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Cardiovascular Imaging In-a-Month

●Transient ST Elevation During Radiofrequency Energy Application From the Left Sinus of Valsalva

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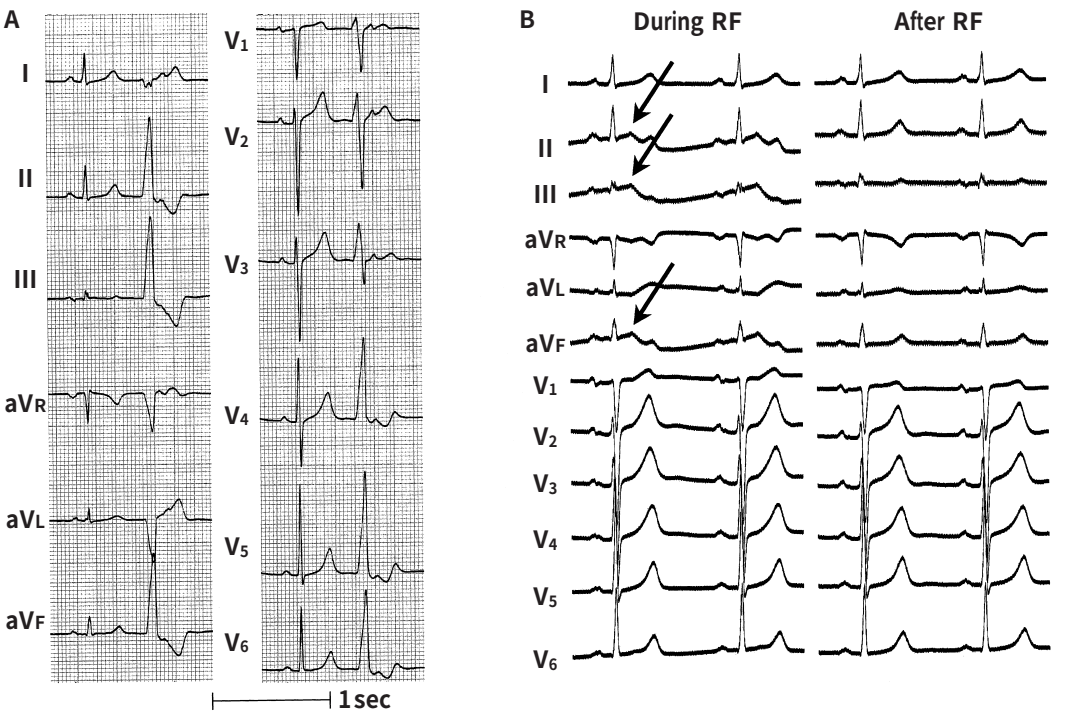

Fig. 1

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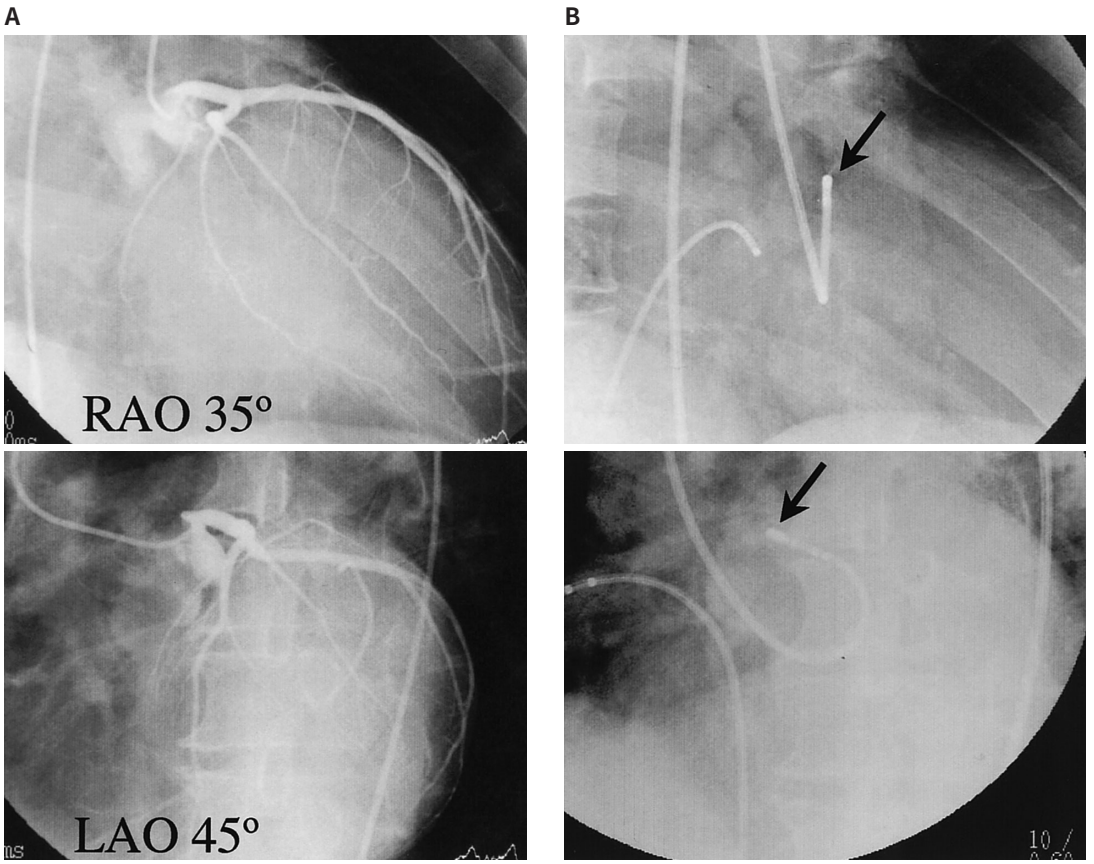

