Bamlanivimab Decreases Severe Outcomes of SARS-CoV-2 Infection in Patients With Antineutrophil Cytoplasmic Antibody Vasculitis

To the Editor: Patients with antineutrophil cytoplasmic antibody–associated vasculitis (AAV) are more likely to have poor outcomes if infected with SARS-CoV-2.[1] B-lymphocytes play a central role in the pathogenesis of AAV.[2] Thus, rituximab therapy targeting B cells is a first-line agent for both induction and maintenance therapy;[3] however, treatment with rituximab increases mortality risk in patients with rheumatic disease infected with SARS-CoV-2.[4] In addition, rituximab use is associated with blunted humoral- and cell-mediated immune responses to SARS-CoV-2 vaccine.[S1] Monoclonal antibody treatment, specifically bamlanivimab, was found to be promising in reducing hospitalization and mortality rates for patients infected with SARS-CoV-2.[S2]

We studied the outcome of SARS-CoV-2 infection in patients with AAV during the pandemic and investigated the impact of bamlanivimab on the risk of hospitalization and death.

After extracting demographic and clinical information from medical records, we performed descriptive statistics and bivariate comparisons using χ^2 and Fisher exact tests for categorical variables and t tests and Welch unequal variance tests for continuous variables. Analyses were conducted in SAS version 9.4 (SAS Institute, Cary, NC).

Of the 20 patients with a mean age of 61 years, 75% White, and 60% myeloperoxidase antineutrophil cytoplasmic antibody, 12 were hospitalized and 5 died of pneumonia or sepsis. Most (75%) were treated with rituximab (Table 1). The median (interquartile range [IQR]) time from last rituximab administration to SARS-CoV-2 diagnosis in 15 rituximab-treated patients with AAV was 18 (13–30) weeks. B cells were depleted in 13 patients who had cluster of differentiation 19 data. There were 4 patients who had received both doses of the SARS-CoV-2 vaccination with Pfizer or Moderna before SARS-CoV-2 diagnosis. Of these 4 vaccinated patients, 3 did not mount a humoral response, and the single patient with a humoral response had subsequently received treatment with rituximab for newly diagnosed AAV. The median (IQR) time between administration of the second dose of SARS-CoV-2 vaccination and SARS-CoV-2 diagnosis was 14 weeks (8.3–23 weeks).

The median (IQR) time from SARS-CoV-2 symptom onset to hospitalization was 3 days (2–4 days). The median (IQR) duration of hospitalization was 8 days (6.5–13.8 days). The median (IQR) time from SARS-CoV-2 symptom onset to death was 14 days (11–49 days). There were 11 patients (55%) who required supplemental oxygen and 5 (25%) who required mechanical ventilation. Furthermore, 11 patients received dexamethasone, 10 remdesivir, and 3 plasma therapy. There were 7 patients including 6 on rituximab therapy who received treatment with the monoclonal antibody bamlanivimab and a statistically significant decrease of hospitalization in this group; hospitalization was required for 1 patient (14.3%) of those who received bamlanivimab versus 11 (84.6%) of those who did not ($P = 0.0044$). No patient who received bamlanivimab died of SARS-CoV-2; 38.5% of those who did not receive bamlanivimab died.

Older age is one factor known to increase the risk of severe outcomes in SARS-CoV-2.[S1] The t test revealed a statistically significant difference ($P = 0.0138$) between the age of those hospitalized (mean 68.3 years) and those who were not (mean 50.9 years). In addition, we found no differences attributable to body mass index, but other comorbidities had nonstatistically significant differences. The small absolute number of patient fatalities meant that observable differences between SARS-CoV-2 survivors and nonsurvivors were minimal for many factors.

Managing patients with AAV on rituximab therapy has been challenging owing to risk of severe SARS-CoV-2 infection and impaired immune response to the SARS-CoV-2 vaccine. Our data reveal that bamlanivimab decreases the risk of severe outcomes offering hope in this vulnerable cohort. Early use of monoclonal antibody therapy should be advocated in patients with AAV on immunosuppressive therapy.

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SUPPLEMENTARY MATERIAL

Supplementary File (Word)

Supplementary References.

