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Burden of Catheter-Associated Thrombosis in Adult ECMO Patients: Institutional Incidence and Vascular Surveillance Outcomes

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Introduction: Catheter-associated thrombosis (CaT) is a clinically significant yet frequently underdiagnosed complication of extracorporeal membrane oxygenation (ECMO), with reported incidences ranging from 25% to over 90% depending on modality, cannulation strategy, and screening methodology. Despite its potential to precipitate thromboembolic events and long-term vascular sequelae, CaT remains outside the scope of routine surveillance in most ECMO programs worldwide. This gap limits both its epidemiological characterization and the development of evidence-based post-decannulation management strategies. The absence of standardized vascular surveillance protocols results in systematic underreporting of thrombotic burden and may contribute to delayed recognition of postthrombotic syndrome — a condition associated with significant morbidity and considerably reduced quality of life in the growing and increasingly complex population of ECMO survivors.

Methods: We performed a retrospective analysis of adult patients supported with ECMO at our institution over a defined study period. All patients underwent systematic duplex ultrasound assessment of cannulation sites and adjacent vascular territories within 24 hours of decannulation, regardless of clinical symptoms or prior thrombotic history. Postthrombotic syndrome was prospectively assessed at structured outpatient follow-up using the Villalta score, incorporated as a standard component of our institutional post-ECMO vascular surveillance protocol. Demographic data, ECMO modality, support duration, anticoagulation strategy, and cannulation site were recorded and analyzed descriptively.

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Results: Forty patients were included — 32 supported with VV-ECMO and 8 with VA-ECMO, with one VA-to-VV modality conversion during the study period. CaT was detected in 24 patients (60%), confirming a high subclinical thrombotic burden in this population. Incidence was substantially higher in the VV-ECMO cohort (68%; median ECMO duration 8 days among affected patients) compared to VA-ECMO recipients (25%; median support duration 6.5 days). One cannula-associated arterial thrombosis was identified in the VA-ECMO group. The systematic application of the Villalta score at follow-up enabled prospective characterization of postthrombotic syndrome in decannulated survivors, identifying patients who may benefit from extended anticoagulation or dedicated long-term vascular follow-up.

Conclusion: A 60% institutional incidence of CaT underscores the substantial and largely subclinical burden of vascular injury in ECMO-supported patients. Early detection through systematic duplex ultrasound may directly inform anticoagulation decisions following decannulation, with meaningful implications for thromboembolic event prevention and long-term outcomes. The integration of Villalta-based assessment into routine post-ECMO outpatient follow-up represents a practical, reproducible, and clinically impactful strategy to capture long-term vascular sequelae in this population and should be considered for adoption across ECMO centers as part of a standardized survivorship care model going forward.