Atrial Premature Contractions Arising from the Right Atrial Appendage

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To the Editor: Atrial premature contractions (APCs) or atrial tachycardia (AT) is a common form of supraventricular (SV) arrhythmias. Arising from the right atrial appendage (RAA), it usually responds well to radiofrequency (RF) ablation; however, successful ablation in this anatomic region can be challenging. Herein, we report a successful treatment of a case.

A 73-year-old man with a three months history of palpitations was referred for curative treatment of drug-resistant frequent APCs or paroxysmal episodes of ATs in February 2017. The result of 24-h Holter monitoring before admission showed that SV ectopics totaled 40,785, with 409 SV-runs. Electrogram showed that the morphology of APC was negative in lead V1 and positive in the inferior leads [Figure 1]. Echocardiogram (ECG) data (left atrial [LA], 31.6 mm, left ventricular ejection fraction, 0.64), chest radiogram, and laboratory tests, including thyroid function, were all unremarkable.

All antiarrhythmic medications were discontinued for at least 5 half-lives. After obtaining informed consent concerning RF catheter ablation, the procedure was performed with the patient in the fasting, nonsedated state.

Mapping in both atria was performed with the PentaRay multispline catheter and 4 mm ablation catheter (Biosense Webster, Diamond Bar, CA, USA). Under the guidance of the three-dimensional atrial geometry (CARTO System, Biosense Webster), endocardial activation mapping demonstrated that the earliest endocardial activation site was in the RAA where the local electrogram was 90 ms prior to the onset of the a wave on reference CSrise [Figure 1].

To avoid an inadvertent RAA isolation, a step-wise incremental discrete application of the RF energy was performed from 15 W to maximum 25 W, target temperature of <43°C, and irrigation rate of 17 ml/min. Application of the RF current at this site resulted in the disappearance of APCs.

After 30 min of waiting, neither APCs nor ATs were inducible; in addition, electrical conduction into and out of the RAA was shown, which indicated no electrical isolation of the RAA.

The result of 24-h Holter monitoring after ablation showed that SV ectopics totaled 84, with 1 SV-run. The patient experienced no cardiac symptoms or ECG evidence of APCs during the follow-up of three months. Previous reports have shown that catheter ablation could be an alternative for the treatment of atrial bigeminy or AT in drug-resistant symptomatic patients.[1,2] A study has reported RAA as the site of focal AT in 3.8% of the cases.[3] However, there are no studies about the origins of atrial bigeminy.

The anatomy of the RAA is unique and delicate in nature: a trabeculated and smooth-walled vestibule resulting from densely organized pectinate muscles, which impedes catheter manipulation and mapping as well as the precise delivery of effective energy to the desired point.[4] For these reasons, RAA tachycardia was sometimes refractory to endocardial and epicardial RF ablation approaches.[5]

The RAA, akin to LA appendage, has a very thin wall, and catheter manipulation deeper inside the RAA would increase the risk of the appendage’s perforation and damage to the neighboring coronary vasculature. Therefore, successful ablation in this anatomic region can be challenging.[4]

These findings suggest that isolating the RAA should be avoided to minimize the long-term risks. A step-wise incremental discrete RF energy application might reduce or even avoid the occurrence of perforation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient’s guardians have given their consent for their images and other clinical information to be reported in the journal. The patient’s guardians understood that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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Figure 1: Carto 3 activation map and 12‑lead electrogram. (a) Electrogram shows that the morphology of atrial premature contraction is negative in lead V₁ and positive in the inferior leads (asterisks, chart speed: 25 mm/s, sensitivity: 10 mm/mv). (b and c) Carto 3 activation map shows an eccentric atrial activation from the RAA (white crosses). (d) The earliest local electrogram (a wave on MAP) recorded from the RAA precedes the onset of a wave on CS by 90 ms. SVC: Superior vena cava; RAA: Right atrial appendage; RA: Right atrial; TR: Tricuspid ring; MAP: Mapping catheter; CS: Coronary sinus. The face icon shows the map of the right anterior oblique view.