Table 1. Demographic, comorbidities, and immunosuppressive treatment vs. SARS-CoV-2 outcomes

Variables	All patients	Not hospitalized	Hospitalized	*P* value	Survived	Died	*P* value
n	20	8	12		15	5	
Age (yr)				0.0138			0.3913
Mean (SD)	61.3 (15.4)	50.9 (14.2)	68.3 (12.2)		59.6 (4.1)	66.4 (14.0)	
Sex, *n* (col %, row %)				1.000			0.3034
Female	10 (50.0)	4 (50.0, 40.0)	6 (50.0, 60.0)		6 (40.0, 60.0)	4 (80.0, 40.0)	
Male	10 (50.0)	4 (50.0, 40.0)	6 (50.0, 60.0)		9 (60.0, 90.0)	1 (20.0, 10.0)	
BMI				0.8596			0.4263
Mean (SD)	35.2 (6.2)	34.8 (8.7)	35.4 (4.2)		35.7 (6.9)	33.7 (3.5)	
Comorbidities, *n* (col %, row %)							
Hypertension				0.2553			1.000
No	4 (20.0)	3 (37.5, 75.0)	1 (8.33, 25.0)		3 (20.0, 75.0)	1 (20.0, 25.0)	
Yes	16 (80.0)	5 (62.5, 31.25)	11 (91.7, 68.8)		12 (80.0, 75.0)	4 (80.0, 25.0)	
Diabetes				0.2421			0.5395
No	17 (85.0)	8 (100.0, 47.1)	9 (75.0, 52.9)		12 (80.0, 70.6)	5 (100.0, 29.4)	
Yes	3 (15.0)	0 (0.0, 0.0)	3 (25.0, 100.0)		3 (20.0, 100.0)	0 (0.0, 0.0)	
Heart disease				0.6027			0.5598
No	15 (75.0)	7 (87.5, 46.7)	8 (66.7, 53.3)		12 (80.0, 80.0)	3 (60.0, 20.0)	
Yes	5 (25.0)	1 (12.5, 20.0)	4 (33.3, 80.0)		3 (20.0, 60.0)	2 (40.0, 40.0)	
CKD				0.8367			0.2088
No	7 (35.0)	2 (25.0, 28.6)	5 (41.7, 71.4)		6 (40.0, 85.7)	1 (20.0, 14.3)	
Stages 3 and 4	10 (50.0)	5 (62.5, 50.0)	5 (41.7, 50.0)		8 (53.3, 80.0)	2 (40.0, 20.0)	
Stage 5	3 (15.0)	1 (12.5, 33.3)	2 (16.7, 66.7)		1 (6.67, 33.3)	2 (40.0, 66.7)	
Immunosuppressant regimen, *n* (col %, row %)				0.6444			0.3025
Rituximab	13 (65.0)	7 (87.5, 46.7)	8 (66.7, 53.3)		12 (80.0, 80.0)	3 (60.0, 20.0)	
Prednisone	3 (15.0)	1 (12.5, 33.3)	2 (16.7, 66.7)		2 (13.3, 66.7)	1 (20.0, 33.3)	
Cyclophosphamide	1 (5.0)	0 (0.0, 0.0)	1 (8.3, 100.0)		0 (0.0, 0.0)	1 (20.0, 100.0)	
Azathioprine	1 (5.0)	0 (0.0, 0.0)	1 (8.3, 100.0)		1 (6.7, 100.0)	0 (0.0, 0.0)	
SARS-CoV-2 vaccination, *n* (col %, row %)				0.6945			0.097
No		7 (87.5, 43.8)	9 (75.0, 56.3)		13 (86.7, 81.3)	3 (60.0, 18.8)	
Yes	4 (20.0)	1 (12.5, 25.0)	3 (25.0, 75.0)		2 (13.2, 50.0)	2 (40.0, 50.0)	
Bamlanivimab, *n* (col %, row %)				0.0044			0.1137
No	13 (65.0)	2 (25.0, 15.4)	11 (91.7, 84.6)		8 (53.3, 61.5)	5 (100.0, 38.5)	
Yes	7 (35.0)	6 (75.0, 85.7)	1 (8.33, 14.3)		7 (46.7, 100.0)	0 (0.0, 0.0)	

BMI, body mass index; CKD, chronic kidney disease; col, column.

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