Autopsy evidence of direct renal infection with SARS-CoV-2

Journal Article, Case report

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Summary

Report:

- Case report of a single autopsy performed at University of Michigan Medical School, USA
- A 53-year-old male presented with aortic dissection. The dissection was repaired and patient was extubated on fourth postoperative day.
- His respiratory parameters deteriorated on the postoperative day 6, and he required reintubation. A respiratory virus panel was negative; RT-PCR for SARS-CoV-2 was positive.
- He developed multiorgan dysfunction including acute renal failure, and died on 12th postoperative day.
- An autopsy limited to the chest and abdomen was done in a negative pressure suite with appropriate protective equipment
- Light microscopy and ultrastructural analysis of kidney tissue was done.

Autopsy findings:

- The left and right kidneys weighed 230 and 240 g, respectively and were grossly unremarkable
- Light microscopic examination of formalin-fixed paraffin sections of the kidneys showed mild autolysis with no definitive nuclear inclusions. No glomerulitis, focal segmental glomerulosclerosis, or tubulointerstitial inflammatory infiltrate was seen in the sections. Some toluidine-blue stained epoxy sections showed focal tubular isometric vacuolization.
- On electron microscopy of the sections correlating to areas of isometric vacuolization, abundant viral forms within tubular epithelial cells were seen. The viruses ranged in size from 65-91 nm (mean 76 nm). Viral particles were composed of cores surrounded by an envelope studded with abundant crown-like, electron-dense spikes.
- Examined glomeruli and vascular endothelial cells were negative for the virus

Conclusions:

- This autopsy provided evidence of direct infection of the kidney by SARS-CoV-2.
- Tubular isometric vacuolization may be a useful histological marker for active SARS-CoV-2 infection in kidney biopsy

Appraisal:

- Strengths: First autopsy evidence of direct viral invasion of the kidney in a patient with COVID-19
- Weakness: Single case, shows presence of virus in tubular cells and does not confirm the cause of renal injury in COVID-19 patients; Frequency of occurrence and clinical importance of demonstrating the virus in the kidney is not clear

Opinion:

Although earlier publications have mentioned the presence of viral particles in the urine, this is the first report of autopsy findings in COVID-19 substantiating that the virus directly invades the kidney. As kidney or other organ biopsies are unlikely to be done as a part of evaluation in patients with the disease. We need more full autopsies to understand the disease process. This might help in developing treatment of this new entity.

Appraisers

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