

EP CASE REPORT

A particular case of transient ST elevation during cryoballoon ablation of atrial fibrillation

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Introduction

The cryoballoon (CB) technology nowadays represents a valid alternative to the radiofrequency for pulmonary vein (PV) isolation.¹ Transient ST elevation has been reported as a rare adverse event occurring during atrial fibrillation (AF) ablation and is mostly related to air embolism during contrast injection.² However, the present case describes the occurrence of ST elevation during CB ablation secondary to the proximity of a venous bypass graft for the distal right coronary artery to the ostium of left inferior pulmonary vein (LIPV).

Case summary

A 66-year-old female with drug-resistant paroxysmal AF came to our attention for AF ablation. Medical history included hypertension, diabetes mellitus, a previous transient ischaemic attack (TIA), and ischaemic heart disease treated with 3 coronary artery bypass grafts

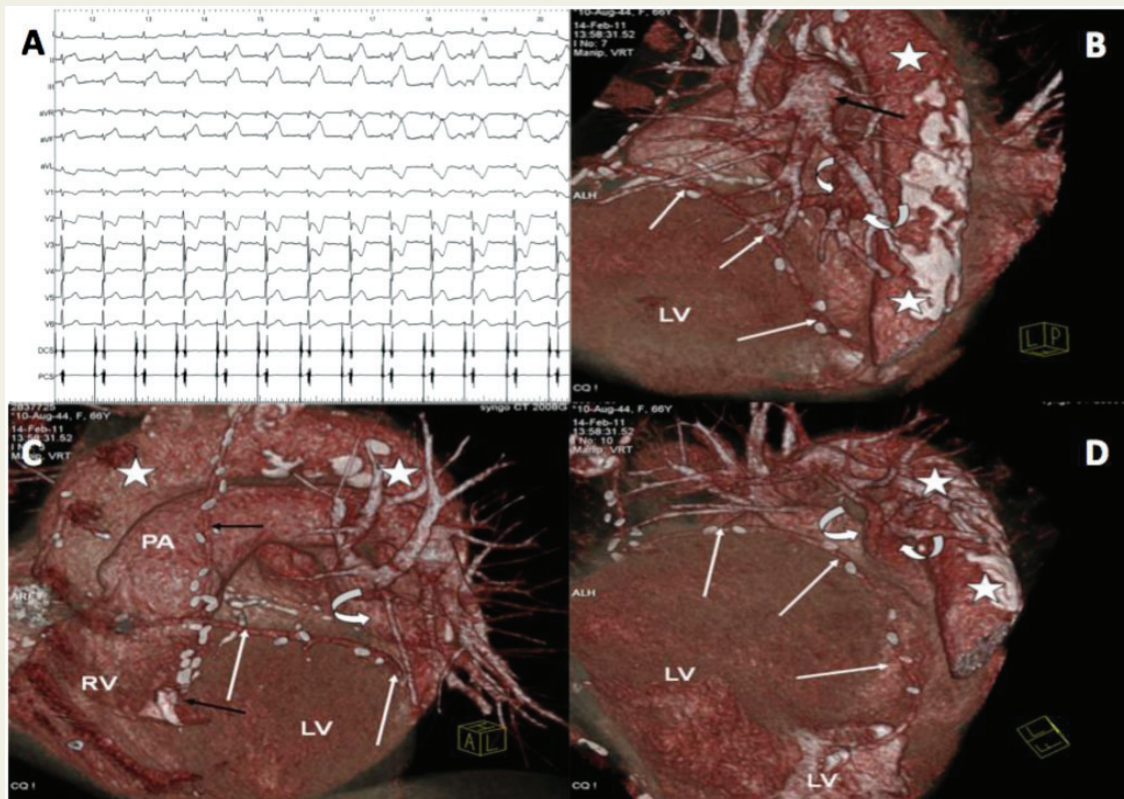


Figure 1 (A) During CB ablation of LIPV, the ECG suddenly showed ST elevation in the inferior leads. (B) 3D cardio CT image in left posterior oblique projection. The venous graft for distal right coronary artery runs near the left lower pulmonary vein. White arrows: venous graft. Curved arrows: left lower pulmonary vein. Black arrow: left descending pulmonary artery. Star: descending aorta. LV, left ventricle. (C) 3D cardio CT image in left anterior oblique view. PA, pulmonary main artery; RV, right ventricle; LV, left ventricle. Star: aorta. Curved arrow: left lower pulmonary vein. White arrow: venous graft. Black arrow: left internal mammary artery. (D) 3D cardio CT images from diaphragm in posterior left oblique view. White arrows: venous graft. Curved arrows: left lower pulmonary vein. Star: descending aorta. LV, left ventricle.

(CABG) 4 years before. The ablation procedure was performed using a 28-mm Cryoballoon Advance (CB-A) (Arctic Front Advance™, Medtronic®), as previously reported in detail.² A pre-procedural cardiac computed tomography (CT) showed a normal left atrial anatomy with four distinct PV ostia. During CB ablation of LIPV (at 102 s, -40°C), ST elevation in inferior leads was abruptly observed and cryo-application was immediately stopped (Figure 1A). A few minutes later ST elevation spontaneously and completely resolved. Then, a further cryo-application was delivered in LIPV and ST elevation again appeared in the inferior leads (at 93 s, -39°C), with a spontaneous and full resolution within 2 min. As no PV potentials were anymore observed in the LIPV, additional applications were not performed. Then, the remaining right-sided PVs were approached and isolated without any complications. The reanalysis of the CT scan showed that the venous bypass graft for distal right coronary artery ran only 25 mm far from the ostium of LIPV (Figure 1B–D) suggesting that during cryoablation, the transmural lesion might probably have injured the bypass connection, or through a vasospasm, leading to a transient myocardial ischaemia.³ Before discharge, a coronary angiography showed no significant impairments in the grafts and no endothelial damages.

Discussion

ST elevation due to transient myocardial ischaemia has been reported as a rare adverse event during AF ablation and it is commonly related to accidental air embolism after contrast injection. A previous study reported an incidence of transient ST elevation during first-generation CB ablation of 1.5%.² The present report describes an unusual case of transient ST elevation during CB ablation of LIPV secondary to an harmed bypass graft lying near the ostium of LIPV itself. Interestingly, the transitory myocardial ischaemia occurred twice during CB ablation of LIPV, in a reproducible way at the threshold of $-39^{\circ}\text{C}/-40^{\circ}\text{C}$. Therefore, although a transitory myocardial ischaemia during CB ablation is most commonly related to air embolism, a possible damage to close anatomical structures such as CABGs should be considered in those patients with a previous heart surgery. Pre-procedural CT imaging might hypothetically be helpful in this subgroup of patients in order to identify some close anatomical relationships between CABGs and PVs tailoring the best ablation strategy and possibly limiting the power and duration of the applications.

Conflict of interest: C.S. and L.O. receive compensation from AF Solutions Medtronic for teaching and proctoring activities. G.M. received an educational grant in Cardiac Electrophysiology and Pacing from Medtronic.

References

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