

# COVID-19 associated fungal co-infections in Solid Organ Transplant Recipients: A single center case series

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## INTRODUCTION

- Increase in fungal co-infections reported in Coronavirus disease of 2019 (COVID-19) pandemic
- COVID-19-associated fungal infections (CFIs) identified – COVID-19 associated pulmonary aspergillosis (CAPA), COVID-19 associated mucormycosis (CAM), COVID-19 associated candidiasis (CAC)
- Incidence and occurrence in solid organ transplant recipients (SOTRs) is limited

## METHODS

- Single-center retrospective study
- Duration: March 2020 – January 2022
- Cohort: SOTRs (≥18 years) diagnosed with COVID-19 and subsequent CFI
- Excluded patients with *Candida spp* infections
- Data collected included demographics, comorbidities, COVID-19 therapeutics, CFI diagnostics and management

## RESULTS

- 612 SOTRs diagnosed with COVID-19
- 23 (3.8%) diagnosed with CFIs
- Predominantly male (17/23, 73.9%), with median age 59 years (range, 43-79)
- Organs transplanted – 20 (86.9%) kidney, 2 heart, 1 double lung
- Majority had lymphopenia (18/23, 78.3%), elevated inflammatory markers
- 22 (95.6%) needed ICU admission

P T	Age / Sex	SOT type	COVID-19 Rx	ICU	ECMO	CRRT	CFI Cat. #	CFI Site	CFI Spp	GM	Outcome	AD M
1	50/F	BLT	RDV + CST + TOC + BAR	74	N	N	Prov - CAPA	RP	<i>Rhizomucor</i>	R	On Rx	NA
2	59/M	DDKT	RDV + CST	29	Y	Y	Prob - CAPA	PUL	IPA	R	Death	29
3	66/M	DDKT	RDV + CST + BAR	6	N	N	Prov - CAPA	RC	<i>Aspergillus niger</i> <i>Aspergillus tamaritii</i>	NE	On Rx	39
4	49/M	DDKT	CST	38	N	Y	Prov - CAPA	SP	<i>Aspergillus fumigatus</i> <i>Aspergillus flavus/oryzae</i>	R	Death	55
5	64/M	OHT	RDV + CST + TPE	48	Y	Y	Prov - CAPA	PUL	<i>Aspergillus fumigatus</i>	S	Death	48
6	66/M	DDKT	RDV + CST + TPE	85	N	Y	Prov	CLA	<i>Candida auris</i>	S	Death	87
7	44/M	LUKT	RDV + CST + TPE	59	N	Y	Prob - CAPA	PUL	IPA	R	On Rx	60
8	59/M	DDKT	RDV + CP + CST + TPE	138	Y	Y	Prob - CAPA	PUL	IPA	R	On Rx	171
9	62/M	DDKT	RDV + CP + CST + TPE	57	N	Y	Prob - CAPA	PUL	IPA	R	Death	64
10	69/F	DDKT	RDV + CP + CST + TPE	46	N	Y	Prov - CAPA	PUL	<i>Aspergillus fumigatus</i>	R	Death	71
11	59/M	OHT	RDV + CP + CST	24	N	Y	Prov - CAPA	PUL	<i>Aspergillus fumigatus</i>	R, S	Death	25
12	43/M	LRKT	RDV + CST + TPE	18	Y	Y	Prob - CAPA	PUL	IPA	R	Death	19
13	75/M	DDKT	RDV + CST + TPE	58	N	Y	Prob - CAPA	PUL	IPA	R	Death	62
14	59/F	DDKT	RDV + CST + TPE	7	N	Y	Prob - CAPA	PUL	IPA	S	Death	17
15	59/M	DDKT	RDV + CST + BAR + TPE	24	N	Y	Prob - CAPA	PUL	IPA	R	Death	27
16	54/M	DDKT	MAB	0	N	N	Prob - CAPA	PUL	IPA	S	On Rx	7
17	56/M	DDKT	RDV + CST + TPE	27	N	Y	Prob - CAPA	PUL	IPA	R	Death	32
18	78/M	DDKT	RDV + CST + CP	14	N	Y	Prob - CAPA	PUL	IPA	R	Death	31
19	49/F	DDKT	RDV + CST + TOC + CP + TPE	8	N	N	Prob - CAPA	PUL	IPA	R	On Rx	139
20	63/F	DDKT	RDV + CP + CST + TPE	200	N	Y	Prob - CAPA	PUL	IPA	R	Death	78
21	47/M	DDKT	RDV + CST + TPE	200	Y	Y	Prov - CAPA	PUL	<i>Aspergillus fumigatus</i>	R	Death	204
22	66/M	DDKT	RDV + CP + CST + TPE	46	Y	Y	Prob - CAPA	PUL	IPA	R	Death	56
23	52/F	DDKT	RDV + CST + TPE	138	Y	Y	Prob - CAPA	PUL	IPA	R	Death	139

Table 1. Characteristics of Solid Organ Transplant Recipients with COVID-19-associated CFIs.  
Legend: ADM: duration (days) of hospitalization; BAR: basiliximab; BLT: bilateral lung transplant; CAM: COVID-19 associated mucormycosis; CAPA: COVID-19 associated pulmonary aspergillosis; Cat: category; CFI: COVID-19 associated fungal co-infection; CLA: central-line associated bloodstream infection; COVID-19: Coronavirus disease 2019; CP: corticosteroid plasma; CRRT: whether patient required continuous renal replacement therapy during hospitalization; CST: high-dose corticosteroids; DDKT: deceased donor kidney transplant; ECMO: whether patient needed extracorporeal membrane oxygenation therapy during hospitalization; GM: elevated *Aspergillus galactosaminase* antigen in respiratory system specimen at time of CFI diagnosis; ICU: whether patient was admitted to the intensive care unit during hospitalization and duration (days) of ICU stay; IPA: invasive pulmonary aspergillosis; LRKT: living related kidney transplant; LUKT: living unrelated kidney transplant; NE: not elevated; OHT: orthotopic heart transplant; Prob: probable fungal infection; Prev: proven fungal infection; PT: patient; PUL: pulmonary; RDV: remdesivir; R: respiratory; RC: rhinocerebral; RP: rhinopulmonary; Rx: therapy; S: serum; SP: sputum; TPE: therapeutic plasma exchange.

## RESULTS

- CFIs diagnosed at median 21 days (range, 3-161) after initial COVID-19 diagnosis
- Only 1 patient was on antifungal prophylaxis
- Probable CAPA diagnosed in 69.6% patients (16/23), with CAM noted in 1 patient
- 34.8% (8/23) had specific species identified
- Elevated fungal markers in 95.6% (22/23)
- Median hospitalization duration → 56 days (range, 7-204)
- Mortality was high → 73.9% (17/23)

## CONCLUSION

- Fungal co-infections in SOTRs are associated with poor outcomes.
- Transplant physicians should have a high clinical suspicion for CFI
- Further studies needed to determine CFI predictors and role for prophylaxis

References  
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