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Case Report

An Uncommon Type of Bundle Branch Reentrant Tachycardia in Hypertrophic Cardiomyopathy

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ABSTRACT

Bundle branch reentrant tachycardia (BBRT) is an uncommon ventricular tachycardia (VT) and is presented with a long His-ventricular (H-V) interval as a reentry between the bundle branches. This arrhythmia is frequently seen in patients with a significant conduction system disorder. QRS morphology during VT is usually the left bundle branch block (LBBB) type and may be similar to that in sinus rhythm. While BBRT usually has LBBB-like morphology, in rare cases it can be seen with the right bundle branch block (RBBB) form.

Most patients have prolonged H-V intervals during sinus rhythm, consistent with His–Purkinje disease; however, some patients may have normal H-V intervals. The ablation of RBBB can cure it, but up to 30% of patients may need pacemaker implantation after ablation.

BBRT is responsible for about 6% of induced VTs during the electrophysiology study.

We herein present an uncommon form of BBRT (the RBBB type) in a patient who had hypertrophic cardiomyopathy with a normal left ventricular function. ***(Iranian Heart Journal 2022; 23(4): 131-134)***

KEYWORDS: BBRT, HCM, Ablation

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A 39-year-old woman, a known case of hypertrophic cardiomyopathy (HCM) with an implanted cardioverter-defibrillator (ICD) due to syncope, presented with frequent episodes of wide complex tachycardia with right bundle branch block (RBBB) morphology (Fig. 1).

An electrophysiology study (EPS) was done using quadripolar and decapolar catheters advanced via the right femoral vein. The recording was done with Claris (Abbot System). At the basal line, surface electrocardiography and intracardiac electrography were remarkable for the RBBB pattern, a prolonged PR, and a prolonged His-ventricular (H-V) interval (72 ms).

A wide-complex tachycardia was induced with atrial extra-stimulation via the coronary sinus, similar to a clinical arrhythmia with a prolonged H-V interval (104 ms) and with the same morphology of the precordial leads and different limb lead morphology of the sinus rhythm, consistent with a BBR-ventricular tachycardia (VT) with RBBB morphology (Fig. 2, 3 & 4).

Because of the patient's stable hemodynamic status during the VT, as well as her intermittent left bundle branch block

(LBBB) and first-degree atrioventricular block during EPS, the ablation of the RBBB was deferred to another session after discussing the risk of complete heart block and the need for upgrading to Cardiac resynchronization therapy with a pacemaker and an ICD with the patient.

