Prolonged but Not Over: 97 days of ECMO Support in Severe ARDS with Suspected Primary Immunodeficiency in an Infant

Authors and Affiliations

Rafael Garcia[1], Leonardo Miana[1,2], Gabriela Carvalho[1], Janaina Moura[1], Ariane Emy[1], Carolina Caiado[1], Maria Emilia C P de Souza[1], Larissa Gondim[1], Layla B. Faleiros[1], Bianca Zimmer[1], Alexandre Targino[1,2], Oswaldo Gomes Jr[1], Tiago N Machuca[1], Desiree S Machado[1,3]

1. São Luiz Children's Hospital, Rede D'Or, São Paulo, SP, Brazil
2. Heart Institute, InCor, São Paulo, SP, Brazil
3. Institute D'Or for Research and Education, IDOR, São Paulo, SP, Brazil

Background: Prolonged extracorporeal membrane oxygenation (ECMO) support in infants with severe acute respiratory distress syndrome is rare and frequently complicated by refractory infections and anticoagulation challenges. A comprehensive multidisciplinary approach is required for cases with prolonged ECMO duration.

Objectives: To describe the successful use of prolonged VA-to-VV ECMO as a bridge to recovery in an infant with severe viral ARDS, prolonged cannulation challenges and complications associated with it.

Methods: Retrospective case report.

Results: A 1-year-old boy admitted with adenovirus, rhinovirus, and parainfluenza respiratory infections rapidly progressed to septic shock and refractory ARDS requiring invasive mechanical ventilation and vasoactive support. Failure of lung-protective ventilation, inhaled nitric oxide, and prone positioning prompted venoarterial (VA) ECMO initiation on hospital day 4. Following cardiovascular recovery, support was converted to venovenous (VV) ECMO. The patient received 14 days of VA-ECMO followed by 83 days of VV-ECMO. The patient was initially cannulated via neck with a 10Fr arterial and 16Fr venous cannula. He was then converted to VV using a 20Fr subxiphoid drainage cannula. The patient was anticoagulated with heparin and, given persistent prothrombotic state, aspirin was added later. Complications included Burkholderia cepacia and *Enterobacter hormaechei* septiciemia occurred at 50 days of support, and drainage cannula thrombosis occurred day 69 of ECMO. There were 6 oxygenator exchanges, with the longest oxygenator lasting over 35 days post aspirin addition (last oxygenator used). During ECMO, the patient was found to have aheterozygous TNFRSF13B variant associated with common variable immunodeficiency susceptibility, whereas cystic fibrosis was excluded. Weekly immunoglobulin replacement therapy was administered during hospitalization. The patient was successfully decannulated after a total of 97 ECMO days and survived to hospital discharge with a tracheostomy, but no other end organ dysfunction.

Conclusion: This case demonstrates that prolonged ECMO support can serve as an effective bridge to recovery in infants with severe ARDS complicated by multidrug-resistant infection and underlying immune dysfunction. Successful outcomes require multidisciplinary care integrating advanced ECMO management that included cannulation technique innovation, rehabilitation, and comprehensive infectious and immunological evaluation.

References:

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