Fig. 2

CASE

A 46-year-old man was referred to our center for radiofrequency catheter ablation for the treatment of symptomatic, monomorphic premature ventricular contractions (**Fig. 1−A**). During an electrophysiologic study, the earliest ventricular activation was identified within the left sinus of Valsalva. After identifying the ostium of the left coronary artery and the contour of the left sinus of Valsalva by angiography (**Fig. 2−A**), an ablation catheter was positioned within the left sinus of Valsalva (**Fig. 2−B**). The first application of radiofrequency energy within the left sinus of Valsalva had no effect. No ST-T segment change was observed during the application. After detailed mapping toward the right sinus of Valsalva, a second application was performed within the left sinus of Valsalva where the ventricular activation recorded from the distal electrodes of the ablation catheter preceded the onset of the QRS complex by 23 msec. Ten seconds after application of radiofrequency energy using a maximum power of 35 watts and a maximum electrode-tissue interface temperature of 55 ℃, ST segment elevation in the inferior leads appeared (**Fig. 1−B−left**, arrows). After prompt cessation of the radiofrequency energy, the ST segment elevation in these leads returned to the baseline (**Fig. 1−B−right**), and the patient did not complain of chest pain.

Points for Diagnosis

Recently, ventricular tachycardias or premature ventricular contractions originating from the left ventricular epicardial site have been ablated from the aortic sinus of Valsalva[1,2]. The 12-lead electrocardiogram of this kind of arrhythmia often shows an S wave in lead Ⅰ, tall R waves in the inferior leads, precordial R wave transition in leads V_1–V_3, and no S wave in either lead V_5 or V_6 like this case (**Fig. 1**).

In this case, selective right coronary angiography revealed an anomalous origin of the right coronary artery from the left sinus of Valsalva, close to the right sinus of Valsalva(**Fig. 3**, arrows). The ablation site where the earliest ventricular activation was recorded was at the ostium of the right coronary artery. Radiofrequency energy application at the ostium might cause spasm of the right coronary artery. The patient was discharged under medication with 300 mg/day of mexiletine and has not complained of chest pain during a 9-month follow-up period.

Coronary anomalies affect about 1% of the general population[3]. Anomalous origin of the right coronary artery from the left sinus of Valsalva is one of the most common coronary anomalies[4]. Selective coronary angiography of both coronary arteries should be performed before radiofrequency application to avoid potential complications in patients undergoing radiofrequency application from the aortic sinus.

Diagnosis: Anomalous origin of the right coronary artery from the left sinus of Valsalva

Key Words: Heart defects, congenital(anomalous origin of the coronary artery); Ablation-catheter; Ventricular arrhythmia

References

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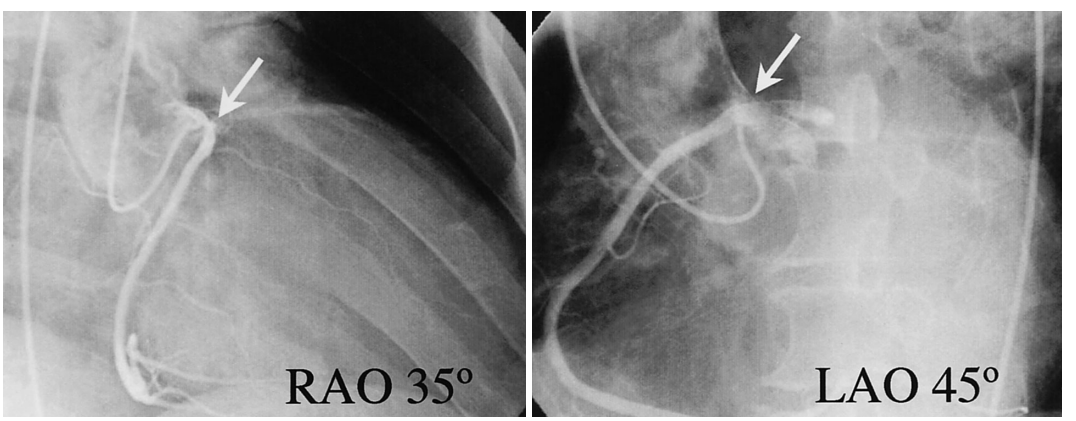

Fig. 3

Fig. 1 Twelve-lead electrocardiograms
A: Twelve-lead electrocardiogram showing premature ventricular contraction as an S wave in lead Ⅰ, tall R waves in the inferior leads, precordial R wave transition in leads V_2-V_3, and no S wave in either lead V_5 or V_6.
B: Twelve-lead electrocardiogram during and just after radiofrequency energy application from the left sinus of Valsalva showing ST segment elevation in the inferior leads during radiofrequency energy application (*left*, *arrows*), which returned to the baseline just after cessation of the radiofrequency energy (*right*).
RF = radiofrequency.

Fig. 2 Angiograms obtained in the right anterior oblique (RAO 35 °, *upper row*) and left anterior oblique (LAO 45 °, *lower row*) projections
A: Left coronary angiogram showing the ostium of the left coronary artery and the shape of the left sinus of Valsalva.
B: Angiogram of the ablation site showing a 7 F quadripolar catheter with a 4 mm distal electrode (Biosense Webster, Diamond Bar) positioned within the left sinus of Valsalva (*arrows*).

Fig. 3 Angiograms obtained in the right anterior oblique (RAO 35 °, *left*) and left anterior oblique (LAO 45 °, *right*) projections
Right coronary angiogram showing the origin from the left sinus of Valsalva, close to the right sinus of Valsalva. The ablation site where the earliest ventricular activation was recorded was at the ostium of the right coronary artery (*arrows*).