Right Atrial Thrombus Aspiration Guided by Intracardiac Echocardiography During Catheter Ablation for Atrial Fibrillation

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A 56-year-old man with psoriasis and a 2-year history of paroxysmal atrial fibrillation and flutter was admitted for catheter ablation. The procedure was performed under general anesthesia. The patient arrived to the electrophysiology laboratory in atrial flutter. A preprocedural transesophageal echocardiogram confirmed the absence of intraatrial thrombus. The patient was chronically anticoagulated with warfarin, and the international normalized ratio (INR) on the day of the procedure was 2.4.

After vascular access was obtained, a duodecapolar catheter was placed from the left femoral vein with the 10 distal electrodes in the coronary sinus and 10 proximal electrodes in the right atrium (RA). A phased-array intracardiac echo (ICE) catheter was placed via the left femoral vein into the RA. Intravenous heparin, 5000 U, was given after initial catheter placement. The presence of typical clockwise atrial flutter was confirmed by activation and entrainment mapping. A cavo-tricuspid isthmus ablation line was created using a 3.5-mm externally irrigated radiofrequency catheter, which terminated the tachycardia. Two transeptal punctures were performed, and 2 sheaths were inserted in the left atrium: A fixed-curve SL1 sheath was used for the circular mapping catheter, and a deflectable sheath was used for the ablation catheter. The 2 sheaths were continuously flushed with heparinized saline at a rate of 30 mL/h. Another 5000 U of heparin was given after the second transeptal puncture, and the patient was started on a heparin infusion of 1200 U/h.

After the 2 transeptal sheaths were placed, a right atrial serpiginous thrombus (23×2 mm) was detected by ICE. The thrombus appeared to be attached to the proximal end of the fixed-curve sheath, the thrombus was aspirated (Figure 1). ICE imaging confirmed complete removal of the thrombus. All pulmonary veins were then successfully isolated and the patient was discharged in sinus rhythm the following day.

Left atrial thrombus formation on the transseptal sheath or mapping catheters, detected by ICE, was reported in 10.3% of patients undergoing radiofrequency ablation for AF despite anticoagulation with heparin to ACT >250 seconds.1 This is the first report of an intraatrial thrombus detected by ICE in a patient with heparin anticoagulation and also on warfarin with a therapeutic INR.

Right atrial thrombus formation at the site of the transseptal puncture was also noted after radiofrequency ablation of other atrial tachyarrhythmias. There is a paucity of data from prospective, randomized studies regarding the optimum approach to reduce the thromboembolic risk in the periablation period.2 Using higher concentrations of heparin (target ACT >300 seconds) for the transseptal system before deployment reduces the risk, especially in patients with spontaneous echo contrast.3 Also, starting the heparin administration before the transseptal puncture and performing the ablation on therapeutic INR4 seems to reduce the risk of thrombus formation. In our case, a thrombus developed despite a therapeutic INR and initiation of heparin before the transseptal puncture.

Even though our patient did not have major factors predisposing to thrombosis, he did have psoriasis, which has been associated with hyperhomocystinemia, increased platelet activation, and increased tendency to develop arterial and venous thrombosis.6

This case shows that an intraatrial thrombus can occur despite adequate anticoagulation with heparin and warfarin and illustrates the utility of monitoring the atrial fibrillation ablation procedure with ICE. This method has the advantage of allowing early detection of intracardiac thrombus and thus allowing early intervention for thrombus removal.7
Disclosures
Dr Heist received grants and speaker and consultant fees from St Jude Medical; Dr Ruskin received grants and honoraria from St Jude Medical; and Dr Mansour received grants and consultant fees from St Jude Medical.

References

Figure 1. A, Intracardiac echo visualization of the thrombus attached to the right atrial side of the interatrial septum at the transseptal puncture site. B, Fragments of the thrombus retrieved by aspiration via the transseptal sheath.

Figure 2. Position of the catheters during thrombus aspiration via the fixed-curve sheath as depicted on fluoroscopy (A) and on intracardiac echocardiogram (B).


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*Circ Arrhythm Electrophysiol.* 2009;2:e18-e20
doi: 10.1161/CIRCEP.109.859918

*Circulation: Arrhythmia and Electrophysiology* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 1941-3149. Online ISSN: 1941-3084

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