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Case Report
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Transjugular Approach in Catheter Ablation of Ventricular Ectopy Originating from the Superior Tricuspid Annulus: An Effective Alternative to the Unsuccessful Transfemoral Approach

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ABSTRACT

Ventricular premature complexes originating from the tricuspid valve can be a major challenge for the electrophysiologist. Anatomical features of the tricuspid valve impose limitations for mapping and catheter ablation through the femoral vein (inferior approach). In this case, we report the elimination of a ventricular ectopy by radiofrequency catheter ablation through the transjugular approach after three unsuccessful attempts through the inferior approach.

KEYWORDS: Ventricular premature complexes; Catheter ablation; Tricuspid valve.

CASE PRESENTATION

Woman, 36 years old, day laborer, with frequent palpitations, associated with chest discomfort and intense malaise, was referred for catheter ablation after failure of clinical treatment with antiarrhythmic drugs. The 24-hour Holter showed high incidence (15% in total) of monomorphic ventricular ectopy (VE). Her echocardiogram showed no abnormalities, and the patient had no other comorbidities.

On the electrocardiogram (ECG), it was possible to observe a VE with a left bundle branch block morphology with inferior axis, with an R pattern in DII, DIII, AVF and AVL, QS in AVR, V1 with an rS pattern and QRS transition in V5 (Fig. 1). The patient had already undergone three catheter ablation attempts, all using a transfemoral approach, the second and the third using a long sheath, irrigated catheter and electroanatomical mapping. The fourth approach was performed with the patient fasting for 8 hours and after interruption of antiarrhythmic drugs for seven days.

Under local anesthesia and through a right femoral access, a decapolar catheter was positioned in the coronary sinus. Three-dimensional electroanatomical mapping of the tricuspid annulus (TA) and right ventricle (RV) was performed using the Carto System and an irrigated ablation catheter with a 3.5-mm tip and a contact sensor (Biosense Webster Inc., Diamond Bar, CA, United States of America). The mapping of the VE was performed using the cardiac activation map, the earliest potential of the VE in relation to the surface QRS and through the pace-mapping.

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Figure 1. Twelve-lead electrocardiogram showing the ventricular ectopy morphology from tricuspid annulus.

The initial approach was performed through the femoral access, and the earliest activation was observed in the lateral and anterolateral regions of the TA. In these places, radiofrequency applications (30-35 Watts, 60 seconds) were performed without interruption of the arrhythmia (Fig. 2a). Given the difficulty of maintaining the stability of the catheter in the region, it was decided to puncture the right internal jugular vein. The ablation catheter was introduced into the RV, retroflected, rotated counterclockwise and repositioned in the anterolateral region of the TA (Figs. 2b and 2c). In this location, an earliest ventricular potential preceded the QRS onset by 45 ms (Fig. 2D), and the pace-mapping was perfect (Figs. 2e and 2f). A radiofrequency ablation (30 Watts, 60 seconds) eliminated the VE after few seconds of application.

