

Catheter ablation of incessant irregular ventricular tachycardia originating from the right bundle branch

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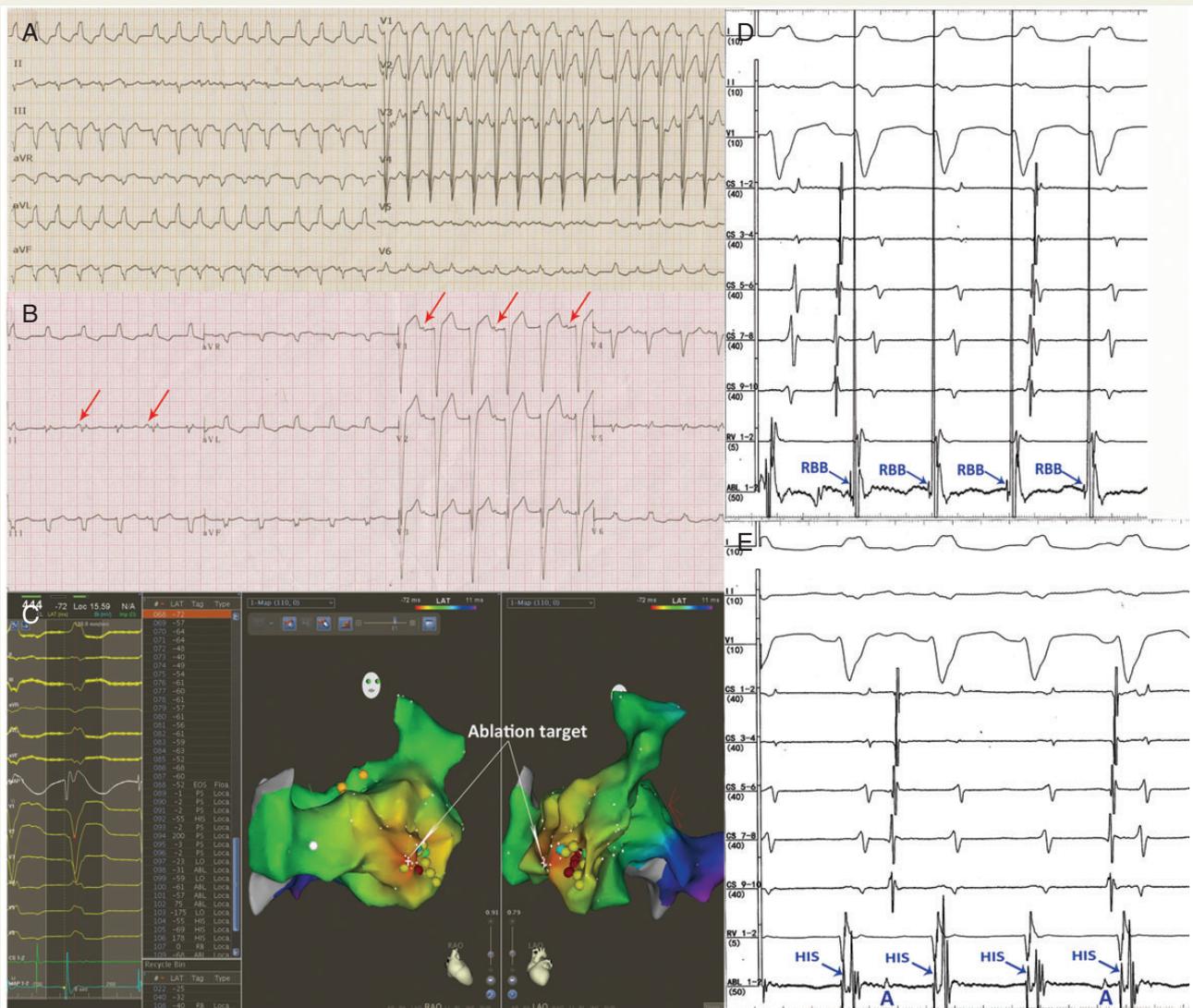
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Case presentation

A 32-year-old woman presented with a history of palpitations over the prior 7 days. Twelve-lead ECG indicated an irregular, wide QRS complex tachycardia with a left bundle branch block (LBBB) morphology and a late precordial R/S transition (*Panel A*). Echocardiography and cardiac magnetic resonance imaging demonstrated no evidence of structural heart disease. This arrhythmia did not respond to verapamil or metoprolol administration. Two attempts of electrical cardioversion of 200 J failed to restore sinus rhythm, and the administration of intravenous amiodarone slowed but failed to terminate the arrhythmia. As the tachycardia rate become slower and regular, closer inspection of ECG showed P waves of probable sinus rhythm with atrioventricular dissociation (*Panel B*, red arrows) indicative of ventricular tachycardia (VT). Because the tachycardia was incessant, urgent catheter ablation was planned. Using a three-dimensional electroanatomic mapping system (CARTO 3), the site of the earliest local ventricular activation was found in mid-anteroseptal region



of the right ventricle (*Panel C*). Here, the right bundle branch (RBB) potentials were slightly earlier than the ventricular activation (*Panel D*). Radiofrequency energy applied at this location terminated the VT. During sinus rhythm, normal PR interval and HV interval of 82 ms with RBB block were documented and felt most likely related to the ablation.

Discussion

Because of the irregularity of the rhythm, the patient's initial presenting electrocardiogram (*Panel A*) was misdiagnosed as atrial fibrillation. However, in addition to an irregularly irregular rhythm, the diagnosis of AF requires the absence of P waves and fibrillation of the baseline (f waves).¹ In our patient, once the rate slowed, positive P waves in lead II and biphasic P waves in lead V1 were more easily recognized (*Panel B*) and suggested probable sinus rhythm with AV dissociation.

The ECG manifestations suggest that VT is of RBB origin, but junctional rhythm with LBBB, bundle branch re-entry (BBR) using the RBB as antegrade limb, or Mahaim fibre automaticity cannot be excluded. Intra-cardiac electrocardiograms demonstrated that the RBB potentials precede the earliest ventricular activation (*Panel D*), and the His potentials lag behind the right ventricle apical activation during tachycardia (*Panel E*). This activation sequence of RBB–V–His ruled out the possibility of BBR or junctional rhythm with LBBB because these rhythms should have an His–RBB–V activation pattern.² Mahaim potentials were not found to precede the local ventricular activation around the tricuspid annulus; therefore, automaticity from an atriofascicular pathway was excluded.

Conclusion

Ventricular tachycardia originating from RBB (RBB-VT), an uncommon form of ventricular arrhythmia, can be observed in patients with structurally normal hearts. The likely mechanism of RBB-VT seems to be increased automaticity because of its focal origin, irregularly irregular rhythm, and the response to electrical cardioversion. Amiodarone is an effective drug therapy to slow the tachycardia rate, and catheter ablation is curative therapy for such incessant arrhythmias.

References

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