# Musculoskeletal Complications in Extracorporeal Membrane Oxygenation for the Orthopaedic Surgeon

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# DOD Disclaimer

- ***The views expressed are those of the [author(s)] [presenter(s)] and do not reflect the official views or policy of the Department of Defense or its Components***

# Background

- Extracorporeal membrane oxygenation (ECMO) is a life-saving intervention for the critically ill patient with refractory cardiopulmonary failure.  In caring for critically ill patients it is important for the orthopedic surgeon to have an interdisciplinary understanding of advanced treatment technologies in order to prevent and recognize complications. The purpose of this systematic review is to define the rates of limb complications including ischemia and amputation for critically ill patients on ECMO.

# Methods

- A comprehensive search of the PubMed, Cochrane, and EMBASE databases was performed for English-language studies of all levels of evidence pertaining to ECMO cannulation and limb ischemia utilizing the Assessing the Methodological Quality of Systematic Reviews checklist. The initial search resulted in 2,410 titles, of which 22 were included in the final analysis. Data pertaining to sample size, cohort body mass index, sex, time on ECMO therapy, cannulation site, vascular complication rate, mortality rate, limb ischemia rate, and amputation rates were recorded for further analysis.

# Results

- Twenty-two studies were included in the final analysis, comprising data from 2,160 patients. There were 1288 (59.6%) males and 872 (40.1%) females included with an average age of 53.1 ± 13.3 years. The most common site of ECMO cannulation was the femoral artery which occurred in 2078 (96.2%) of patients identified. Overall, the rate of limb ischemia with ECMO cannulation was 19.5% (417/2160). The overall rates compartment syndrome and fasciotomy were 4.8% (103/2160) and 4.9% (107/2160) respectively. Compartment syndrome rarely occurred with peripheral femoral cannulation (99/2078, 4.8%) and axillary cannulation (4/41, 9.7%). Less than 1% of the patients underwent lower extremity amputation after femoral artery ECMO cannulation. Lastly, of the patients with limb ischemia secondary to femoral cannulation, 23.7% (99/417) were associated with compartment syndrome, 24.9% (104/417) were associated with lower extremity fasciotomy, and amputations were seen in 4.1% (17/417) of cases.

# Discussion and Conclusion

- With ECMO use expanding, it is imperative for the orthopaedic surgeon to understand the basic principles and applications. With knowledge of its highly morbid musculoskeletal complications, perming damage control orthopaedics can prevent the development of ARDS and need from ECMO cannulation. Lastly, further investigation into novel applications for ECMO in traumatic amputations and flaps which can transform the field of reconstructive orthopedics.