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Commentary: Walking wounded: Role of ambulatory femoral venovenous extracorporeal membrane oxygenation

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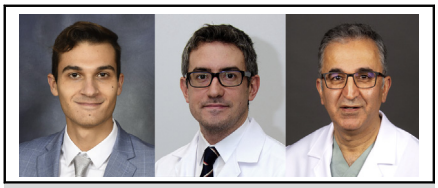

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CENTRAL MESSAGE

Femoral cannulation does not preclude ambulation and physical therapy for patients requiring ECMO with limited vascular access.

Venovenous extracorporeal membrane oxygenation (VV-ECMO) can support patients with respiratory failure refractory to mechanical ventilation and optimal medical therapy. Conventional VV-ECMO can be achieved by placement of 2 single-lumen cannulae: typically a femoral vein drainage cannula and a jugular vein reinfusion cannula. This strategy generally requires the patient to be bedridden to avoid potential cannula displacement and/or catastrophic bleeding complications. Patients who require prolonged VV-ECMO support for any cause are thus at high-risk of profound physical deconditioning, which is associated with longer hospital stays, severe neuromuscular weakness, and results in poorer general outcomes.[1,2] This is of particular relevance in patients awaiting lung transplant, for whom pretransplant physical condition largely influences recovery.[3] In 2010, Garcia and colleagues[4] reported the first case of ambulatory VV-ECMO using the Avalon (Getinge AB, Göteborg, Sweden) dual-lumen cannula inserted through the right internal jugular vein.[4] Since then, alternative surgical techniques using central or upper body cannulation strategies for VV and venoarterial (VA) ambulatory ECMO have been described.[5-7] In a review article,[2] the authors conclude that ambulatory VV-ECMO could be a be safe approach in high-volume centers, and may provide equivalent or superior outcomes compared with prolonged mechanical ventilation in patients awaiting lung transplant.

Orozco-Hernandez and colleagues[8] present the case of a 27-year-old woman who underwent bilateral lung transplant for end-stage mixed connective tissue lung disease. Postoperatively, the patient required emergency initiation of percutaneous femoral VA-ECMO for severe lung edema and right ventricular dysfunction. Due to critical limb ischemia under femoral VA-ECMO, and given that cardiac function had recovered, the authors planned to transition to VV-ECMO until her pulmonary function recovered. The patient had previously undergone prolonged VV-ECMO support a few years earlier, which had been complicated by right internal jugular vein and superior vena cava thrombosis. This precluded any upper body venous access strategy, and the authors opted to exchange the right femoral single-lumen cannula for a Protek Duo dual-lumen cannula (LivaNova/Tandem life, London, United Kingdom). The 32F femoral cannula precluded the authors from attempting active physiotherapy during the early postoperative course. The patient was able to achieve 90° hip flexion on postoperative day 11, and was able to walk an impressive 444 feet on postoperative day 39 when the cannula was removed.

This work represents a courageous and successful attempt in pushing the boundaries of ambulatory ECMO in a patient with limited venous access. The authors and their team are to be congratulated for what appears to be the first report of ambulatory VV-ECMO using a femoral dual-lumen cannula. Schmidt and colleagues[9] had previously described 3 young patients awaiting lung transplantation and ambulating on ECMO using a conventional percutaneous femoral venous drainage and jugular vein reinfusion cannula. The same group reported[10] using additional fixation plates distal

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to the entrance site to secure the venous cannula. Additional details regarding the fixation technique and type of permitted physical activities used by Orozco-Hernandez and colleagues[8] would be welcome in future reports. In parallel with the first description by Garcia and colleagues[5] of ambulatory ECMO and other reports[7] describing tunneling of the cannulae, one may question whether or not a tunneling strategy may reduce the risks of infection in the groin and displacement of the cannula.

Orozco-Hernandez and colleagues[8] claim that using an ultrasound-guided percutaneous femoral approach is faster and represents less risk of complications compared with a cervical technique. Although this strategy can be debated, especially in nonemergency ECMO deployments, their work will certainly encourage ECMO centers to rethink patient immobilization in the setting of femoral venous cannulation. Larger prospective reports on the safety of patient mobility with a femoral venous cannula are needed, especially to assess the benefits of physiotherapy compared with the risks of infection and bleeding complications in the groin area. Anatomic characteristics of the patient presented in the case report would have also been informative to the readership, including femoral vein diameter, patient height, and body mass index. In fact, the authors highlight patient height as being among the major limitations of this technique but provide no guidance toward patient selection based on their experience. There is also no mention of an anticoagulation regimen, evidence of infection or bleeding at the access site throughout ECMO support, femoral vein patency, or access site status at the time of ECMO removal.

The technique described by Orozco-Hernandez and colleagues[8] may prove to be a valuable tool in the armamentarium of treatment of patients with limited vascular access requiring ECMO. Although further prospective reports are required before widespread adoption of this strategy, the authors' work may pave the way to the expansion of ambulatory ECMO beyond central and upper body cannulation techniques.

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