

Downstream-from-Occlusion contrast injection to localize the vein of Marshall

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We report six patients undergoing atrial fibrillation or perimitral flutter catheter ablation for whom vein of Marshall ethanol infusion was planned but conventional approaches did not allow to identify the vein of Marshall. The use of a novel technique, downstream-from-occlusion contrast injection (DOCI), eventually allowed vein of Marshall localization in five of them and subsequent ethanol infusion in four patients.

Vein of Marshall (VOM) ethanol infusion can increase the efficacy of catheter ablation for atrial fibrillation (AF) or perimitral flutter.^{1,2} Localizing the VOM can be challenging despite direct contrast injection in the coronary sinus (CS) or selective contrast injection using a left internal mammary artery catheter.^{1,3} About 10% of ethanol infusion attempts are unsuccessful due to VOM dissection or inability to visualize then catheterize the VOM.³ Alternatives to obtain an equivalent effect to that of VOM ethanol infusion are limited.

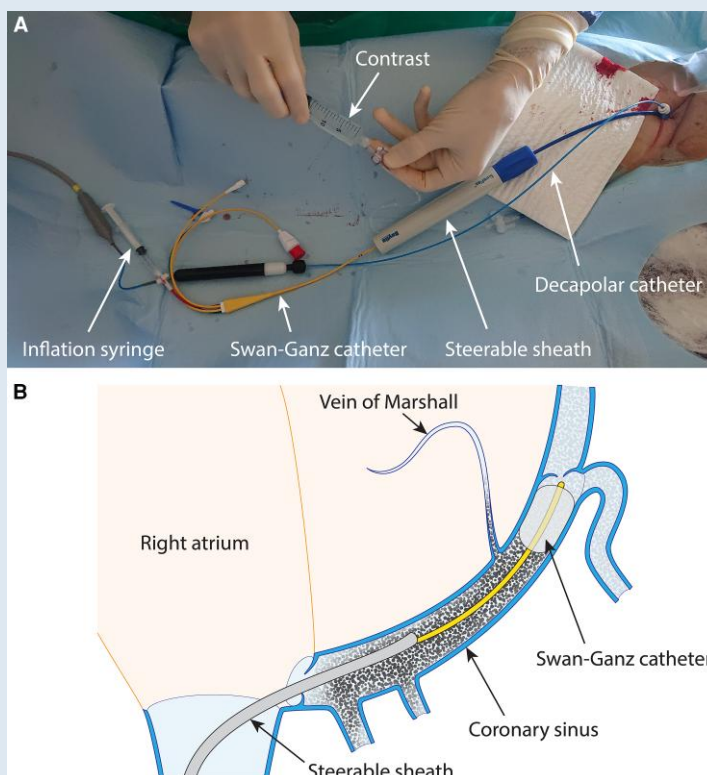
We report six cases of catheter ablation in which we tried to overcome such situations by using a novel technique to identify the VOM. The median age was 72 years and two subjects were females. Four patients had AF and two had perimitral flutter, four patients had a relapse despite one to two previous catheter ablations. In all patients, standard approaches (direct contrast injection and selective contrast injection) failed to image the VOM, leading us to attempt downstream from occlusion contrast injection (DOCI). A Swan–Ganz 7F pulmonary artery catheter (Edwards Lifesciences, Irvine, CA, USA) was inserted through the sheath lumen into the CS and the balloon of the catheter was inflated about halfway into the CS to occlude it. Then, rather than infusing contrast at the tip of the Swan–Ganz catheter as would be done for the implantation of a left ventricular lead, we infused contrast through the sheath. By doing so, the opacification was obtained downstream from occlusion and revealed the end of the CS where the VOM was expected to lie (*Panel A and B*). If needed, several injections and fluoroscopic views were performed with the balloon inflated at further or closer positions into the CS.

Downstream from occlusion contrast injection was feasible in all subjects and allowed VOM visualization (see [Supplementary material online, Video S1](#)) in five patients. DOCI resulted in one VOM dissection which was not related to the opacification in itself but to VOM catheterization instead. This dissection remained asymptomatic and did not lead to tamponade. Among the five DOCI successes, VOM catheterization and ethanol infusion could be performed in four patients and resulted in sinus rhythm restoration in three of them. Mitral isthmus block could be ascertained in all patients.

In this case series, we described a new technique to localize the VOM in the setting of AF ablation with planned ethanol infusion. It relies on CS balloon occlusion and downstream contrast injection, which could be helpful in situations where conventional techniques have failed.

The study protocol was examined and passed all regulatory checks. Registration number RnIPH 2022-16.

Panel A: Picture of all devices in place during DOCI. *Panel B:* Depiction of the DOCI technique (contrast is represented as black dots). DOCI, downstream-from-occlusion contrast injection.



Supplementary material

Supplementary material is available at *Europace* online.

Conflict of interest: None declared.

References

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