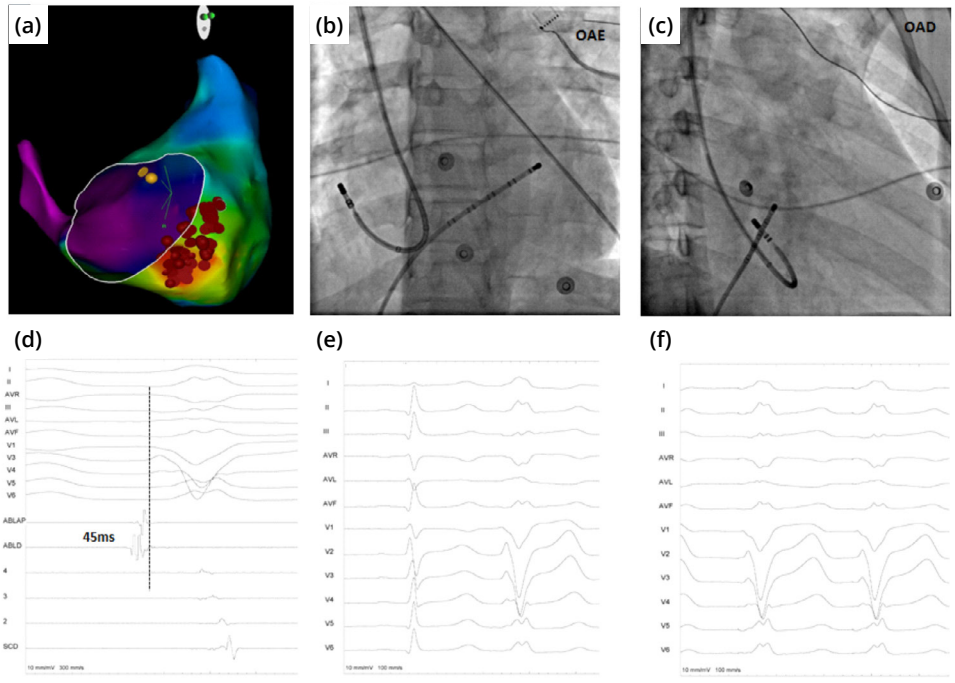

Figure 2. (a) The electroanatomical mapping of the tricuspid annulus. The radiofrequency applications in lateral and anterolateral regions (red dots), (b and c) Fluoroscopic images in left anterior (LAO) and right (LAO) oblique views demonstrating catheter placement at the ablation site. (d) The earliest activation preceding the QRS onset, (e and f) The ventricular ectopy morphology on electrocardiogram and the pace-mapping in the anterolateral region of the tricuspid annulus.

A test with isoproterenol infusion was performed 30 minutes after the last application and demonstrated the success of the ablation by not inducing the reappearance of the arrhythmia. After two years of follow-up, the patient was asymptomatic, without VE on the 24-hour Holter and without antiarrhythmic drugs.

DISCUSSION

In this case report, we address the difficulty in accessing the idiopathic VE originating from the superior TA via femoral access. After three unsuccessful procedures, the VE was eliminated through the transjugular access, which allowed greater stability of the ablation catheter in the region.

The analysis of the VE morphology on the ECG comprises one of the most important steps in the planning of catheter ablation. Although it is not possible to define by ECG the preferential route of approach for VE associated with the superior TA, the simple recognition of the site of this arrhythmia is enough to alert the operator about the need to use the transjugular route in these cases. The VE originating from the TA comprises a subgroup of idiopathic ventricular arrhythmias with electrocardiographic characteristics distinct from those located in the RV outflow tract region. The presence of positive DI and AVL (R or r) are morphological aspects that differ the VE of the TA from those located in the RV outflow tract that always present with negative AVL and variable D1 (R, S or R/S)[1].

Ablation through the superior route eventually offers an advantage for approaching arrhythmogenic substrates related to the TA, such as in the right accessory pathways[2]. In VE related to the TA, the superior approach is usually used when the femoral vein approach fails in eliminating the arrhythmia or in redo procedures. Previous studies have shown that the failure rate for a first procedure using the inferior approach can reach up to 30% of cases[3]. In the series published by Teng et al.[3], the subclavian approach associated with the use of a long sheath was able to increase the success rate in a new approach from 69.5 to 94.4% and indicates that the superior approach offers a great advantage on the stability of the ablation catheter in the upper and lateral annulus of the tricuspid[3].

In our case, the initial mapping was performed through the inferior route, and a great instability of the catheter was observed in the lateral and anterolateral regions of the tricuspid valve. Especially in these regions, the instability of the catheter ablation determines an extensive area of earliest activation and makes the pace-mapping technique quite inaccurate. The location of the VE in the subvalvular region is also another factor that can hinder the accessibility and stability of the catheter when using the inferior route, even when long and deflectable sheaths are used to facilitate manipulation and positioning of the ablation catheter.

Although access via the upper route entails additional and potentially serious risks, such as pneumothorax, the jugular vein puncture technique is widely used by some cardiac electrophysiology services and can be facilitated with the use of ultrasound-guided puncture. The manipulation of the catheter through the superior route does not require great dexterity by the operator, and the TA as well as the RV can be easily accessed. In addition, there is the possibility of using only a single puncture in cases in which a second approach is necessary, and the location of the arrhythmia focus has already been previously determined[4].

CONCLUSION

The idiopathic VE located in the superior TA represents a great challenge for the electrophysiologist. The recognition of these arrhythmias by the ECG and the high probability of failure in the inferior approach are factors that must be considered in the initial planning of the catheter ablation. The use of the superior route offers great advantages for the resolution of these cases and should be recommended as an additional strategy in cases of failure using the femoral route.

CONFLICT OF INTEREST

Nothing to declare.

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DATA AVAILABILITY STATEMENT

All dataset were generated or analyzed in the current study.

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