



Coronary Air Embolism During Cryoablation of Atrial Fibrillation: A Catastrophic Complication and Its Management

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Abstract

Various acute complications and their management during ablation of atrial fibrillation have been described. In the current report, coronary air embolism, its acute adverse effects and management of the problem were presented in a patient underwent cryoballoon ablation of atrial fibrillation.

Introduction

Well-described acute procedure-related adverse effects of cryoablation of atrial fibrillation (AF), resulted clinical conditions including life-threatening events and the acute management of them have been presented previously^[1]. Coronary air embolism related to left-sided cardiac procedures, however, has been relatively less described. Herein, a case underwent cryoballoon AF ablation and detected coronary air embolism and its acute management was discussed.

Case report

A 57-year-old female with coronary heart disease and paroxysmal AF was referred to our center for cryoballoon ablation of AF. Following proper patient preparation including transesophageal echo, a transeptal catheter placement using an 8F SL1™ (St. Jude Medical) sheath was performed and the sheath was replaced with a FlexCath Advance™ sheath (Medtronic) to introduce the Arctic Front Advance™ cryoballoon catheter (Medtronic) under conscious sedation. Just seconds after placement of the FlexCath™, the patient reported heavy chest pain. The continuous 12-lead ECG showed ST elevations in leads DII, DIII and aVF with corresponding ST segment depression in other derivations and worsening AV block. The decapolar catheter in the coronary sinus was immediately placed in the right ventricular apex. Urgent coronary angiography of the right coronary artery demonstrated air bubbles in the right coronary cusp and the right coronary artery with total occlusion of the vessel ([Figure 1] and Video). Immediately, a 0.014" guidewire was introduced and a 6F compatible manually controlled thrombus

aspiration catheter (Hunter™, IHT Cordynamic) was placed just before the occlusion [Figure 2]. Multiple rapid suction through the catheter resulted in air filling of the syringe and full patency of the vessel on coronary angiogram with complete resolution of ST segment elevations and diminishing of chest pain [Figure 2]. The left coronary system was also patent. The transeptal sheath was also controlled for any air. After complete hemodynamic stability and no clinical evidence for other organ-system embolism, unfinished procedure was finished with the isolation of all 4 pulmonary veins without any other problem. The day after the procedure was uneventful and the ECG and transthoracic echo showed no abnormality.

Discussion

Air embolism to the systemic circulation via introducing catheters and atrio-esophageal fistula during and/or after AF ablation is always a catastrophic complication^[2]. In the acute setting, the majority was due to catheters exposing systemic circulation. Possible mechanisms causing air embolism from introducing catheters are multiple catheter exchanges and rapid removal of catheters and dilators, deep sedation and prolonged apnea periods with deep breaths, and air-opened or loosened hemostasis valves, all causing negative pressure and air transportation through the catheter into the low pressure left atrium^{[3],[4]}. In our case, the most possible mechanism seems as rapid removal of the dilator of the FlexCath™. Because symptoms started just after removal of the dilator and, the patient had no deep sedation causing deep apnea periods. Also, no catheter exchanges were performed before the complication. The management of the complication was through mechanic aspiration of the air using a thrombus aspiration catheter without forceful injection of contrast medium or saline, which may cause distal embolization, vascular damage, or proximal leakage of bubbles causing other organ/system embolization^[5]. Various maneuvers to be applied to prevent air embolism are slow removal of dilators and catheters, continuous heparinized saline infusion, no so deep sedation, minimized number

Key Words

ablation, cryoballoon, embolism.

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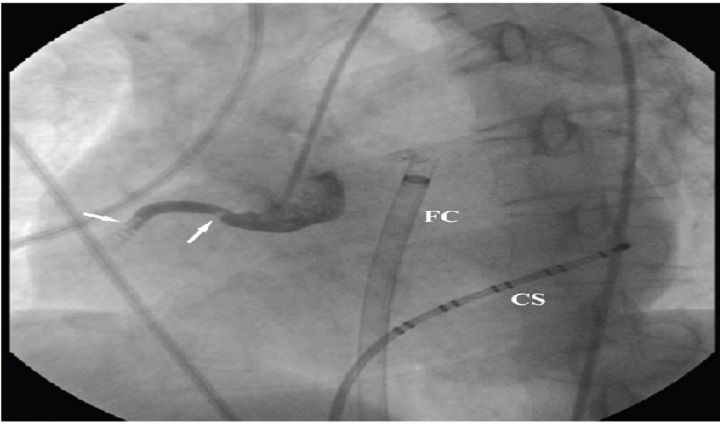


Figure 1: Selective right coronary angiography showed air bubbles (white arrows) in the vessel in the left anterior oblique projection. CS, decapolar coronary sinus catheter; FC, 15F FlexCath™ catheter

of catheter exchanges, and review for loosened hemostatic valves. Lastly, the cause of air embolism to the right sinus of Valsalva and the right coronary artery without involvement of other organ-systems can be more superior position of the right sinus of Valsalva and, so the right coronary artery in supine position.

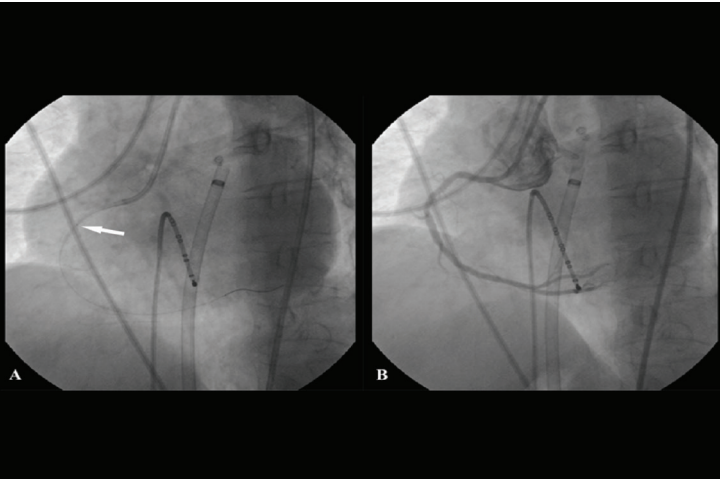


Figure 2: A 0.014" guidewire and the Hunter™ aspiration catheter were introduced in the vessel (A) (white arrow, distal marker of the aspiration catheter). Forceful aspiration was resulted in complete patency of the vessel without residual air (B). Coronary sinus catheter was placed in the right ventricular apex.

Conclusions

In conclusion, air embolism to the coronary artery during cryoablation of AF can cause myocardial infarction and proper aspiration of air bubbles using aspiration catheter can resolve the problem without any sequela.

Disclosures

None.

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