

First-time Use of the Seraph® 100 Microbind® Affinity Blood Filter in a Pediatric Patient with Severe COVID-19 Disease: A Case Report



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Background

- Seraph® 100 Microbind® Affinity Blood Filter is a broad-spectrum sorbent hemoperfusion device designed to reduce bacteria, viruses, toxins, cytokines, and other inflammatory mediators.
- As it is an extracorporeal therapy/filter, it can be added in-line to both continuous kidney replacement therapy (CKRT), hemodialysis, and extracorporeal membrane oxygenation (ECMO).
- The FDA has granted an emergency use authorization (EUA) for the Seraph® 100 filter in adults who are admitted to the intensive care unit (ICU) with respiratory failure and COVID-19 infections.
- The filter has not been previously used in pediatric patients under 18 years of age.

Patient Course

- 17 year old with medical history of asthma and morbid obesity (180kg) presented to the emergency department in respiratory distress due to COVID-19 Infection.
- Patient required bi-level positive airway pressure (BiPAP) and subsequent Pediatric ICU admission.
- PICU course was complicated by:
 - Severe rhabdomyolysis (peak CPK >18,000)
 - KDIGO Stage 3 AKI (peak creatinine >10 mg/dL)
- COVID treatment was initiation and included:
 - Dexamethasone
 - Remdesivir
 - Tocilizumab
- ICU day 2 - Patient was initiated on continuous kidney replacement therapy (CKRT)
- ICU Day 3 – Patient's respiratory status declined progressing to respiratory failure requiring intubation and invasive mechanical ventilation
- ICU Day 3-4 - Patient had worsening of respiratory status and concern for episodes of pulmonary hypertensive crises
- ICU Day 4 – Patient had continued worsening which lead to prone positioning or ECMO
- ICU Day 4-8 – CKRT with Seraph Filter
- ICU Day 8 – Patient was extubated to BiPAP
- ICU Day 9 – Patient's respiratory support weaned to High-flow Nasal Cannula
- ICU Day 15 – Patient transferred out of the ICU

CKRT Treatment with Seraph® 100

- Seraph Filter was added to his CKRT on ICU day 4 under FDA emergency devise use approval
- Developed transient hypotension approximately 5 minutes after initiation of CKRT with the Seraph Filter and required increase in vasoactive support for about 5 minutes until returning to baseline
- He was continued on a total of 3 filters from ICU Day 4 to ICU Day 8 for a total of approximately 96 hours of total treatment time
- During this time, his respiratory status improved as well as his need for vasoactive medications (Table 1).
- Inflammatory markers were also noted to decrease during his treatment

CKRT Treatment with Seraph® 100 (continued)

