VIA MEDICA

CASE REPORT

Cardiology Journal
2008, Vol. 15, No. 3, pp. 277–280

ISSN 1897–5593

Repetitive monomorphic ventricular tachycardia originating from the inferior tricuspid annulus

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Abstract

We report a case of an otherwise healthy 63-year-old male with incessant, highly symptomatic ventricular arrhythmia that displayed over 60,000 premature ventricular contractions and 499 runs of non-sustained ventricular tachycardia (VT) during 24 hours of ECG monitoring. The ventricular ectopy had a QRS morphology of the left bundle branch block (LBBB), however, with a superior axis. Structural heart disease was absent and the history was negative. Therefore the arrhythmia was considered to be atypical idiopathic repetitive monomorphic VT. Radiofrequency catheter ablation in an inferior region of the tricuspid ring at a site with good pacemap was successful. We conclude that idiopathic repetitive monomorphic VT may originate from uncommon locations and that QRS morphology (superior axis, LBBB, notching in inferior leads, transition at V4, duration ≥ 160 ms) can help diagnose inferior free wall tricuspid location. (Cardiol J 2008; 15: 277–280)

Key words: idiopathic ventricular tachycardia, tricuspid annulus

Case report

A 63-year-old man was admitted with incessant ventricular arrhythmia. He had no other current health problems or history of previous cardiovascular or other major diseases. Symptoms began 2 weeks prior to admission, and had progressed to constant palpitations, agitation and breathlessness. An ECG showed a sinus rhythm with very frequent premature ventricular contractions (PVC) and runs of non-sustained repetitive monomorphic ventricular tachycardia (RMVT) with QRS morphology of the left bundle branch block (LBBB) and a superior axis (Fig. 1B). A 24-hour ECG showed incessant arrhythmia with over 60,000 PVCs, long periods of bigeminy and 499 runs of non-sustained VT (Fig. 2). Echocardiogram findings were unremarkable, with a left ventricular ejection fraction of 75%, and no chamber enlargement or valve defects. Exercise test was negative, and showed arrhythmia suppression during exercise. A signal-averaged ECG showed no late potentials. The arrhythmia was considered to be idiopathic since structural heart disease was absent and the history was negative.

The LBBB morphology suggested that the arrhythmia had a right ventricular origin, and the superior axis suggested that the inferior wall was the source. During mapping of the subvalvular area of the right ventricle, a site with a good pacemap and early ventricular activation was found in the inferior part of the tricuspid ring (Fig. 1). The intracardiac electrocardiogram at that site showed a sharp local ventricular activation 20 ms before QRS onset and a small potential of retrograde atrial depolarization (Fig. 3). Several radiofrequency (RF) applications (60°C, 60 W) were delivered to that area. While initial RF applications repeatedly resulted in rapid intensification, acceleration and then transient suppression of the ectopic activity, ultimately the ectopic beats and runs completely disappeared and did not return over the 30 minutes of monitoring.

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Received: 4.02.2008 Accepted: 31.03.2008

