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Case Report

Coronary and Cerebral Artery Air Embolism Complicating Trans-septal Accessory Pathway Ablation

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ABSTRACT

A 30-year-old woman presented with frequent episodes of paroxysmal palpitation and electrocardiographic evidence of minimal pre-excitation of the left lateral accessory pathway. The patient underwent septostomy, which revealed air bubbles in the left ventricular cavity. Aspiration was done with a pigtail catheter via the retrograde aortic approach. Transient ST-elevation in the inferior leads was demonstrated. Left-sided hemiplegia was present after consciousness, which was completely resolved after 24 hours. ***(Iranian Heart Journal 2020; 21(1): 110-114)***

KEYWORDS: Accessory pathway, Trans-septal catheterization, Air embolism

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About 0.1%–0.3% of the general population have ECG findings in favour of accessory atrioventricular pathways, which ise called Wolff–Parkinson–White (WPW) syndrome in the presence of arrhythmias. [1]

The most common arrhythmias in these patients are reentrant tachycardia and atrial fibrillation (AF). The catheter ablation of the accessory pathway is the treatment of choice, and it can be done via the retrograde or trans-septal approach.

We herein describe a patient with WPW syndrome who suffered coronary and cerebral air embolism as a complication of septostomy for trans-septal radiofrequency catheter ablation.

Case

A 30-year-old woman with a history of frequent episodes of supraventricular tachycardia presented with the ECG manifestations of a minimal left-sided accessory pathway and WPW syndrome.

An electrophysiological study was performed in conscious sedation status, and diagnostic catheters were introduced via the left and right femoral veins.
Intracardiac ECGs were recorded using the Bard (Boston Scientific) electrophysiology system.

The evaluation of the conduction system revealed the most fused atrioventricular (AV) signal in the left lateral side of the coronary sinus (CS) (Fig. 1).

Figure 1. Most fused atrioventricular signal in the left lateral side of the coronary sinus

The retrograde conduction pattern was also eccentric, and the earliest retrograde atrial signal was recorded in the distal part of the CS during right ventricular pacing. A narrow QRS tachycardia was reproducibly inducible with programmed atrial and ventricular stimulation.

Septostomy was attempted with the use of an Agilis long sheet (Agilis NxT™ Steerable Introducer, St Jude Medical). A needle was inserted and advanced into the left atrium without the need for the puncture of the interatrial septum. Immediately after the septostomy, air bubbles were observed in the left ventricular apex (Fig. 2).

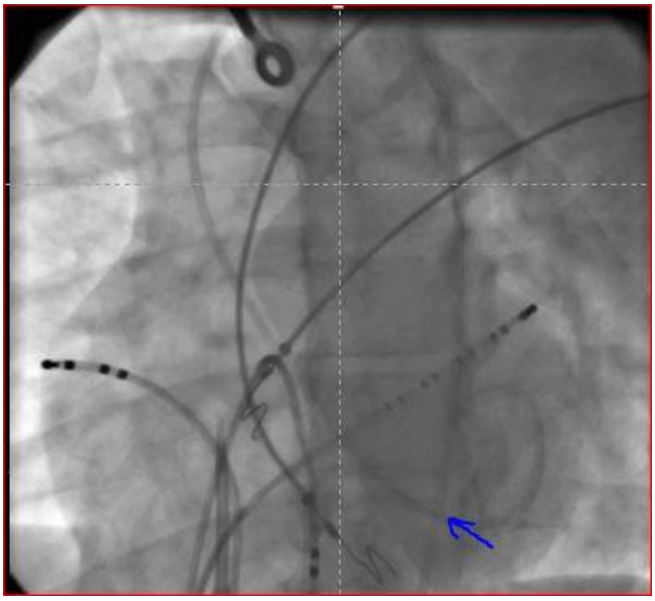

Figure 2. Air bubbles in the left ventricular apex

Immediately, 100% oxygen was administrated. The right femoral artery was cannulated, and a pigtail catheter (Dawson–Mueller Drainage Catheter) was introduced via the femoral artery via the retrograde approach into the left ventricular cavity. Next, suction was done, during which ST-elevation in the inferior leads appeared with sinus bradycardia and manifest accessory pathway conduction, in favor of AV block (Fig. 3).

