

A Rare Anatomical Variant: Cryoballoon Ablation of an Accessory Pulmonary Vein Originating from the Left Atrial Roof – A Case Report

Nadir Bir Anatomik Varyant: Sol Atriyal Roof'tan Kaynaklanan Aksesuar Pulmoner Venin Kriyobalon Ablasyonu: Bir Olgu Sunumu

ABSTRACT

We performed cryoballoon ablation on a 61-year-old female patient with recurrent paroxysmal atrial fibrillation. Pre-procedural contrast-enhanced computed tomography (CT) angiography, used to assess the patient's pulmonary vein anatomy, revealed an accessory pulmonary vein originating from the left atrial roof. Cryoballoon ablation was successfully applied to this accessory vein, which represents a rare anatomical variant not commonly described in the literature.

Keywords: Accessory pulmonary vein, cryoballoon ablation, computed tomography

ÖZET

61 yaşındaki kadın hastaya tekrarlayan paroksizmal atriyal fibrilasyon nedeniyle kriyobalon ablasyonu uygulandı. Kriyobalon ablasyon işleminden önce hastanın pulmoner ven anatomisini görüntülemek için çekilen kontrastlı BT anjiyografide, sol atriyal roof'tan çıkan bir aksesuar pulmoner ven saptandı. Literatürde nadir görülen bu aksesuar vene ilk kez kriyobalon ablasyonu başarıyla gerçekleştirildi.

Anahtar Kelimeler: Aksesuar pulmoner ven, kriyobalon ablasyon, BT anjiyografi

CASE REPORT OLGU SUNUMU

Cryoballoon ablation (CA) as a first-line treatment has been shown to be more effective than drug therapy in preventing the recurrence of atrial arrhythmias in patients with paroxysmal atrial fibrillation (PAF).¹ The fundamental principle of CA is the isolation of the pulmonary veins (PVs). In approximately 60% of individuals, four distinct PV ostia are observed. The most common anatomical variations include a left common PV trunk and a right middle PV.² Pulmonary vein anatomy is highly variable; therefore, noninvasive imaging of individual PV structures prior to ablation is essential. Contrast-enhanced computed tomography (CT) angiography, magnetic resonance imaging (MRI), and transesophageal echocardiography (TEE) are commonly used for this purpose.³

This case report presents the first documented instance in the literature of CA targeting a PV originating from the left atrial roof, an extremely rare anatomical variation in left atrial PV configuration.

Case Report

A 61-year-old female patient was admitted to our hospital with symptoms of palpitations and dyspnea that had started 10 hours earlier. The patient's medical history included chronic hypertension (HT) and a thrombosis in the right leg that had occurred one year prior. The electrocardiogram (ECG) revealed atrial fibrillation (AF). On physical examination, the patient had a heart rate of 136 beats per minute and a blood pressure of 120/70 mmHg. The respiratory rate was 18 breaths per minute, oxygen saturation was 95%, and body temperature was 37°C. Laboratory results, including complete blood count, serum biochemistry, thyroid function tests, and

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Figure 1. Contrast-enhanced computed tomography angiography image.

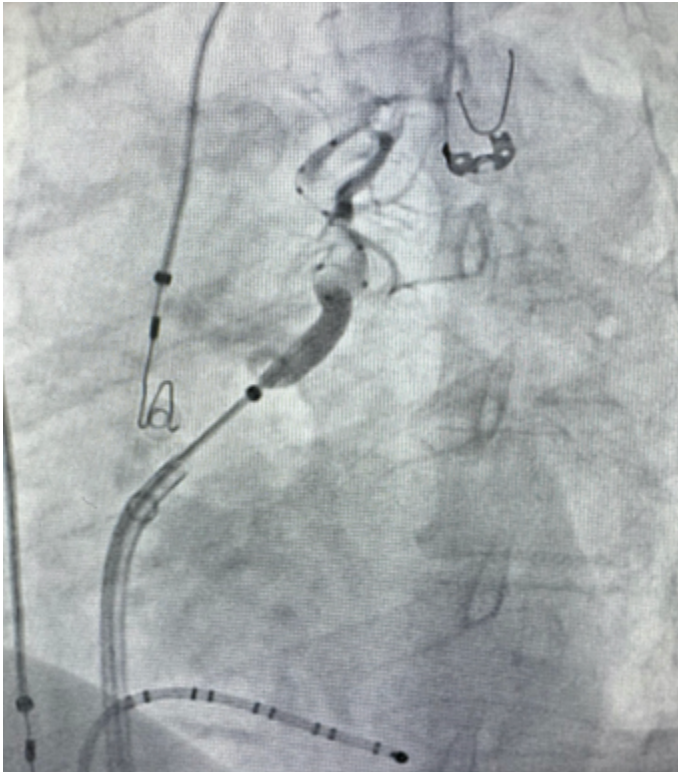


Figure 2. Cryoballoon ablation of the accessory pulmonary vein.

cardiac biomarkers, were within normal limits. Transthoracic echocardiogram (TTE) showed an ejection fraction (EF) of 60%, normal valve structures, normal cardiac dimensions, and only mild mitral insufficiency. Sinus rhythm was restored with medical cardioversion following a 600 mg loading dose of propafenone. Anticoagulation and beta-blockers were initiated as part of the therapeutic regimen for rate control. Over the subsequent four months, the patient experienced two additional episodes of AF, leading to the decision to proceed with CA for the management of PAF. Pre-procedural contrast-enhanced CT angiography of the left atrium and PVs revealed, in addition to the right upper and lower PVs draining the right lung and the left upper

ABBREVIATIONS

AF	Atrial fibrillation
CT	Computed tomography
ECG	Electrocardiogram
EF	Ejection fraction
HT	Hypertension
MRI	Magnetic resonance imaging
PAF	Paroxysmal atrial fibrillation
PVs	Pulmonary veins
TEE	Transesophageal echocardiography

and lower PVs draining the left lung, an accessory PV draining the apical-posterior segment of the right upper lobe. This vein entered the left atrium independently via a 4 mm trunk (Figure 1). After the necessary preparations, the patient was taken to the operating room, and CA was initiated. Cryoballoon ablation (POLARx; Boston Scientific) was performed in the following order: left upper PV, left lower PV, right upper PV, and right lower PV. Subsequently, the accessory vein located on the roof of the left atrium was identified and successfully ablated (Figure 2). Following confirmation of PV occlusion after contrast injection in all PVs, including the accessory PV, CA was performed using a freeze-thaw cycle of 240 seconds, creating a single lesion in each PV and achieving temperatures below -50°C . Post-ablation, it was confirmed that all PV potentials captured by the Achieve mapping catheter were eliminated. Electrical isolation of all PVs was verified using both entry and exit block maneuvers, and the procedure was successfully completed without complications. The patient underwent follow-up evaluations at 1, 3, and 6 months post-procedure. During these visits, ECGs demonstrated sinus rhythm, and the patient reported no symptoms. Continued anticoagulant and beta-blocker therapy, along with regular cardiology follow-up, was recommended.

Conclusion

Given the frequent occurrence of anatomical variations in PV structures, a comprehensive pre-procedural evaluation of PV anatomy may be essential to ensure the efficacy of the cryoballoon ablation procedure.

Informed Consent: Written informed consent was obtained from the patient for the publication of relevant medical history, ECGs, procedural images, and laboratory results.

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