The Role of Immunosuppressants, Vaccination, and Monoclonal Antibody Treatment in COVID-19 Outcomes for Liver and Renal Transplant Recipients

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Study Aim

We aim to study the effectiveness of vaccination and monoclonal antibody treatment for SARS-CoV-2 infection amongst liver and renal transplant recipients.

Background

- Post-transplant immunosuppression leaves patients at an increased risk of COVID-19 related morbidity and mortality.[1]
- The effectiveness of vaccination and monoclonal antibody treatment remains unclear for this population. Studies have shown that two doses of COVID-19 vaccine have resulted in a weak immune response among organ transplant recipients.[2]

Methods

A retrospective study of liver and renal transplant recipients diagnosed with COVID-19 between 3/2020 to 1/2022 was performed. Statistical analysis included Chi Square tests, t-tests and logistic regression.

Data Recorded for all patients:
Patient demographics, Immunosuppressants* taken, vaccine dose numbers, monoclonal antibody treatment (MABs), hospitalization, length of stay (LOS, days), mechanical ventilation (MV) use, as well as 3- and 6-month mortality.

Data collected for Antibody analysis:
Quantitative and qualitative (positive or negative) IgG antibodies were recorded when present. Data was analyzed for correlations with +/-IgG, hospitalizations, and vaccine doses

*immunosuppressants studied (tacrolimus, cyclosporine, mycophenolate, prednisone, everolimus)

Results

Demographic Analysis

- Median age 59 y; 42% Female, 58% Male
- 55% White, 41% Black, 2% Hispanic, 2% Asian
- 255 liver and renal transplant (LRT) patients: 26% liver, 69% renal, and 4% dual LRT patients

Analysis 1: Does Monoclonal Antibody Treatment (MAB) change outcomes?

Variable	Response	No MABs given N=190	MABs given N=65	p-value
Age	Mean ± SD	58.63 ± 13.42	54.46 ± 13.57	0.032
Hospitalized	Yes	**130 (68%)**	**24 (37%)**	**<.001**
Hospitalization duration (days)	N Mean ± SD	130 8.78 ± 8.51	24 7.92 ± 6.20	0.82
Mortality in 6 months after Covid	Yes	**38 (20%)**	**7 (11%)**	**0.092**
Mortality in 3 months after Covid	Yes	**34 (18%)**	**7 (11%)**	**0.177**

Table 2: Outcomes for all patients who received MABs vs those not given MABs

Results of 65 (25%) patients treated with MABs:
- Fewer hospitalizations (37% vs 68% p< 0.001)
- Trend towards reduced mortality at 3 months and 6 months
- No significant difference in mechanical ventilation use (25% vs 20% p=0.589) or length of stay (7.92 ± 6.20 vs 8.78 ± 8.51 p=0.820).

Analysis 2: Does the number of vaccine doses affect outcomes?

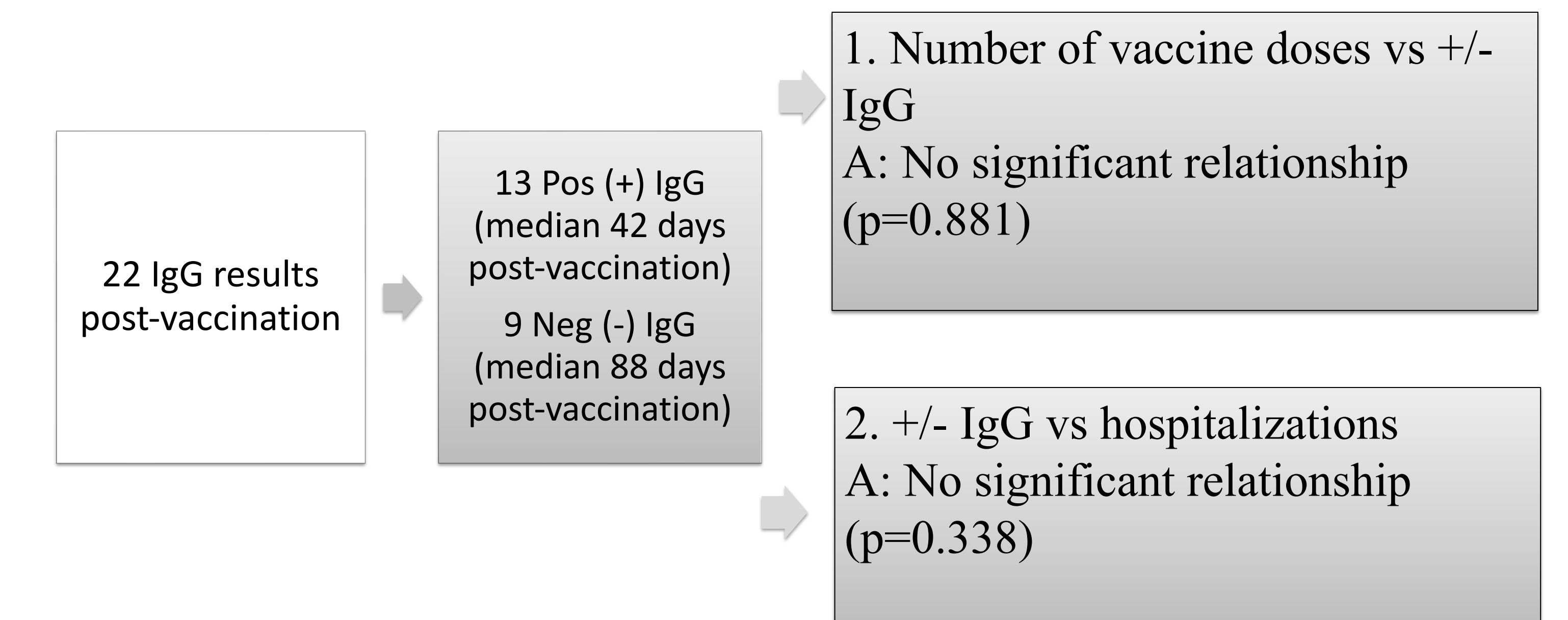| Variable	p-value
Hospitalization Rates	0.948
LOS	0.688
6 mos mortality	0.595

Table 3: Correlation between 3 vaccine doses and outcomes

- No correlation between number of vaccine doses (up to 3) and hospitalization rates, LOS, 3-month mortality, or 6-month mortality

Results cont.

Analysis 3: Comparing Qualitative Antibody results, vaccine doses, and hospitalizations

22 IgG results post-vaccination →
13 Pos (+) IgG (median 42 days post-vaccination)
9 Neg (-) IgG (median 88 days post-vaccination) →

1. Number of vaccine doses vs +/- IgG
A: No significant relationship (p=0.881)

2. +/- IgG vs hospitalizations
A: No significant relationship (p=0.338)

- The number of vaccine doses did not correlate with having a positive IgG level at the time of COVID diagnosis
- Positive IgG levels did not correlate with reduced hospitalizations

Conclusion

The immunosuppressed state of LRT recipients negatively impacts recovery from COVID-19.

- **Monoclonal antibody treatment significantly reduces hospitalizations and 3- and 6-month mortality.**
- The inability to predict any improvement in clinical outcomes offered by a 3-vaccine series suggests the need to consider further therapeutic options such as 1) a fourth mRNA vaccine dose and 2) the use of tixagevimab/cilgavimab for solid organ transplant recipients.

References

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