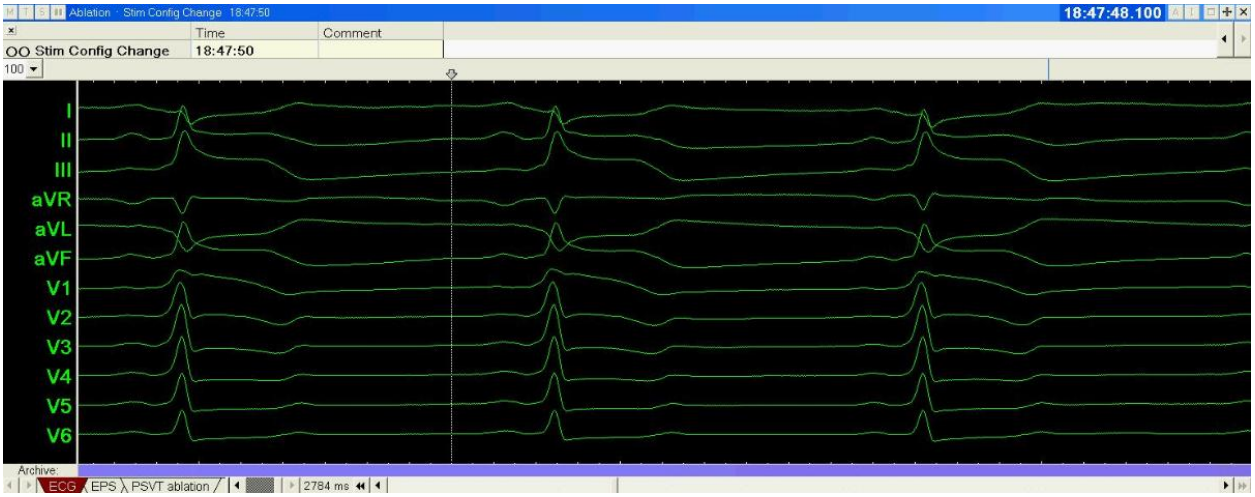

Figure 3. ST-elevation in the inferior leads with sinus bradycardia and accessory pathway conduction, in favor of atrioventricular block

Rapid right ventricular pacing was done, 100% oxygen was administrated, and an inotrope was injected. ST-elevation was resolved in about 1–2 minutes.

The procedure was terminated without any attempt for ablation. A decision was made against propofol injection.

After regaining consciousness, the patient was alert and awake and obeyed orders. However, she had left-sided hemiparesis without left central hemifacial weakness.

Brain computed tomography scan was done, and the results were normal. The distal force of the left upper extremity was resolved in about 1 hour, but the proximal force of the left arm as well as the total force of the left leg was still compromised. Neurological consultation was done, and heparin drips and dexamethasone were recommended by the neurologist.

Twenty-four hours after the procedure, all the forces returned to the normal status and after 72 hours, the patient was discharged in a good general condition without any problems.

The follow-up of the patient showed no problems. Fourteen days later, she underwent a redo procedure, during which the accessory pathway was successfully ablated via the retrograde approach.

Transesophageal echocardiography in the second admission revealed a patent foramen ovale, about 2 × 5 mm in size, and a right-to-left shunt.

DISCUSSION

Radiofrequency ablation for WPW syndrome can be done via the retrograde or trans-septal approach. The retrograde approach may be associated with the risk of prolonged catheter manipulation and potential arrhythmogenic ventricular lesions created during ablation. [2-4]

Potential risks can be avoided using trans-septal atrial insertion. The approach was developed in the 1950s and nowadays is one of the most useful approaches for the ablation of left-sided targets in electrophysiology studies. [5,10]

Lesh et al [9] reported a case of coronary air embolism complicating the trans-septal radiofrequency ablation of the left lateral accessory pathway during catheter exchange and recommended continuous flushing with heparinized saline during the catheter exchange.

Khurram et al [4] in 2016 reported a case of catastrophic coronary air embolism during AF ablation with massive air embolism into the right coronary artery, leading to the hemodynamic collapse, and its subsequent successful management with catheter-based coronary aspiration.

Murat Tulmac et al [9] reported a case of massive systemic air embolism during the aortic root angiography in 2012, with the collapse of the patient and pulseless electrical activity. The patient became electrically stable shortly after cardiopulmonary resuscitation, but she had garbled speech and left hemiplegia with partial weakness and paresthesia in the right leg and arm. [6-8] The brain computed tomography of the patient was normal, as was the case in our patient, and she was transferred to a center with facilities for hyperbaric oxygen chamber treatment (HBOT), and all of her neurological functions became normal after 1 day.

Our center lacks HBOT facilities. We administered 100% O_2 and after 24 hours, everything was normal and our patient was discharged after 72 hours without any residual defect.

CONCLUSIONS

Air embolism is almost always iatrogenic during cardiac procedures, and the administration of 100% O_2 or the catheter-based aspiration of the air may reduce the risk of sequels.

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