

EP CASE REPORT

Atrial fibrillation in partial anomalous pulmonary venous return: right atrial drainage from one vein and epicardial conduction from another vein

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A 72-year-old man with a history of patch closure of sinus venosus atrial septal defect (ASD) and uncorrected partial anomalous pulmonary venous return (PAPVR) of the right superior pulmonary vein (RSPV) draining to right superior vena cava (Figure 1A) presented for atrial fibrillation (AF) ablation. In addition to the PAPVR of the RSPV, computed tomography angiography showed four veins draining into the left atrium (LA): a right middle pulmonary vein (RMPV), a right inferior pulmonary vein, and two left-sided pulmonary veins. Mapping showed the RSPV was electrically silent but pulmonary vein potentials were present in all other pulmonary veins. An irrigated radiofrequency ablation catheter was used to perform wide antral circumferential ablation of the pulmonary veins in the LA. After completion of the line as well as a carinal line, an entrance block was seen in all pulmonary veins except the RMPV. Mapping while pacing the posterior LA showed earliest activation was deep within the RMPV 1 cm from the antrum. Pacing within the pulmonary vein at the low output (ensuring absence of direct RA capture) showed earliest activation in the posterior right atrium (RA) even prior to LA activation (Figure 1B). These findings were consistent with bidirectional conduction across an epicardial electrical connection between RMPV and RA. The site of earliest RA activation was directly adjacent to the phrenic nerve as delineated by high output pacing. As such, ablation was not undertaken to isolate this vein out of concern for phrenic nerve injury. Recurrence of AF has not been seen at a 6-month follow-up.

Anomalous pulmonary veins draining to the RA have an unclear role in the pathogenesis of AF. Like our case, most published reports of such patients undergoing AF ablation have suggested that these veins are typically electrically silent.¹ In addition to the anomalous drainage, we describe an anomalous electrical connection to the RA from another pulmonary vein interfering with vein isolation. The presence of

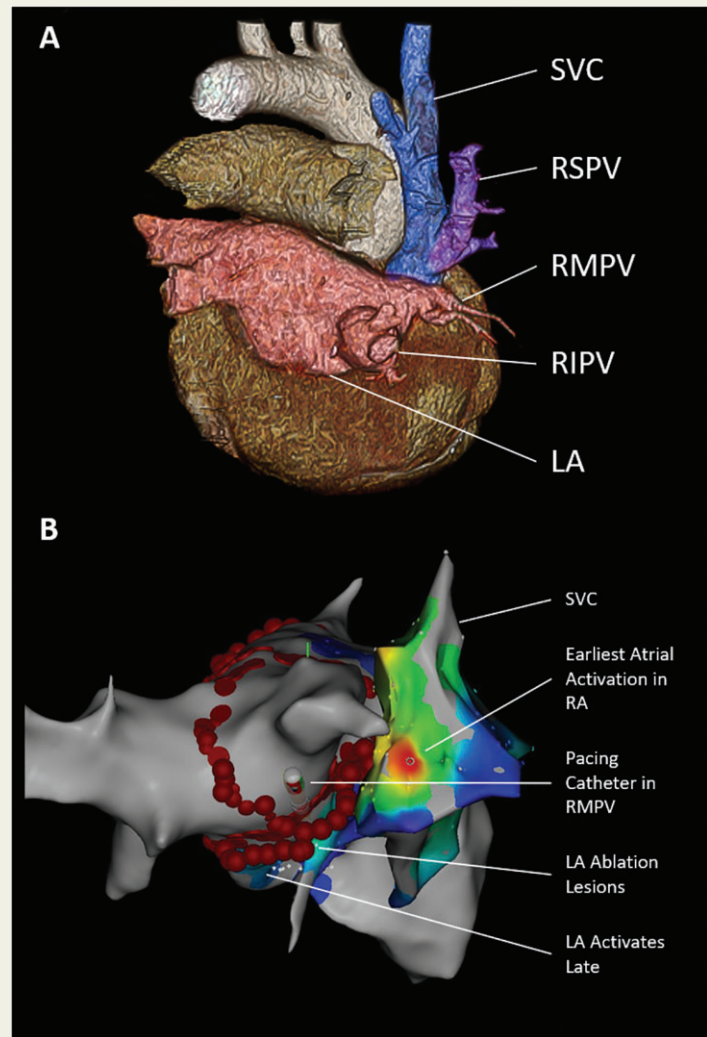


Figure 1 (A) Computed tomography reconstruction image demonstrating right superior pulmonary vein (RSPV) draining into the superior vena cava (SVC) and the right middle (RMPV) and inferior (RIPV) draining into the left atrium (LA). (B) Activation map performed during low output pacing within the RMPV with early activation of the high posterior right atrium (RA) and late activation of the LA following wide antral circumferential ablation, consistent with an epicardial RMPV to RA connection.

muscle bundle connection between the right pulmonary vein and RA relevant to catheter ablation has been described in anatomical and electrophysiology studies in normal hearts.^{2,3} To our knowledge, this is the first report of such connection in a patient with sinus venosus ASD and PAPVR. Whether the interatrial connection in PAPVR posterosuperior to the fossa ovalis predisposes to the presence of epicardial muscle connection needs further study. The recognition and ablation of such connections in the RA are essential to achieve durable pulmonary vein isolation. When the phrenic nerve is in close proximity, an intrapericardial balloon can be used to deflect the phrenic nerve to allow safe ablation. This was however deferred in this case due to the higher risk of pericardial access in the setting of prior cardiac surgery.

Supplementary material

Supplementary material is available at *Europace* online.

Conflict of interest: none declared.

References

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