

**MO090 TRANSPLANT KIDNEY BIOPSY FINDINGS IN COVID-19: A SYSTEMATIC REVIEW**

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**BACKGROUND AND AIMS:** Patients with transplanted kidneys are more susceptible to COVID-19 infections compared to those with native kidneys because of chronic immunosuppression and co-existing co-morbidities. A wide spectrum of renal

Author, Journal & Year of Publication	Age	Sex	Ethnicity	Donor Type & Year of Tx	Co-morbidities	Renal Pk	Creatinine on Pk (mg/dL)	Proteinuria on Pk (g/day)	Albumin on Pk (g/L)	Treatment received	Outcome (Renal Survival)	RRT needed	Time from COVID-19 diagnosis to biopsy	Haematuria
<b>T-cell Mediated Rejection</b>														
Kudose et al. J Am Soc Nephrol, 2020	54	F	Caucasian	Not Reported	IgA Nephropathy, Donor Specific Ab +ve, HTN, Obesity	AKI	2.6	0.2	-	Steroid Tocilizumab Thymoglobulin IV Immunoglobulin	DI	No	-	Yes
<b>Antibody-Mediated Rejection (ABMR)</b>														
Akilesh et al. Am J Kidney Dis, 2020	47	F	Black	Deceased Donor, 2015	HIV-associated Nephropathy, Vascular Rejection Post-Tx, HTN	AKI	1.63	2	-	Renal Transplantation S-MTP Plasma Exchange IV Immunoglobulin	-	-	6 weeks	No
Akilesh et al. Am J Kidney Dis, 2020	54	M	Asian	Not Reported	Chronic Transplant Glomerulopathy, C4d +ve, HTN, T2DM	AKI with Proteinuria	5.2	3	-	Regular MMF withhold Regular Tacrolimus dose reduced Steroids	DI	No	6 weeks	No
<b>Acute Tubular Injury</b>														
Akilesh et al. Am J Kidney Dis, 2020	42	M	Hispanic	Live Donor, 2019	HTN	AKI	1.53	0.15	-	-	DI	No	7 weeks	No
Kudose et al. J Am Soc Nephrol, 2020	54	F	Hispanic	Deceased Donor, 2020	ADPKD, HTN	AKI	2.9	0.2	-	None	DI	No	-	-
<b>Focal Segmental Glomerulosclerosis (FSGS)</b>														
Doeveaar et al. J Nephrol, 2020	35	M	Black	Deceased Donor, 2019	None	AKI Normothermic Regional Perfusion	1.7	3.29	-	Steroids (Hydrocortisone 200mg/day)	DI	No	34 Days	-
Oniszczuk et al. Transplantation, 2021	49	M	Black	Deceased Donor, 2020	Renovascular Disease, HTN	AKI Nephrotic Syndrome	2.17	3.27	2.7	Steroids ACE inhibitor	DI	No	2 weeks	-
Yamada et al. Transplantation Proceedings, 2020	49	F	Black	Live Donor, 1995 (from Sibling)	Pre-eclampsia	AKI Normothermic Regional Perfusion	3.4	6.3	3.8 at diagnosis with COVID-19	ACE inhibitor, Steroids (Prednisolone 60mg with quick wean due to side effects)	DI	No	5 days	-
<b>Collapsing Focal Segmental Glomerulosclerosis (Collapsing FSGS)</b>														
Noble et al. Nephron, 2020	45	M	Black	Live Donor, 2016	Malignant HTN, Obesity (BMI 42.6), Previous TCMR in 2017	AKI Nephrotic Syndrome	4.69	1.09	-	MMR withheld on admission, restarted after 14 days Steroid (Prednisolone dose doubled from 10mg OD to 20mg OD)	DD	Yes	12 Days	Yes
Lazareth et al. Am J Kidney Dis, 2020	29	M	Black	Deceased Donor, 2015	Urinary Schistosomiasis Previous ABMR in Jan 2020	AKI Nephrotic Syndrome	6.06	0.49	2.8	MMF withheld temporarily	DI	No	2 Days	-
<b>Transplant Infarction</b>														
Kudose et al. J Am Soc Nephrol, 2020	22	M	Black	Deceased Donor, 2018	Membranous Nephropathy PLA2R +ve, HTN	AKI	9.4	-	-	Tocilizumab, HCQ, Azithromycin	DD	Yes	-	-

MO090 Table 1: Transplant Kidney Biopsy Findings from Positive COVID-19 Cases

pathologies has been reported from renal biopsies taken from patients with native kidneys following COVID-19 presentation. In comparison, biopsy-proven findings in the setting of kidney transplantation and COVID-19 diagnosis are seldom described. Our study aims to review early reported histological findings of transplant kidney biopsies from patients testing positive for COVID-19.

**METHOD:** This is a secondary analysis of a larger study (PROSPERO registration number: CRD42020218048) which reviewed the histopathological findings of kidney biopsies in adults with concurrent COVID-19 infection. A systematic literature search was conducted independently by two authors (HW, VJ) through 'PubMed', 'Web of Science', 'Embase' and 'Medline-ProQuest' using the following keywords: "COVID-19 AND Kidney Biopsy", "COVID-19 AND Renal Biopsy", "SARS-CoV-2 AND Kidney Biopsy" and "SARS-CoV-2 AND Renal Biopsy". Articles were screened by three authors (HW, VJ, RC) for relevance and duplicates were removed. The study selection process was carried out as per the PRISMA guideline. In this analysis, we included all research articles reporting biopsies in transplanted kidneys in adults over age > 18 who tested positive with COVID-19 following a PCR swab test. We only included articles published in the English language. All relevant articles published before November 1<sup>st</sup> 2020 were included in this review. Information regarding demographic data, co-morbidities, renal presentation, renal parameters at time of COVID-19 diagnosis, management, need for renal replacement therapy and outcomes were extracted from selected articles.

**RESULTS:** Our review identified 11 cases reporting transplant kidney biopsies in patients with positive COVID-19 status. These 11 cases were reported from 7 articles, which were either single case reports or part of a case series. Mean age of the reported cases was 43.6 years  $\pm$  10.7. Transplant kidney biopsies were taken from 4 female and 7 male patients, where 7 patients were of black ethnicity. The review involved 3 live donor and 6 deceased donor transplanted kidneys, and 2 cases did not report type of kidney transplant received. All of the documented cases presented with acute kidney injury. 9 patients have essential hypertension or hypertension secondary to other co-morbidities. Biopsy findings revealed 2 cases of acute T-cell mediated and antibody mediated rejection, 2 cases of acute tubular injury, 5 cases of either FSGS or collapsing FSGS and 1 report of post-transplant kidney infarction. Acute treatment received involved different regimes. All 11 patients were eventually discharged from hospital, where 2 patients required dialysis following discharge. Table 1 describes data from the extracted cases.

**CONCLUSION:** There are multiple histological pathologies observed amongst transplant kidney biopsies taken from patients admitted following COVID-19 diagnosis. Early results suggest aggressive medical treatment to manage inflammation, transplant rejection and co-morbidities such as hypertension may optimize general and renal-specific outcomes. Collation of further cases is required to determine a clearer association between COVID-19 and characteristics demonstrated from transplant kidney biopsies.