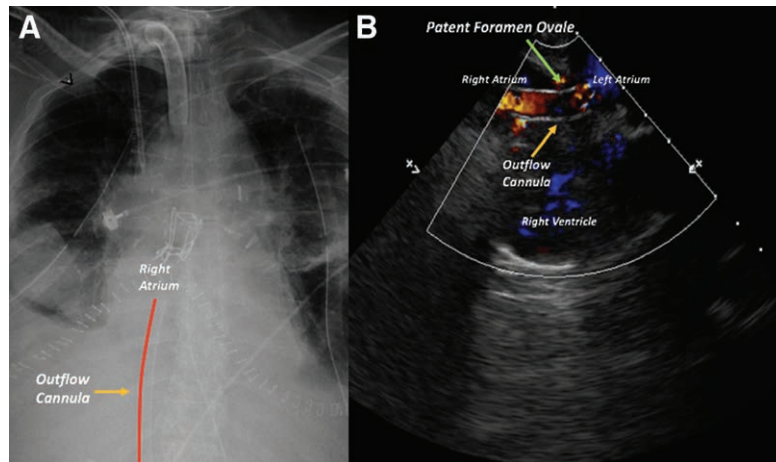


# Images in Anesthesiology: Inadvertent Extracorporeal Membrane Oxygenation Cannulation across a Patent Foramen Ovale

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Extracorporeal membrane oxygenation cannula malposition represents one of the most consequential complications from surgical placement, as demonstrated in the case of this 54-yr-old woman placed on venovenous extracorporeal membrane oxygenation because of primary graft dysfunction after bilateral lung transplantation and persistent hypoxemia. Chest radiograph (image A) demonstrates the position of the outflow cannula (19-French)—accessed through the right femoral vein—within the right atrium. The inflow cannula (21-French) was accessed *via* the left femoral vein into the inferior vena cava in this patient. Transesophageal echocardiography displays the venovenous-extracorporeal membrane oxygenation outflow cannula crossing from the right atrium into the left atrium (image B), with color Doppler revealing bidirectional flow across this newly enlarged patent foramen ovale (Supplemental Video 1, Supplemental Digital Content, <http://links.lww.com/ALN/B788>), introducing new shunt physiology, which is exaggerated when the extracorporeal membrane oxygenation flow is low, increasing the amount of deoxygenated blood flowing through the lungs, explaining the refractory hypoxemia in this patient.

Two methods for extracorporeal membrane oxygenation cannulation have been described: venoarterial and venovenous.<sup>1,2</sup> The venovenous-extracorporeal membrane oxygenation system consists of an inflow cannula that drains deoxygenated blood from the patient and an

outflow cannula that returns oxygenated blood.<sup>1,3</sup> Most common cannulation sites are single/dual-lumen catheter, accessed *via* the right internal jugular vein, or separate inflow/outflow cannulas, accessed through the right internal jugular and femoral vein respectively, or *via* both femoral veins.<sup>3</sup>

Extracorporeal membrane oxygenation cannula malposition is important to recognize, particularly in patients with refractory hypoxemia on venovenous-extracorporeal membrane oxygenation.<sup>2</sup> Transesophageal echocardiography proves to be a powerful modality to identify and redirect cannula positioning.

## Competing Interests

The authors declare no competing interests.

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## References

1. Sidebotham D, Allen SJ, McGeorge A, Ibbott N, Willcox T: Venovenous extracorporeal membrane oxygenation in adults: Practical aspects of circuits, cannulae, and procedures. *J Cardiothorac Vasc Anesth* 2012; 26:893–909

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- Griffie MJ, Tonna JE, McKellar SH, Zimmerman JM: Echocardiographic guidance and troubleshooting for venovenous extracorporeal membrane oxygenation using the dual-lumen bicaval cannula. *J Cardiothorac Vasc Anesth* 2018; 32:370–8
- Fierro MA, Daneshmand MA, Bartz RR: Perioperative management of the adult patient on venovenous extracorporeal membrane oxygenation requiring noncardiac surgery. *ANESTHESIOLOGY* 2018; 128:181–201

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# Would Chest Compressions from 57 Rescuers Save Albert Frick from Landry's Paralysis?



Four days after undergoing two dental extractions, 22-yr-old Albert R. Frick (1904 to 1927) found himself hospitalized in a wheelchair as first his legs weakened and then his diaphragm became completely flaccid from acute ascending or Landry's paralysis, now better known as Guillain-Barré syndrome. For 4 days in St. Francis Hospital, Evanston, Illinois, Frick's employer (*far right*), Frick's father (*next to the employer*), and scores of friends and coworkers toiled in pairs to rhythmically compress and release Frick's chest. Finally, at 10:02 PM on Thursday, March 10, 1927, Albert Frick was pronounced dead. Before critical care and ventilators were commonplace, salesmen, bookkeepers, stenographers—all told, 57 rescuers—had tried to keep young Frick breathing during his 108 h of respiratory paralysis. (Copyright © the American Society of Anesthesiologists' Wood Library–Museum of Anesthesiology.)

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