Outcomes of Convalescent Plasma Transfusion for SARS-CoV2 Patients in the Intensive Care Unit

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Background

- SARS-CoV2 is a grave illness and few therapeutic agents have yielded benefit or reduced mortality
- Outcomes following convalescent plasma use in SARS have had generally inconclusive results[1],but receiving convalescent plasma earlier in the disease course before Day 14 has been associated with a shorter hospital course[2]
- Analysis of the sera of SARS-CoV2 patients shows that nearly all patients seroconvert within 1-2 weeks of symptoms onset, with plateau levels of IgG observed 6 days after seroconversion[3,4]
- In a recent limited case series involving 5 SARS-CoV2 patients who were administered convalescent plasma between 10-22 days after hospital admission, all 5 patients were reported to have improvement of multiple clinical markers such as fever, oxygen requirements, and Sequential Organ Failure Assessment (SOFA) scores [5]
- In the present study, we aimed to determine the benefit of administering convalescent plasma to critically ill patients in the intensive care unit, and the impact on mortality and other clinical markers

Methods

- Five critically ill patients in the intensive care unit with confirmed SARS-CoV2 infection were enrolled in the uncontrolled case series study at NorthShore University HealthSystem
- Mechanically ventilated patients with severe acute respiratory distress syndrome (range, PaO2/FiO2 < 100) were eligible to receive convalescent plasma
- We reviewed daily vital signs, inflammatory markers (C-reactive protein and ferritin), PaO2/FiO2 ratio, ventilatory support requirements and SOFA scores before and after convalescent plasma transfusions
- SARS-CoV2 PCR viral load testing was completed on day 0 of transfusion and repeated on day 3 and 6. Complications during the hospitalization and 30-day mortality were assessed

Table 1. Patient characteristics

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
Sex	Female	Male	Male	Male	Male
Age (years)	58	66	45	60	65
Weight (kg)	57		73	77	92.5
Smoking	No	No	Yes	No	Yes
Comorbidities	Hypertension Diabetes mellitus	Prediabetes	Gout	Hypertension Hepatitis B Hepatitis C carrier	Obesity
Interval between symptoms and admission	9 days	7 days	10 days	8 days	6 days
Interval between admission and plasma	31 days	23 days	9 days	20 days	9 days
Complications prior to plasma transfusion	Bilateral upper extremity DVT SIADH	VAP Hypernatremia	None	VAP	None
Disease classification	Severe	Severe	Severe	Severe	Severe
Treatments	Plasma Diuretics	Plasma Diuretics	Plasma Diuretics Antibiotics	Plasma Antibiotics	Plasma CRRT Antibiotics
Proned	Yes	Yes	Yes	Yes	Yes
Extubated	No	No	Yes (day 29)	No	No
Deceased	Yes	Yes	No	Yes	Yes

Figure 1. Fever curve and trends of inflammatory markers

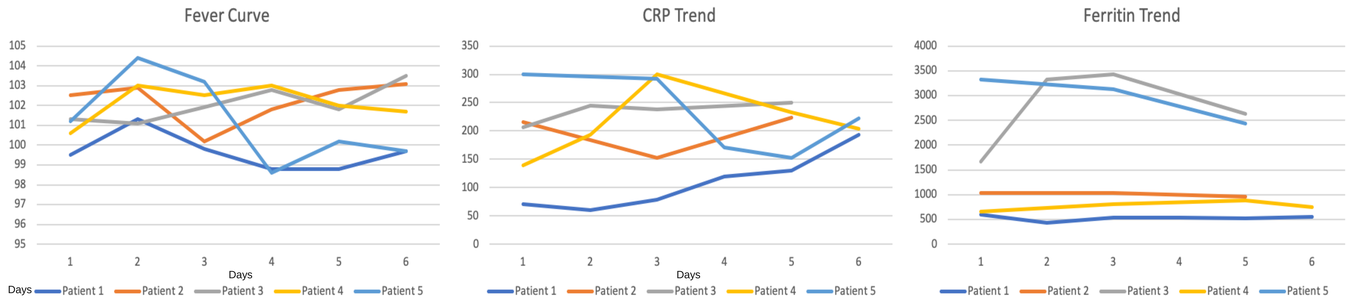
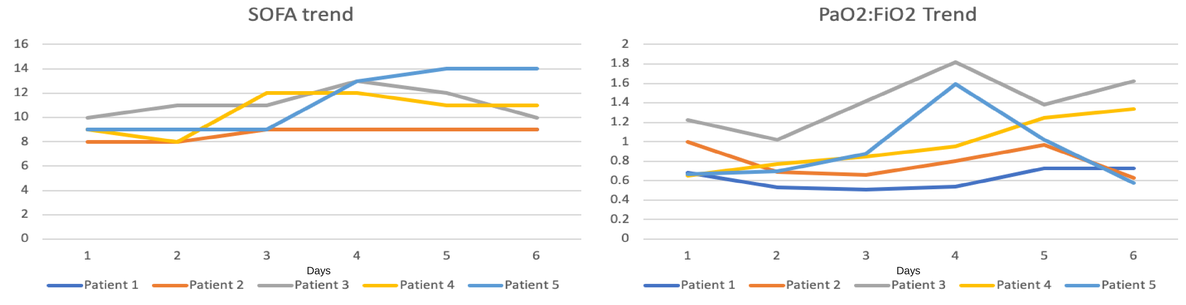


Figure 2. Trends of SOFA score and PaO2:FiO2



Results

- All 5 patients were mechanically ventilated at the time of transfusion and between day 7 to 31 of their illness
- Following plasma transfusion, body temperature and inflammatory markers remained elevated in four patients (figure 1)
- SOFA score and PaO_2/FiO_2 ratios continued to worsen in three and four patients respectively (figure 2)
- SARS-CoV2 PCR remained positive in 4 patients
- 4 of 5 patients had died at the end of the follow up period
- One patient who received convalescents plasma early on day 9, was successfully extubated on day 29 (table 1) and discharged after a long hospital course

Conclusions

- In our patient cohort, the administration of convalescent plasma did not show any therapeutic clinical or laboratory benefit
- In addition to a small and uncontrolled sample group, a notable limitation of this study is that all patients received plasma greater than 14 days from symptom onset
- One retrospective study has shown more probable benefit if administered before 14 days[2], which is congruent with the known peak viral shedding period of around Day 10 in SARS-CoV2[6]. Thus, the patients in our study were likely beyond the period where they could have derived significant clinical benefit, especially since peak viral shedding in SARS-CoV2 occurs sooner, around Day 4[7]
- Further investigation is necessary to draw definitive conclusions about the utility of convalescent plasma in the treatment of SARS-CoV2

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