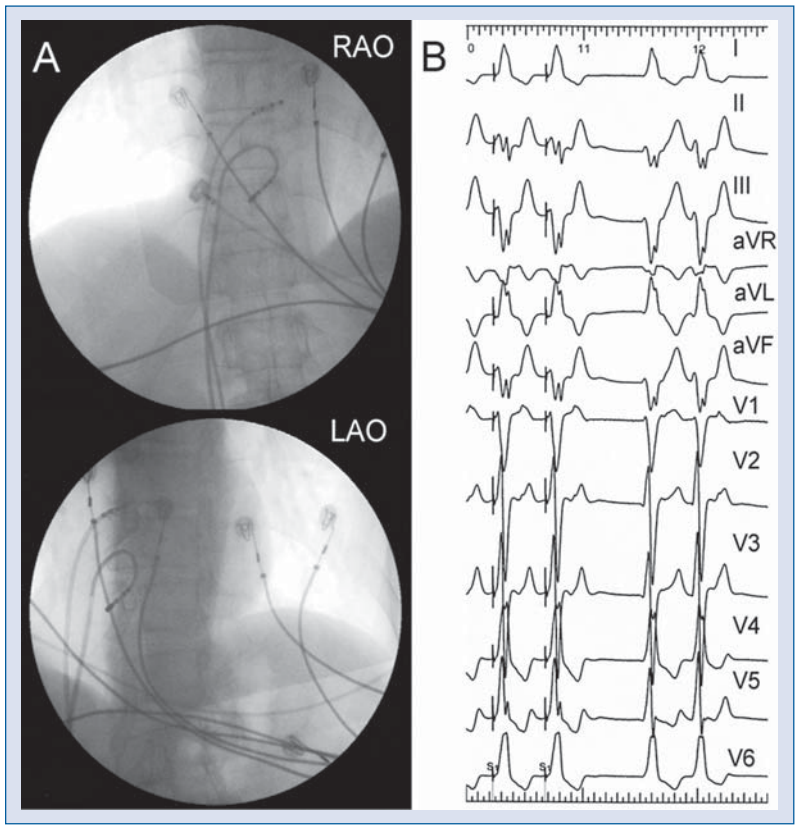

Figure 1. A. Diagnostic catheter positioned at the His bundle, and ablation catheter positioned below the inferior leaflet of the tricuspid valve at the site of successful ablation; **B.** A 12-lead ECG showing good match between the spontaneous ventricular ectopic activity and paced QRS morphology at the site of successful ablation.

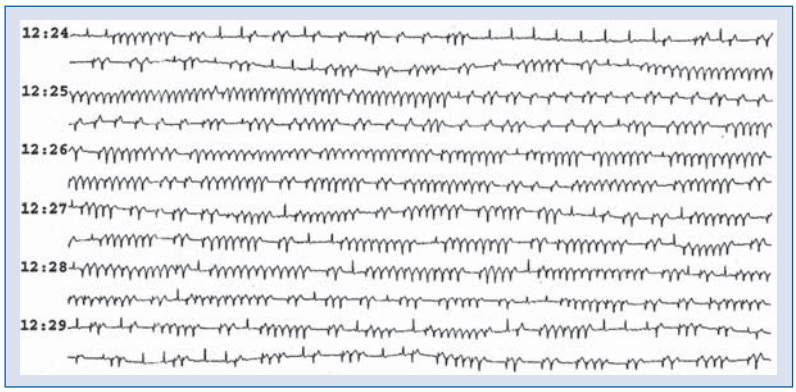

Figure 2. Holter monitoring documenting the repetitive nature of the ventricular tachycardia.

Surprisingly, 5 hours after the procedure the arrhythmia spontaneously returned (QRS morphology identical to the clinical arrhythmia), but rather than RMVT we observed an incessant accelerated ventricular rhythm of 90 bpm, occasionally accelerating to 120 bpm. By the next day the arrhythmia had disappeared completely. Complete cure was achieved probably due to the late effect — a delayed expansion of the initial RF lesion. During the subsequent 12-month follow-up, the patient remained asymptomatic and without any ventricular ectopic activity.

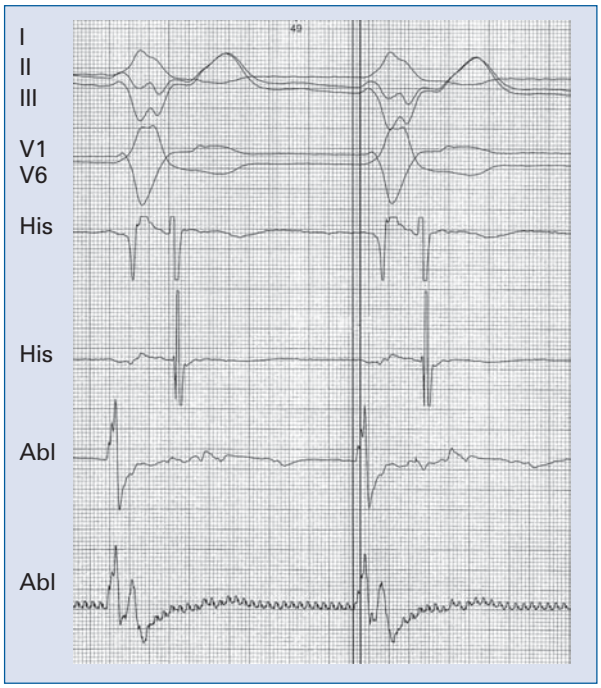

Figure 3. The intracardiac electrocardiogram at the site of succesful ablation with a sharp local ventricular activation 20 ms before QRS onset and a small potential of retrograde atrial depolarization.

