

Recurrences of tachycardia after repeated slow pathway ablation: What is the diagnosis?

Soorampally Vijay¹, Harshad Shah¹, and Yash Lokhandawala¹

¹The Royal Hospital Department of Cardiology

July 21, 2022

Abstract

A 30-year-old man with a structurally normal heart was referred to us with a 2-year history of recurrent episodes of rapid paroxysmal palpitations. A few episodes required hospitalization and were terminated with intravenous diltiazem. During electrophysiology (EP) study done twice before in other hospitals, the patient was diagnosed as typical atrioventricular nodal reentrant tachycardia (AVNRT) and underwent radiofrequency ablation of the slow pathway. However, the episodes recurred. Because of the patient's persistent symptoms, an EP study was performed again. Tachycardia was easily induced using atrial extrastimuli, ventricular extrastimuli and with rapid atrial pacing.

Title: Recurrences of tachycardia after repeated slow pathway ablation: What is the diagnosis?

Authors names:

Soorampally Vijay^a DM, Harshad Shah^bDM, Yash Lokhandwala^b DM.

^aDepartment of Cardiology, Manipal Hospital, Bangalore, India.

^bDepartment of Cardiology, Holy Family Hospital, Mumbai, India.

Corresponding Author:

Dr. Soorampally Vijay

Department of cardiology,

Manipal Hospital,

98, old airport road,

Kodihalli, Bangalore, Karnataka, 560017.

E-mail: surampallivijay8@gmailcom

Phone: 91-8885212729

Number of tables: 0

No of words: 345

Number of Figures: 4

Disclosures: None.

Funding: Nil.

Acknowledgements: Bhavesh Gunaji Chavan, Holy Family Hospital.

Case details:

A 30-year-old man with a structurally normal heart was referred to us with a 2-year history of recurrent episodes of rapid paroxysmal palpitations. A few episodes required hospitalization and were terminated with intravenous diltiazem. During electrophysiology (EP) study done twice before in other hospitals, the patient was diagnosed as typical atrioventricular nodal reentrant tachycardia (AVNRT) and underwent radiofrequency ablation of the slow pathway. However, the episodes recurred.

Because of the patient's persistent symptoms, an EP study was performed again. Tachycardia was easily induced using atrial extrastimuli, ventricular extrastimuli and with rapid atrial pacing.

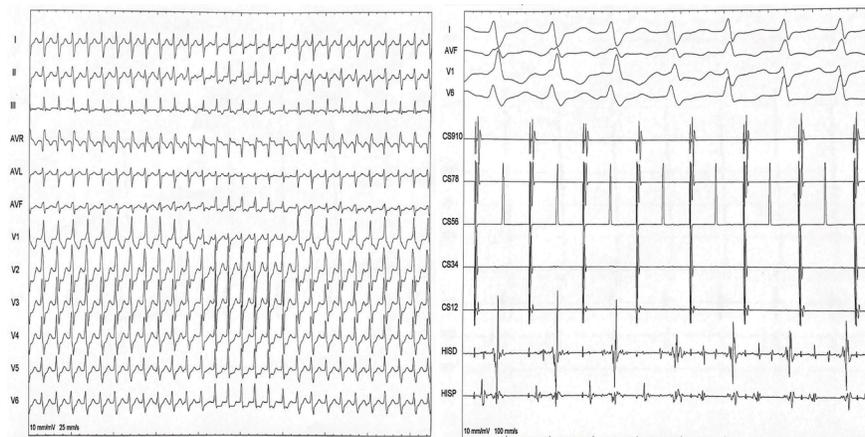
Figure 1: Induction of tachycardia with atrial extrastimuli.

Figure 2: Atrial overdrive pacing during the tachycardia.

Figure 1. Induction of tachycardia with atrial extrastimuli.



Figure 2. Atrial overdrive pacing during the tachycardia.



Based on these traces, what is the diagnosis?

Answer:

PACs initiate an incomplete RBBB morphology tachycardia with an "A on V" morphology and a normal HV interval. The differential diagnoses include typical AVNRT, atrial tachycardia and orthodromic tachycardia via a concealed nodofascicular or nodoventricular pathway. The tachycardia initiated with A-H-H-A sequence suggests that it can be typical AVNRT initiating with a double fire (2 for 1 phenomenon) and rules out the other differential diagnoses enumerated above. Interestingly, in our case, the HV interval during the tachycardia is shorter than in sinus rhythm, suggesting that ventricular tachycardia (VT) involving the conduction system could be a differential diagnosis. In supraventricular tachycardia, the HV interval during the tachycardia is equal to or longer than in sinus rhythm, while the HV interval is generally negative in myocardial VTs and preexcited tachycardia.

The diagnosis of fascicular VT was confirmed by performing atrial overdrive pacing during the tachycardia, which revealed entrainment of the tachycardia as seen by fusion beat and at a faster atrial rate, the QRS narrowed (ruling out rate related RBBB). The HV interval during the tachycardia (HV 34 ms) was less than during sinus rhythm (54 ms). After 6 mg of adenosine, the tachycardia continued with ventriculoatrial block. During fascicular VT, the His is typically activated retrogradely, resulting in a pseudo HV interval with a negative HV usually.¹

Mapping was performed both during tachycardia and during sinus rhythm, with the earliest fascicular signals detected in the upper septum (upper septal fascicular VT) just below the His region. After discussing the patient and his relatives, RF energy was delivered during tachycardia, which terminated the tachycardia within 2 seconds. Even with isoprenaline, no tachycardia was induced after RF energy application. During a 6-month follow-up, the patient was symptom-free.

The interesting points in our case were: 1) For moments during the tachycardia, it resembles typical AVNRT due to the 'A on V' pattern. Hence the patient was treated as AVNRT with slow pathway ablation attempted twice in other hospitals. 2) The shorter HA was due to robust VA conduction through the AV node along with a relatively slow conduction time down the septal fascicle. This case illustrates the importance of measuring the HV interval during the tachycardia and comparing it with the HV interval during sinus rhythm. 3) A pseudo-normal HV interval during fascicular VT has not been reported before.

Among the idiopathic fascicular VTs, the upper septal variant is the least common type (<1%). This variant can mimic supraventricular arrhythmias like AVNRT, and an incorrect diagnosis can result in RF energy delivery in the region of the AV node, potentially causing damage to the conduction system.^{2,3}

References:

1. Talib AK, Nogami A, Nishiuchi S. Verapamil-sensitive upper septal idiopathic left ventricular tachycardia: prevalence, mechanism, and electrophysiological characteristics. *JACC Clin Electrophysiol.* 2015; 1(5):369–380.
2. Abdelwahab A, Sapp JL, Gardner M, Basta MN. A case of narrow complex tachycardia. *J Cardiovasc Electrophysiol.* 2008; 19(3):330–331.
3. Namboodiri N, Bohora S, Ajitkumar VK, Tharakan JA. Narrow complex tachycardia with ventriculoatrial dissociation—what is the mechanism? *Pacing Clin Electrophysiol.* 2011; 34(6):756–759.