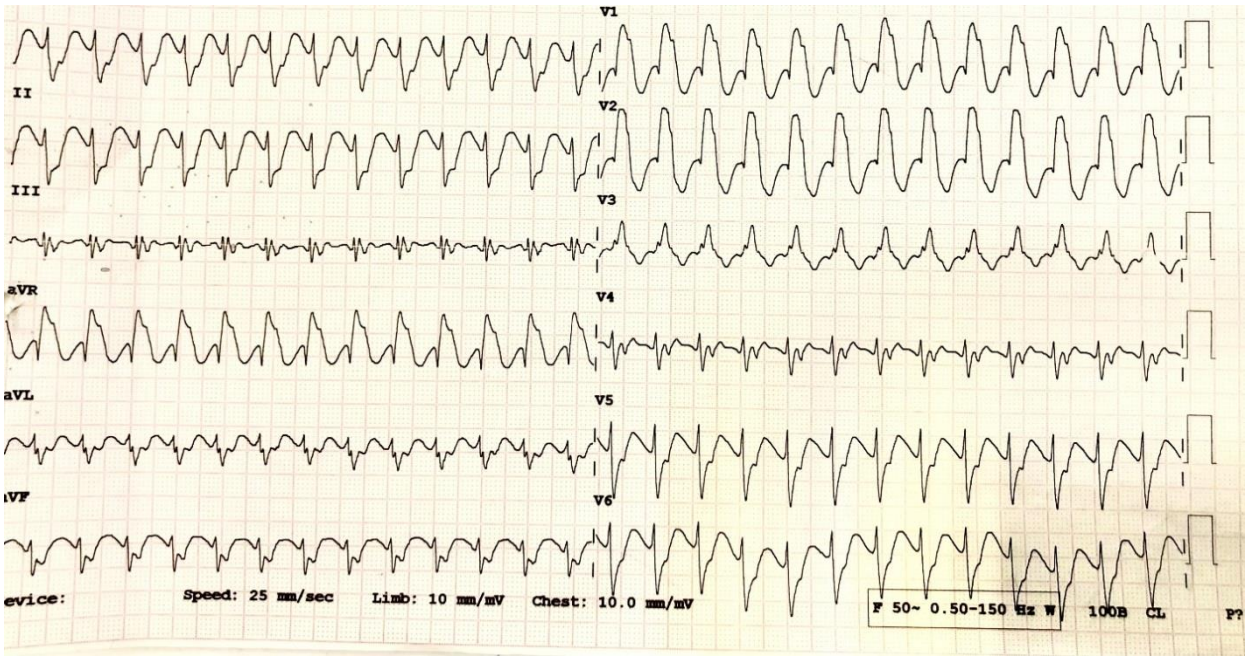

Figure 1: The image shows a wide-complex tachycardia with typical right bundle branch block-like morphology with a rate of about 150 bpm. There is no evidence of atrioventricular dissociation.

Figure 2: The image shows a bundle branch reentrant tachycardia with right bundle branch block-like morphology and a prolonged His-ventricular pattern (104 ms).

Figure 3: The image shows the induction of arrhythmia with coronary sinus pacing with a prolonged His-ventricular pattern and right bundle branch-like morphology.

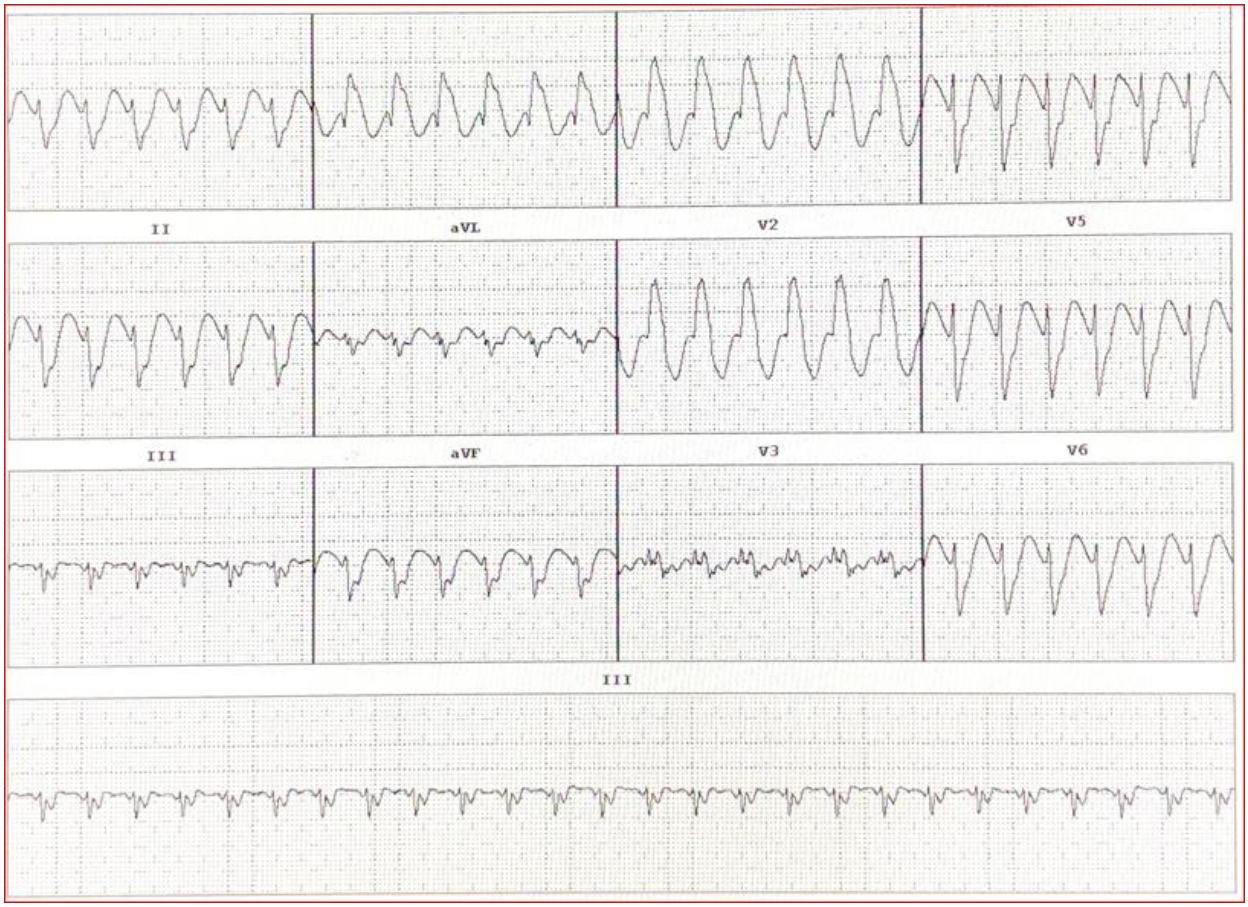

Figure 4: The image presents the 12-lead electrocardiogram of the induced arrhythmia in the patient in the electrophysiology lab.

