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Commentary: Therapeutic plasma exchange in COVID-19 pediatric patients: Is there a role?

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COVID-19 infection in pediatric patients is variable, ranging from asymptomatic to a multisystem inflammatory syndrome characterized by elevated cytokines and hyperimmune response. In a small subset of pediatric COVID-19 patients, particularly those with complex medical conditions and important comorbidities, severe respiratory failure can occur with deadly consequences. In the literature, the experience of extracorporeal membrane oxygenation (ECMO) in pediatric patients with severe acute respiratory distress syndrome (ARDS) due to COVID is largely confined to case reports, with some larger US and UK studies capturing outcomes of subsets of pediatric patients with COVID-19 requiring ECMO; however, data surrounding their ECMO course are limited.¹⁻⁴ In their case report, Kakuturu and colleagues⁵ describe the successful use of veno-veno ECMO and therapeutic plasma exchange (TPE) to break the cycle of cytokine storm, coagulopathy, and endothelial dysfunction in a morbidly obese teenager with ARDS attributed to COVID-19. In addition, they highlight a programmatic approach to ECMO recipients involving early extubation and ambulation.

TPE has shown some benefit in adult patients with severe sepsis and multisystem organ failure⁶ and has been applied to adult patients with fulminant COVID-19 infection as rescue therapy.^{7,8} TPE is hypothesized to break the cycle of coagulopathy, endothelial dysfunction, and cytokine storm that plays a role in adult COVID-19. Recently published studies show reductions in C-reactive protein, interleukin-6, lactate dehydrogenase, and D-dimer, in



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CENTRAL MESSAGE

This case highlights a multimodal approach of veno-veno extracorporeal membrane oxygenation and therapeutic plasma exchange in a teenage patient with respiratory failure attributed to COVID-19.

addition to improved oxygenation after TPE in critically ill COVID-19 adults.^{9,10} For patients with fulminant COVID-19 ARDS, TPE is emerging as a potential adjunct to the COVID-19 armamentarium; however, more research is needed to guide its potential use in adult patients.

There are no detailed reports of TPE in pediatric COVID-19 patients and how adult data applies to the pediatric population with severe COVID-19 infection is unclear. TPE has been described as a rescue therapy during the H1N1 pandemic in pediatric patients. Three children with acute lung injury and hemodynamic compromise underwent TPE after failure of conventional therapy and saw improvement in oxygenation and vasopressor support.¹¹ The report by Kakuturu and colleagues highlights the adjunct use of TPE and concomitant reduction in measured inflammatory markers, suggesting a temporal improvement related to TPE use.

This case report describes a 15-year-old patient with many comorbidities found in adult COVID patients (obesity, prediabetes, hypertension), and the generalizability of these results to the broader pediatric population is not clear. However, Kakuturu and colleagues have provided important insights into care for this complex case with their successful use of veno-veno ECMO and TPE in a pediatric patient with severe ARDS attributed to COVID-19. Given the rare occurrence of severe SARS-CoV-2 in pediatric patient, multi-institutional discussions are needed to delineate a role of TPE in critically ill pediatric COVID-19 patients.

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