Vascular and Endovascular Surgery
47(4) 317-319

DOI: 10.1177/1538574413484973
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Bilateral Pulmonary Emboli Secondary to Indwelling Hemodialysis Reliable Outflow Catheter

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Abstract

We present a 33-year-old dialysis-dependent female who presented with new onset split second heart sound. Following a failed left upper extremity dialysis fistula, a right upper extremity hemodialysis reliable outflow (HeRO) graft was performed in 2011. Her subsequent cadaveric renal transplant had delayed function necessitating concurrent use of hemodialysis. However, as renal function improved, hemodialysis was discontinued. Two weeks following transplantation, the HeRO graft occluded. Subsequent clinical and radiological assessment confirmed widespread pulmonary emboli. Following cessation of hemodialysis and subsequent HeRO graft occlusion, removal was deemed appropriate to reduce further thromboembolic phenomenon. Right atrial thrombi are complications associated with central venous catheters. However, their actual incidence varies significantly. Right heart thromboemboli are associated with a 4% to 6% pulmonary embolism rate. Katzman et al assessed 38 patients who underwent HeRO graft and reported 1 (2.6%) patient with right atrial emboli and likely pulmonary embolism. Although thrombotic complications remain rare, consideration of graft removal should always be evaluated particularly in the absence of an alternative thrombotic source.

Keywords

emboli, HeRO catheter, pulmonary, thrombosis

Clinical Case

A 33-year-old female presented with new onset split second heart sound. She had a history of end-stage renal disease secondary to diabetes with a previous nonfunctioning left brachiocephalic arteriovenous fistula. Subsequent insertion of a right upper extremity hemodialysis reliable outflow (HeRO) graft in 2011 facilitated dialysis prior to a cadaveric renal transplant in September 2012. Anticoagulant treatment with Coumadin for left upper limb deep venous thrombosis (DVT) was temporarily discontinued during the perioperative transplant period. The transplanted kidney had delayed function necessitating concurrent use of hemodialysis via the HeRO graft. However, as renal function improved, hemodialysis was discontinued. Two weeks following transplantation, the HeRO graft occluded. On examination, she was hemodynamically stable but had an increased respiratory rate with a split second heart sound. Ventilation perfusion scan demonstrated bilateral diffuse lung perfusion mismatch suggesting widespread pulmonary emboli. Chest x-ray confirmed the tip of the HeRO graft in the right atrium. Echocardiography revealed significant thrombi in the right atrium. Bilateral lower extremity ultrasound was negative for lower limb DVT, while ultrasound evaluation of both the subclavian veins was nondiagnostic. However, the previously thrombosed left cephalic vein showed potential new thrombus formation, but no evidence of propagation to deeper upper limb veins.

Based on the absence of an identifiable source in upper and lower limbs, the patient proceeded to the operating room for transesophageal echocardiography (TEE) to assess the distal aspect of the HeRO catheter within the right atrium. The HeRO catheter was exposed through the previous scar in the right upper limb just proximal to the polytetrafluoroethylene (PTFE) graft at the titanium connector junction with the silicon venous outflow (Figure 1). As the PTFE segment was already thrombosed, the

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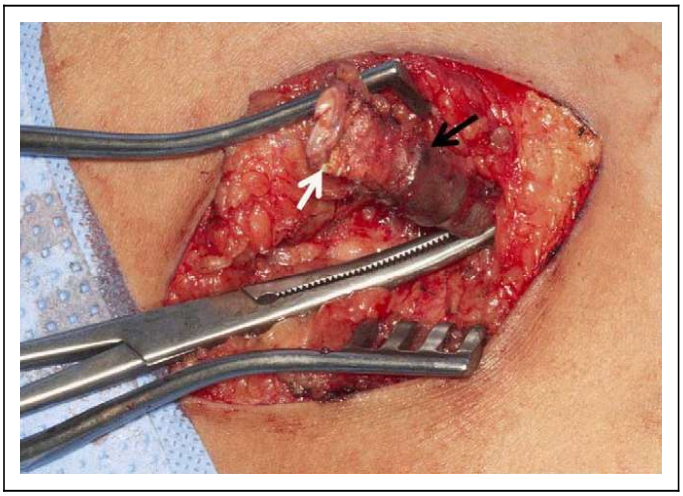

Figure 1. HeRO catheter exposed through the previous scar on the lateral aspect of the right upper chest wall. The PTFE segment (white arrow) has been divided just distal to the titanium connector junction (black arrow) with the silicon venous outflow. HeRO indicates hemodialysis reliable outflow; PTFE, polytetrafluoroethylene.

