the peripheral zone of the prostatic gland appears globally hyperintense with few mild hypointense bands and wedges; after Covid' disease the peripheral zone shows a diffuse strong increase of hypointensity within hypointense wedges, especially in the middle and on the base area of the peripheral zone.

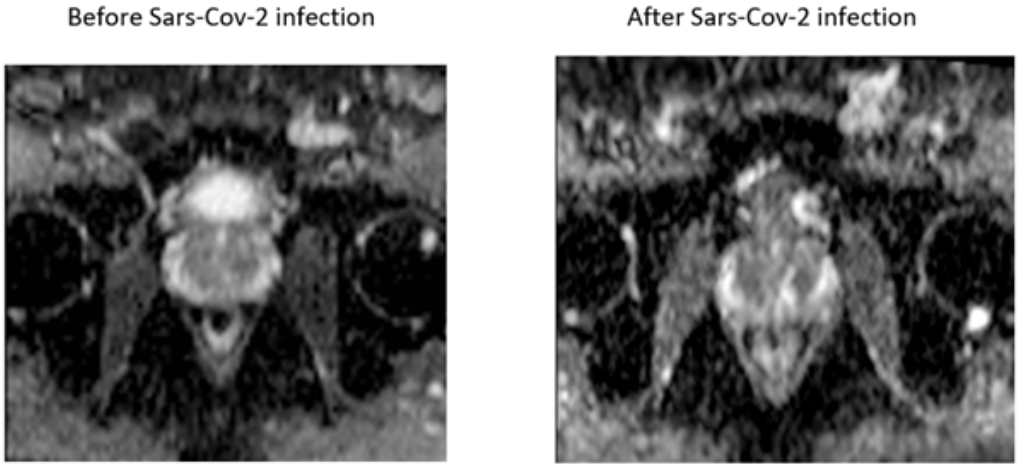


Figure 2: Patient X with PSA level 4.50 ng/ml and prostate volume 65 ml. ADC: after Covid's disease the peripheral zone shows an increase on hyperintensity.

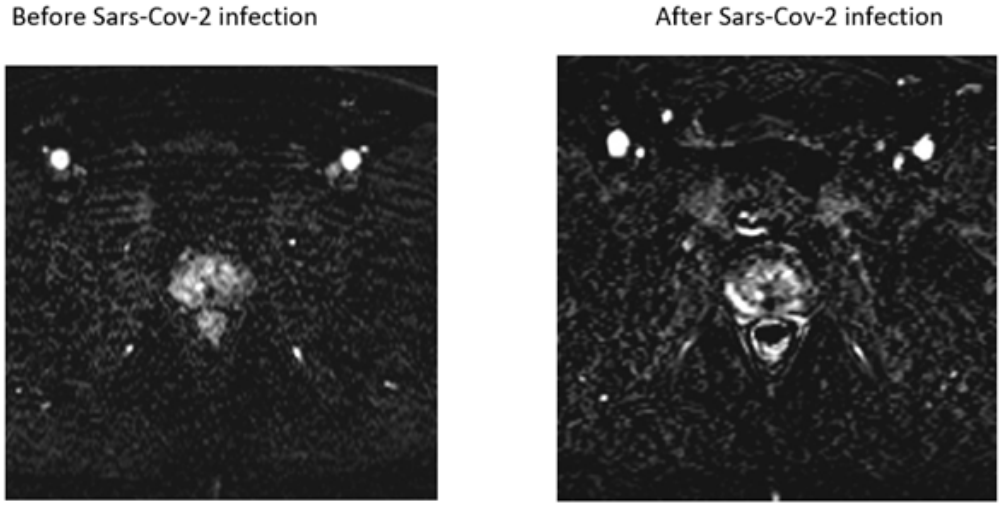


Figure 3: Patient X with PSA level 4.50 ng/ml and prostate volume 65 ml. DCE: after Covid' disease the peripheral zone shows a diffuse increase on vascularization on both sides.

6. Conclusion

Our study indicates that patients after Sars-Cov-2 infection have an increase in PRECISE score. This suggests an increase in inflammation of the prostate, with the association of clinical symptoms. Despite this, Sars-Cov-2 infection doesn't appear to be associated with an increased incidence of prostate cancers, although larger series are required to draft definitive conclusion.

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