Renal and testicular involvement in COVID-19 patients – implication for the urologist

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SUMMARY

The current coronavirus disease 2019 (COVID-19) pandemic, caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is rapidly spreading and overwhelming health-care facilities across the globe. In an editorial,[1] the author has focused on the associations between COVID-19 and the urogenital system, broadening our insight into the disease pathogenesis and future implications.

The author states that angiotensin-converting enzyme II (ACE2), the cellular receptor for SARS-CoV-2, is widely distributed in the urogenital system, including proximal renal tubular cells, urothelial bladder cells, Leydig cells, and cells in seminiferous ducts. Thus, the potential direct insults in COVID-19 patients include acute kidney injury (AKI), hypogonadism, and infertility. The implications of SARS-CoV-2 being isolated from urine include potential transmission through urine and the possibility of a urine-based noninvasive diagnostic test. Viral shedding in urine may be a result of cytokine storm-induced renal dysfunction or direct invasion by binding to ACE2 receptors. The author also emphasizes the cadre of urological patients at increased risk of COVID-19, including those with urological malignancies and chronic kidney disease, especially dialysis-dependent patients. These patients have increased susceptibility to infection and also higher mortality due to decreased immunity.

In conclusion, the author underscored the implications of the COVID-19 pandemic for a urologist.

COMMENTS

The SARS-CoV-2 is phylogenetically similar to SARS-Cov, and the spike (S) protein of both coronaviruses binds to the same ACE2 receptor on the target cell.[2] The ACE2 receptors promote viral entry and replication, and their abundance in alveolar epithelium explains the pathogenesis of respiratory disease caused by both coronaviruses. Moreover, convalescent SARS-Cov patients had neutralizing antibodies against the S-protein. Thus, the importance of interaction between the S-protein and ACE2 in the pathogenesis of COVID-19 cannot be overemphasized. This justifies the evaluation of ACE2-expressing organs for evidence of injury.

Recent studies have reported renal dysfunction in COVID-19 patients and its association with increased morbidity and mortality. A retrospective study, including 193 COVID-19 patients,[3] showed a high prevalence of renal dysfunction even in nonsevere cases, including proteinuria (60%), hematuria (48%), elevated blood urea nitrogen (BUN) (31%), and elevated serum creatinine (Scr) (22%). AKI was diagnosed in 66% of patients with severe disease and was associated with around 5.3 times higher risk of mortality. Computed tomography showed signs of parenchymal inflammation and edema, further corroborating renal insult by SARS-CoV-2.

In another cohort study[4] including 710 consecutive COVID-19 patients, baseline renal parameters were deranged in a significant proportion, including proteinuria (44%), hematuria (27%), elevated BUN (14%), and elevated Scr (16%). Overall, AKI was diagnosed in 3.2% of patients and was associated with increased mortality. A similar pattern is observed in both studies whereby a sizable proportion of patients have mild abnormalities in renal parameters, which is associated with increased risk of AKI, which in turn is associated with increased mortality.

Evidence is currently lacking for male gonadal injury related to SARS-CoV-2. A recent study shows an indirect association by comparing sex-related hormones in COVID-19 male patients and healthy males.[5] Significantly higher levels of serum luteinizing hormone (LH) and lower testosterone-to-LH ratio were observed in the COVID-19 patients. However, direct evaluation of semen or testicular tissue was not done.

Thus, patients with active COVID-19 should undergo baseline evaluation for renal dysfunction on admission, including BUN, Scr, and urine routine-microscopy. Patients with abnormalities should be closely followed up for the development of AKI, and proactive management should be sought to reduce morbidity and mortality. Careful handling
of urine is advisable. Potential for male gonadal injury is a matter of concern, given the magnitude of the pandemic. If proven in further studies, a surge in male infertility cases may be observed in the near future.

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