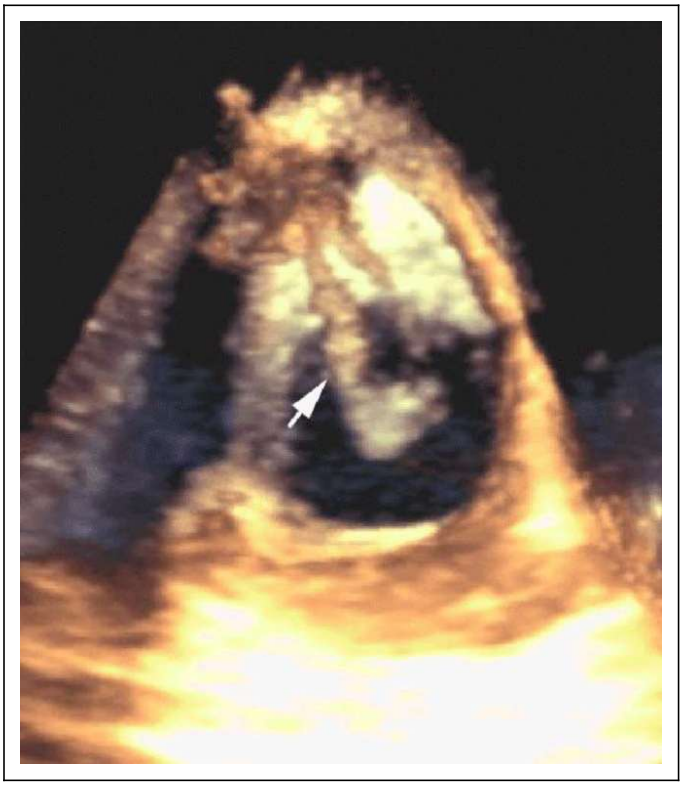

Figure 2. Right atrial thrombus prolapsing through the tricuspid valve (white arrow).

graft was divided at this level, and the PTFE segment was ligated with 2/0 silk. There was no back bleeding consistent with HeRO graft occlusion. The TEE evaluation confirmed multiple atrial thrombi adherent to the wall with atrial thrombus prolapsing through the tricuspid valve (Figure 2). The tip of the HeRO catheter was clearly visualized within the right atrium opposing

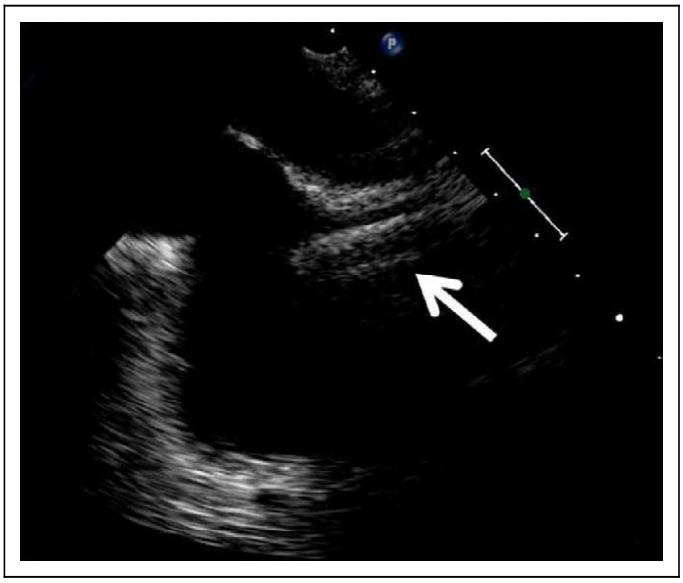

Figure 3. The HeRO catheter within the right atrium (white arrow) opposing thrombus on the opposite wall. HeRO indicates hemodialysis reliable outflow.

thrombus on the opposite wall (Figure 3). It was subsequently removed without complication under echocardiographic visualization. The procedure was well tolerated, and therapeutic anticoagulation with heparin and Coumadin was recommenced.

Discussion

Right atrial thrombi are well-documented complications associated with central venous catheters. However, the actual incidence varies significantly probably due to underreporting in asymptomatic patients.[1] Right heart thromboemboli are associated with a 4% to 6% pulmonary embolism rate.[2] Katzman et al assessed 38 patients who underwent HeRO graft and reported 1 (2.6%) patient with right atrial emboli and likely pulmonary embolism.[3] Other researchers have postulated that a catheter tip position in the right atrium may lead to increased thrombus formation secondary to irritation of the atrial wall, fluid dynamics of the catheter tip being located in an area of separation or stagnation of blood flow, or intraluminal clot elongation.[4] The National Kidney Foundation: Dialysis Outcomes Quality Initiative guidelines recommend right atrial placement for improved blood flow in hemodialysis catheters. Although thrombotic complications remain rare, consideration of graft removal should always be evaluated particularly in the absence of an alternative thrombotic source. In this case, the cadaveric transplant was slow to function necessitating continuation of HeRO graft usage for dialysis. However, following cessation of hemodialysis and subsequent HeRO graft occlusion, removal was deemed appropriate to reduce further thromboembolic phenomenon, particularly after echocardiographic imaging.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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