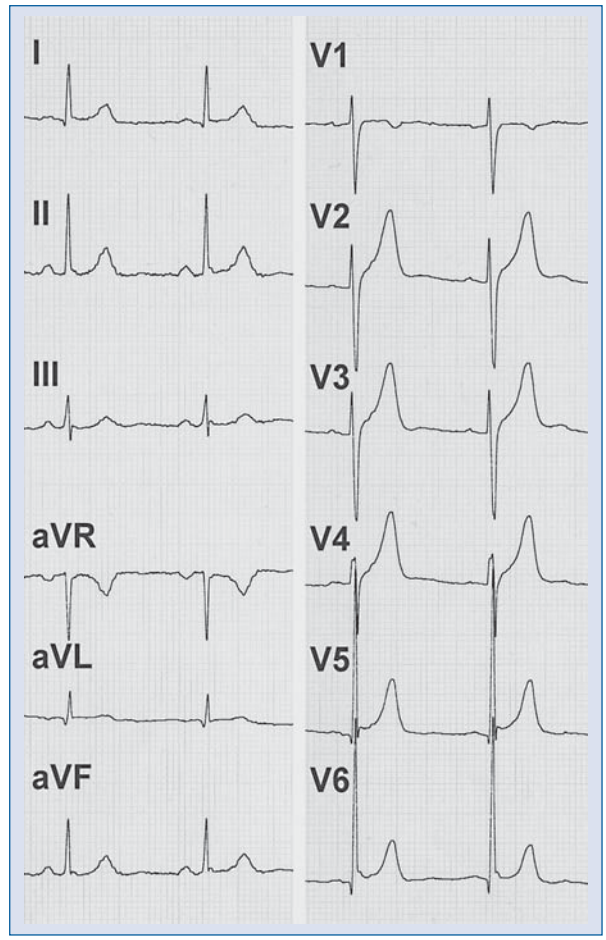

Figure 4. Post-ablation ECG showing sinus rhythm without features suggestive of arrhythmogenic right ventricular cardiomyopathy.

Discussion

The presented patient displayed an arrhythmia clinically resembling the most common type of idiopathic ventricular tachycardia from the outflow tract of the right or left ventricle with repetitive salvos of non-sustained tachycardia and frequent ectopic beats of the same morphology. However, in contrast to outflow tract RMVT the QRS morphology was atypical for a classical idiopathic RMVT pointing to a different location of the arrhythmogenic focus. Recently, annular regions were recognized as important sources of idiopathic ventricular ectopic activity. Tada et al. [1] reported that 8% of idiopathic VT/PVCs originate from the tricuspid annulus, however, mainly from its septal region. It that series of 454 patients with idiopathic VT only 2 patients had, similarly to our patient, an inferior, free wall location of tricuspid tachycardia focus, indicating that this is the least common of all locations. The QRS morphology in the current case had all features of free-wall tricuspid annulus VT observed in that series: notching of QRS in inferior leads, transition at V4 or later and QRS ≥ 160 ms [1]. Of note, these features are also typical for free wall focus in the case of right ventricular outflow tract tachycardia [2]. Probably such QRS morphology together with negative QRS complexes in leads II, III, aVF and LBBB morphology should be considered suggestive of inferior free wall tricuspid location. However, to the best of our knowledge, there are no other studies or case reports corroborating this.

Arrhythmias originating anywhere in the right ventricle raise concerns about the presence of arrhythmogenic right ventricular cardiomyopathy (ARVC). While ARVC could not be completely excluded in our patient, the case was much more likely to be one of idiopathic tachycardia based on the observations of a normal-sized right ventricle, lack of epsilon waves or inverted T waves in precordial leads (Fig. 4), lack of late potentials, no fractionated electrograms at or around the ablation site, arrhythmia suppression during exercise, single QRS morphology of the arrhythmia and the success of focal ablation [3]. None of the major ARVC criteria were fulfilled and only one minor (VT) was present.

Conclusions

We present a rare variant of idiopathic RMVT originating from the free wall inferior tricuspid annulus. We propose that rather than undertaking extensive diagnostic workups, prompt RF catheter ablation should be considered, possibly with an extended follow-up to allow for an atypical presentation of early stage organic heart disease.

Acknowledgements

The authors do not reported any conflict of interest regarding this work.

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