

## Images in Cardiovascular Medicine



# Giant Vein of Marshall in a Patient With Persistent Atrial Fibrillation

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#### Conflict of Interest

The authors have no financial conflicts of interest.

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A 58-year-old woman with persistent atrial fibrillation (AF) was admitted for percutaneous left atrial appendage (LAA) occlusion, ethanol ablation of the vein of Marshall (VOM), and conventional AF catheter ablation. After LAA occlusion, a cardiac vein angiography revealed a giant VOM (**Figure 1A and B**). It was confirmed by the occluder in the LAA and the circular mapping catheter in the left superior pulmonary vein (**Figure 1A and B**). It was much larger than the great cardiac vein as shown in the right anterior oblique projection (**Figure 1A**). Its ostium was 13 mm × 10 mm (right anterior oblique projection × left anterior oblique projection), and the coronary sinus ostium was 12 mm × 14 mm. Finally, ethanol infusion was not performed because there were no appropriate balloons, and catheter ablation was successful. A 3-dimensional cardiac computerized tomography (CT) also showed the VOM (**Figure 1C and D**). The cardiac vein angiography and the cardiac CT both indicated that the large VOM was not a persistent left superior caval vein (**Supplementary Videos 1-3**). Additional cardiac vein angiography and three-dimensional cardiac CT figures are also provided (**Supplementary Figures 1 and 2**).

The VOM, also known as the oblique left atrial vein, is thought to be obliterated in most individuals. It is extremely narrow even when a lumen is present. However, it has been implicated in the pathogenesis and maintenance of AF.<sup>1)</sup> Ethanol infusion in the VOM in addition to conventional catheter ablation has been proven to increase the chances of maintaining a normal rhythm in patients with AF.<sup>2)</sup> A giant VOM is uncommon and may be found accidentally on cardiac vein angiography during ethanol ablation for AF.

This study was performed in accordance with the Declaration of Helsinki (2013) and was approved by the Ethics Committee of Fuwai Hospital (Approval Number: 2021-1575) on 06 December 2021. A written informed consent was obtained from the patient.

## SUPPLEMENTARY MATERIALS

### Supplementary Video 1

Coronary vein angiography in the right anterior oblique projection.

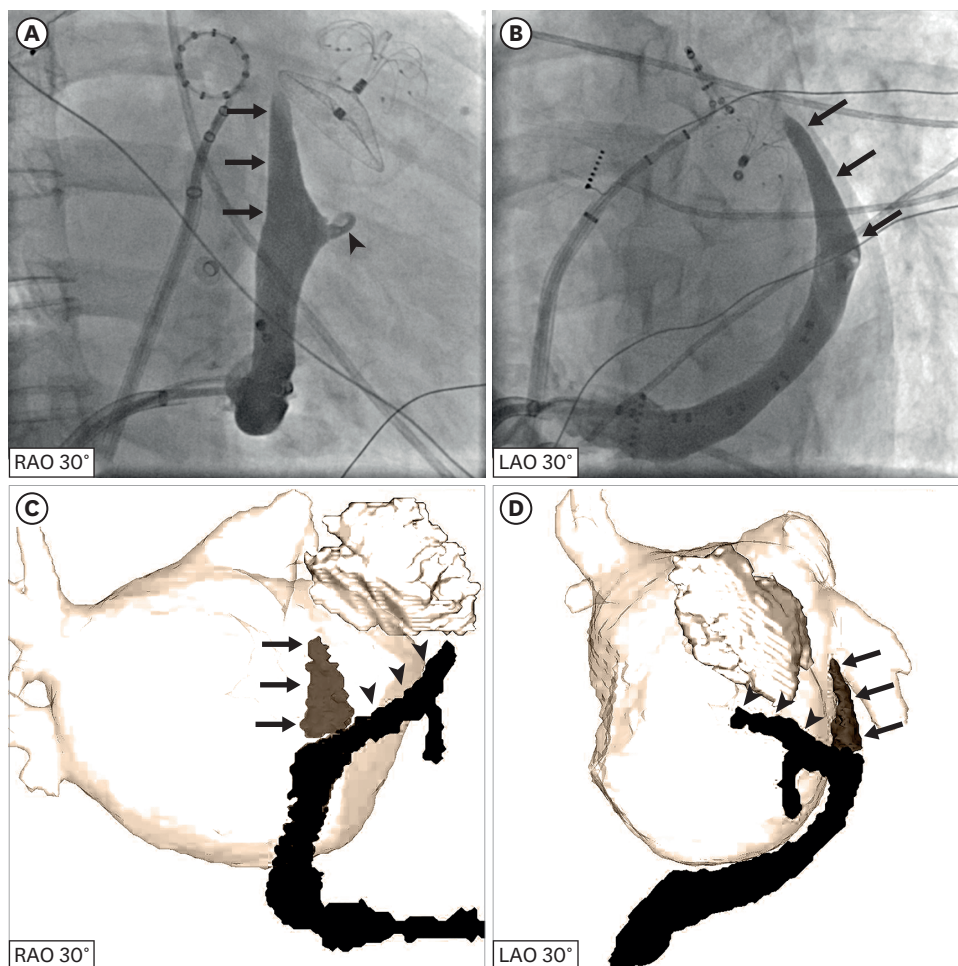
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**Data Sharing Statement**

The data generated in this study is available from the corresponding author upon reasonable request.

**Author Contributions**

Conceptualization: Zhang HD, Ding L, Tang M; Data curation: Zhang HD, Ding L, Tang M; Formal analysis: Zhang HD, Ding L, Tang M; Funding acquisition: Zhang HD, Tang M; Investigation: Zhang HD, Tang M; Methodology: Zhang HD, Ding L, Tang M; Project administration: Zhang HD, Tang M; Resources: Zhang HD, Tang M; Software: Zhang HD; Supervision: Zhang HD, Tang M; Validation: Zhang HD, Tang M; Visualization: Zhang HD, Tang M; Writing - original draft: Zhang HD; Writing - review & editing: Zhang HD, Ding L, Tang M.



**Figure 1.** Images of a 58-year-old woman with a giant VOM. (A, B) The coronary vein angiography reveals a giant VOM. (C, D) Three-dimensional cardiac computerized tomography reconstruction shows the giant VOM. Arrows indicate the VOM. Arrowheads indicate the great cardiac vein. LAO = left anterior oblique; RAO = right anterior oblique; VOM = vein of Marshall.

**Supplementary Video 2**

Coronary vein angiography in the left anterior oblique projection.

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**Supplementary Video 3**

Cardiac computerized tomography.

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**Supplementary Figure 1**

The RAO view of the giant VOM. (A, B) The guiding catheter (yellow arrow) for angiography was advanced to the conjunction of distal coronary sinus, proximal great cardiac vein, and ostium of the VOM. (C, D) The valve of Vieussens and the VOM were shown. (E, F) The VOM and the great cardiac vein were shown. The black arrows indicate the VOM. The black

arrowheads indicate the great cardiac vein. The white curve and the white arrow indicate the valve of Vieussens. The yellow arrows indicate the guiding catheter.

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### Supplementary Figure 2

Three-dimensional cardiac computerized tomography reconstruction. (A) Two LAO views (different degrees) show the aorta, pulmonary artery, atria, ventricles, the VOM, coronary sinus, great cardiac vein, and LAA. (B) The RAO and LAO views show the left atria, the VOM, coronary sinus, great cardiac vein, and LAA. (C) A transparent form of (B), in which the left atria, the VOM, coronary sinus, great cardiac vein, and LAA are presented. The blue vein is the coronary sinus and great cardiac vein. The light green vein is the VOM.

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