DISCUSSION

VT due to sustained bundle branch reentry has been previously described in a report in HCM patients with preserved left ventricular size and systolic function.[1] Another report on HCM was about a patient with a compromised left ventricular function, suggesting the end stage of the disease.[2]

BBR-VT is commonly diagnosed according to the following criteria[1]: the QRS morphology of the tachycardia exhibits a typical RBBB or LBBB pattern,[2] the onset of the ventricular depolarization is preceded by the His bundle,[3] a variation in the H-H interval precedes changes in the V-V interval during the VT,[4] and the H-V interval is prolonged during the VT when compared with that during sinus rhythm.[3]

Our patient had an RBBB-type intraventricular conduction delay during sinus rhythm and a BBR-VT with the same QRS morphology in the precordial leads and a slight change in the limb leads.

In our case, there was no evidence of wobbling; consequently, an evaluation of H-H variation preceding V-V changes was not possible. Nonetheless, the H-V interval was prolonged during the VT compared with sinus rhythm.

Our patient had RBBB-like VT morphology, which was repetitively inducible by atrial extrastimuli.

Several reports have demonstrated that BBR-VT with an RBBB pattern rather than an LBBB pattern could be sporadically induced by incremental atrial pacing or premature atrial beats.[4,5]

In the case of a unidirectional block in the RB with enough delay in the LB and trans-septal conduction, a BBR-VT with an RBBB configuration can be induced.

As a unidirectional block can occur in the RB during incremental atrial pacing, the stimulus conducted through the LB with a required delay for the recovery of the refractory period of the RB allows the development of BBR-VT with an RBBB pattern.[5-8]

REFERENCES

1. Sustained Bundle Branch Reentry in a Patient with Hypertrophic Cardiomyopathy and Non dilated Sunset Mittal, Robert F. Coyne, Irving M. Herling, Dusan Z. Kocovic, and Behzad B. PavriLeft Ventricle Journal of Interventional Cardiac Electrophysiology 1997; 1:73–77
2. Cohen TJ, Chien WW, Lurie KG, et al. Radiofrequency catheter ablation for treatment of bundle branch reentrant ventricular tachycardia: Results and long-term follow-up. J Am Coll Cardiol 1991; 18:1767–1773
3. Blanck Z, Dhala A, Deshpande S, Sra J, Jazayeri M, Akhtar M. Bundle branch reentrant ventricular tachycardia: cumulative experience in 48 patients. J Cardiovasc Electrophysiol 1993; 4:253 –62
4. Blanck Z, Dhala A, Deshpande S, Sra J, Jazayeri M, Akhtar M. Bundle branch reentrant ventricular tachycardia: cumulative experience in 48 patients. J Cardiovasc Electrophysiol 1993; 4:253 –62.
5. Simons GR, Sorrentino RA, Zimerman LI, Wharton JM, Natale A. Bundle branch reentry tachycardia and possible sustained interfascicular reentry tachycardia with a shared unusual induction pattern. J Cardiovasc Electrophysiol 1996; 7:44–50.
6. Touboul P, Kirkorian G, Atallah G, Moleur P. Bundle branch reentry: a possible mechanism of ventricular tachycardia. Circulation 1983; 67:674–80. 14. Nallasivan M, Appel RA, Welch WJ, Bauernfeind RA. Ventricular tachycardia due to bundle branch reentry: induction by spontaneous atrial premature beats. Am Heart J 1988; 116:552 – 5.
7. Mehdirad AA, Keim S, Rist K, Mazgalev T, Tchou P. Asymmetry of retrograde conduction and reentry within the His-Purkinje system: a comparative analysis of left and right ventricular stimulation. J Am Coll Cardiol 1994; 24:177–84.
8. Denker S, Lehmann M, Mahmud R, Gilbert C, Akhtar M. Facilitation of ventricular tachycardia induction with abrupt changes in ventricular cycle length. Am J Cardiol 1984; 53