EP CASE REPORT

Superior vena cava isolation by right pulmonary vein ablation

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There are few reports demonstrating the electrical isolation between superior vena cava (SVC) and right atrium (RA) during right superior pulmonary vein (RSPV) isolation. We present the case of a patient, in whom electrical SVC–RA isolation was achieved by radiofrequency energy applications in RSPV.

Case

A 77-year-old female patient with paroxysmal atrial fibrillation (AF) was referred for catheter ablation of AF. The echocardiogram showed no remarkable abnormalities. Pulmonary vein (PV) isolation was performed during sinus rhythm. Right superior PV (RSPV) isolation was initiated after successful left PV isolation. Before RSPV isolation, two components of potentials were recorded at a circular mapping catheter placed in the antrum of RSPV (*Figure 1*). The first component consisted of high-frequency and low-amplitude signals (first component), followed by a high-frequency and high-amplitude signals (second component). The first component was recorded at 66 ms, whereas the

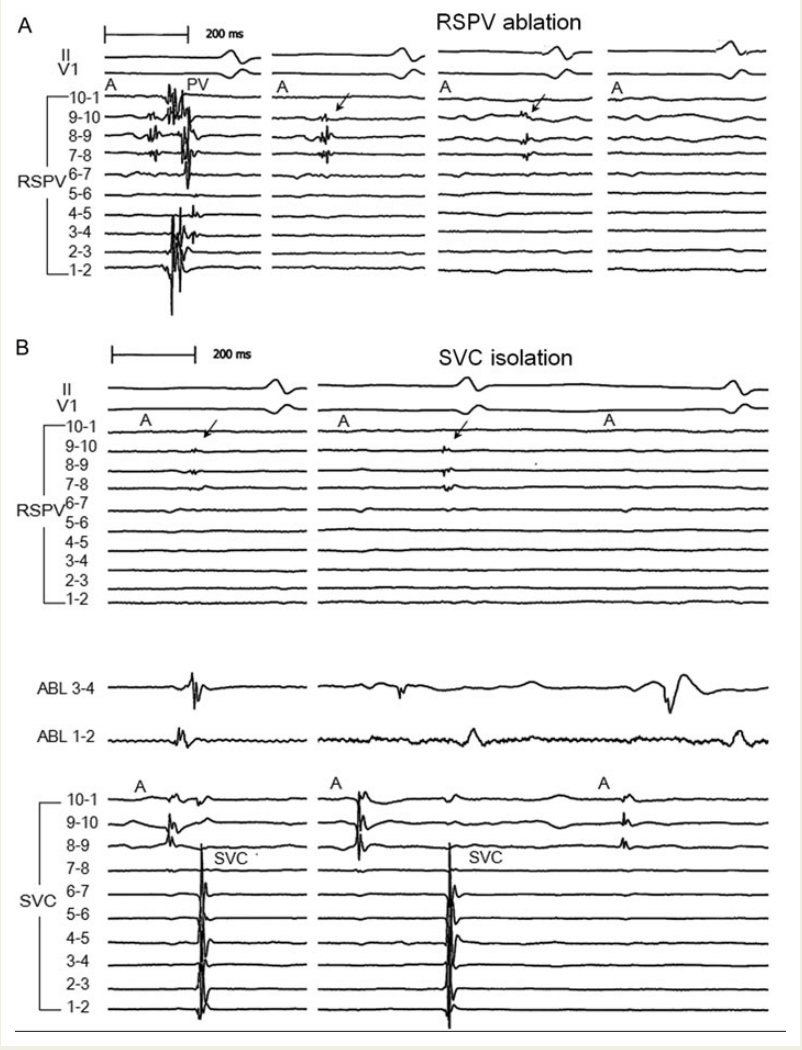

Figure 1 (*A*) Intracardiac tracing of RSPV isolation showing stepwise disappearance of two components. (*B*) Intracardiac tracing showing SVC isolation. Although the first component reappeared in RSPV before SVC isolation, the potentials disappeared simultaneously with SVC isolation.

second component was recorded 106 ms after the onset of the surface P-wave. After disappearance of the second component during RSPV ablation, the first component was present without any conduction delay. Radiofrequency energy applied at the anterior edge of the RSPV delayed the first component and ultimately disappeared, which suggested complete RSPV isolation. However, the first component reappeared shortly after termination of radiofrequency energy delivery. Then, a circular mapping catheter was placed in superior vena cava (SVC), where large and high-frequency signals synchronous with the first component in RSPV were recorded. Isolation of electrical activity in SVC by only one radiofrequency application at the septal aspect of the junction between SVC and RA eliminated the remaining potentials in RSPV. After successful bilateral PV and SVC isolation, the patient was free from any atrial arrhythmia recurrence. There is one report describing that SVC was electrically isolated during RSPV isolation.[1] Kimura *et al*. reported inadvertent SVC isolation during RSPV isolation, which was judged from the disappearance of SVC potentials recorded by the proximal electrodes of the liner electrode catheter introduced to the coronary sinus. The ablation catheter placed at the septal side of the SVC–RA junction, where SVC was successfully isolated by application of only one radiofrequency energy in the same way as described our case suggested that the electrical breakthrough may have been localized in the septal aspect of SVC–RA junction. From the anatomical view point, RSPV passes posterior to SVC.[2] Because the septal side of SVC–RA junction was proximity to the anterior part of RSPV, it was not surprising that elimination of SVC potentials was achieved by radiofrequency applications in RSPV. Shah *et al*. demonstrated that the timing from sinus P-wave onset was 17 $\pm$ 12 ms for the first low-amplitude SVC potentials and 52 $\pm$ 9 ms for the earliest RSPV potentials, respectively.[3] In addition to the findings that the first signals delayed and disappeared during RSPV ablation, the delay of the first potentials in the timing from the onset of P-wave at baseline made the potentials look PV potentials.

Conflict of interest: none declared.

References

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