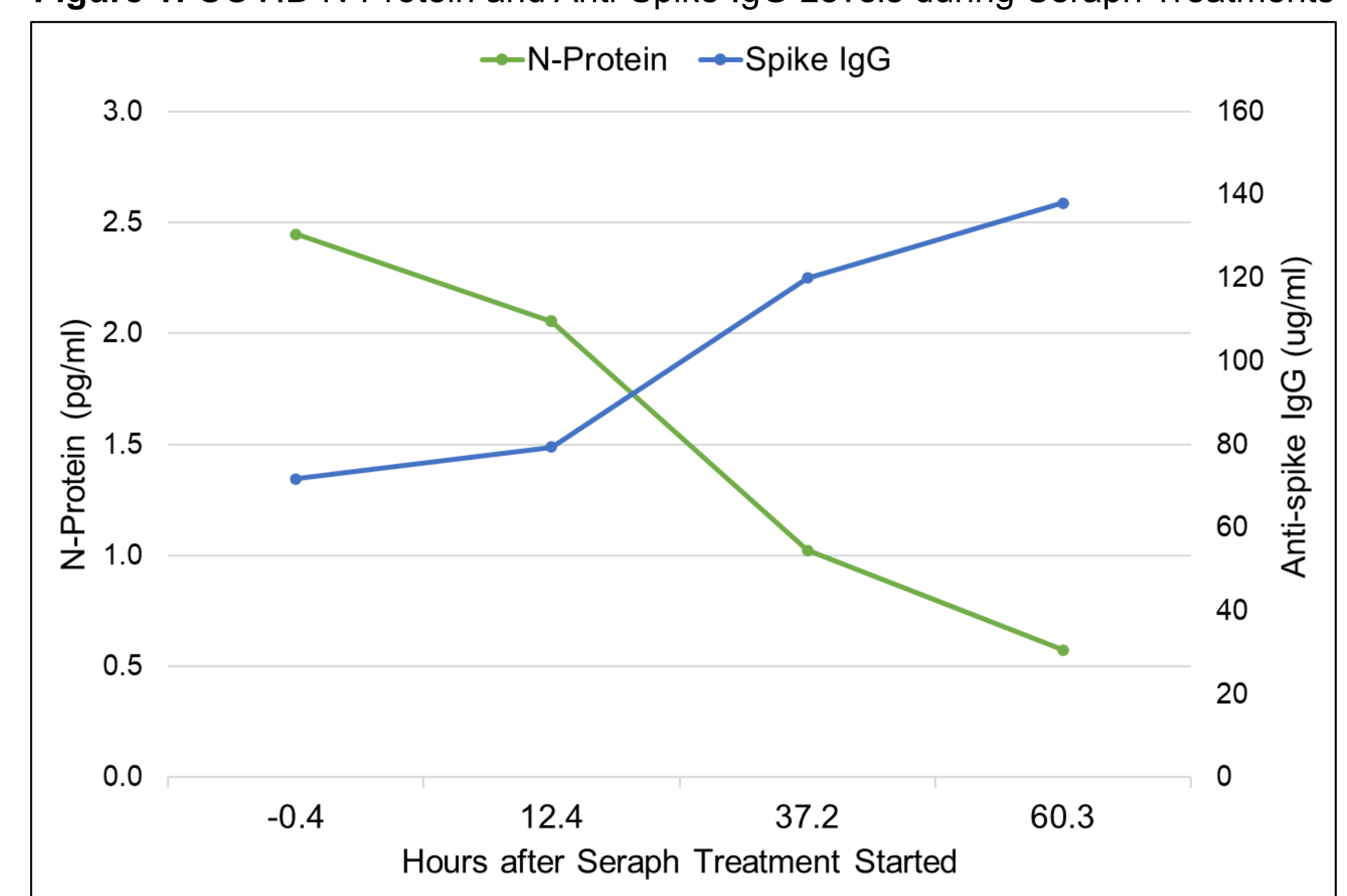
- Patient was extubated on ICU day 8 and CKRT therapy was discontinued
- No further kidney replacement therapy was needed the remainder of hospitalization
- Patient was discharged on hospital day 23 with a creatinine of 1.65mg/dL.

Cardiorespiratory Support and Laboratory Markers

Table 1. Trend of Cardiorespiratory Support Needed and Laboratory Markers

	ICU Day 3	ICU Day 4	ICU Day 5	ICU Day 6	ICU Day 7	ICU Day 8	ICU Day 9
Seraph Filter		--- Filter #1 ---	--- Filter #2 ---	--- Filter #3 ---			
Lowest PaO ₂ :FiO ₂ Ratio	101	124.6	136.7	141.7	191.4	171.4	
Highest Oxygenation Index	19.3	14.4	13.2	12.7	6.2	6.4	
Mean Oxygenation Index	16.2	12.1	10.7	8.7	5.3	5.8	
Highest Norepinephrine Dose (mcg/min)	7.5	4	8	2	1	0	0
Cumulative Daily Dose (mcg)	1,432	5,124	3,119	2,435	657	0	0
Mean Norepinephrine Dose (mcg/min)	2.4	3.6	2.2	1.7	0.7	0	0
pSOFA Score	10	10	9	8	8	6	4
Troponin (pg/mL)		257.74	164.57	89.52	49.86		19.74
CRP (mg/dL)		7.9	4.6	3	1.9		0.6
Procalcitonin (ng/mL)		5.05	3.46	1.54	0.87		0.38
Ferritin (ng/mL)		775	643.7	890.5	936.7		505.6
CPK (u/L)		1,300	1,099	721	782		490
COVID-19 N-protein (pg/mL, mean (CV %))		2.45 (10%)	2.06 (18%)	1.02 (20%)	0.57 (21%)		
Anti-Spike IgG (ug/ml, mean (CV %))		71.7 (4%)	79.4 (8%)	120 (11%)	130 (1%)		

Figure 1: COVID N-Protein and Anti-Spike IgG Levels during Seraph Treatments



Conclusion

This pediatric patient with severe COVID-19 ARDS and stage 3 AKI requiring CKRT tolerated treatment with the Seraph® 100 Microbind® Affinity Blood filter without any significant adverse events.

Acknowledgements

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