


CASE REPORT

Persistent VA dissociation during atrioventricular nodal reentry tachycardia: The existence of upper common pathway

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Abstract

The existence of the upper common pathways is not well-established yet. This case describes atrioventricular nodal reentry tachycardia with persistent ventriculoatrial dissociation that proof of upper common pathway existence.

KEYWORDS

atrioventricular nodal reentry tachycardia, upper common pathway, VA dissociation

1 | INTRODUCTION

The term upper common pathway refers to atrioventricular (AV) nodal tissue that connects the tachycardia circuit to the atrial. The existence and concept of the upper common pathways is not well-established yet. Whether slow and fast pathways connect directly to the atria or via upper common pathways is still debatable. One of the theories, proposed by Josephson and Kastor¹ and Miller et al.,² was that an entire intranodal circuit with an upper common pathway localized between the upper turnaround point within the AV node (upper junction of fast and slow pathways) and both atria. We report a case of AVNRT with persistent complete ventriculoatrial (VA) dissociation that may support the existence of an upper common pathway.

2 | CASE REPORT

A 32-year-old male was referred for ablation due to recurrent palpitation. Baseline electrocardiogram (ECG) was normal. Two quadripolars catheters were introduced into the right ventricle (RV) and His. One duo-decapolar catheter was introduced along the low right atrial crista (H19-20) to distal coronary sinus (H1-2). Electogram and surface ECG were recorded at 100 mm/s. Tachycardia induced during catheter manipulation. During tachycardia, A-A and V-V cycle length showed slight variation, whereas HV interval and H-H cycle length were constant. Tachycardia showed VA dissociation (Figure 1).

During tachycardia, QRS changed from left bundle branch block (LBBB) to right bundle branch block (RBBB) pattern. HV intervals during RBBB and LBBB pattern remained fixed. Changes in the QRS duration and morphology did not alter H-H cycle length (Figure 2).

Tachycardia was terminated by RV overdrive pacing. During sinus rhythm, AH and HV intervals were normal. Right ventricular pacing showed VA dissociation. Tachycardia following “borderline” AH jump (55 ms) was induced by atrial extra stimuli (AEST) 500/340 ms. During tachycardia, entrainment could not be demonstrated due to no A capture. Several ventricle premature extrastimuli from RV apex and close to the His failed to advance the next His potential. Final diagnosis was AVNRT. Procedure was continued by slow pathway ablation. Junctional rhythm was observed during slow pathway ablation. Neither AH jumped nor tachycardia induced after slow pathway ablation. There was no recurrence of tachycardia during 3 years of follow-up.

3 | DISCUSSION

Supraventricular tachycardia with persistent complete VA dissociation is unusual. Some cases had reported this phenomena. Hamdan et al. and Josephson showed AVNRT with VA dissociate.^{3,4} However, this report did not described the case in detail. And also, they did not specifically mention whether the VA dissociation was persistent or not. In several cases that had been reported before, the upper common block

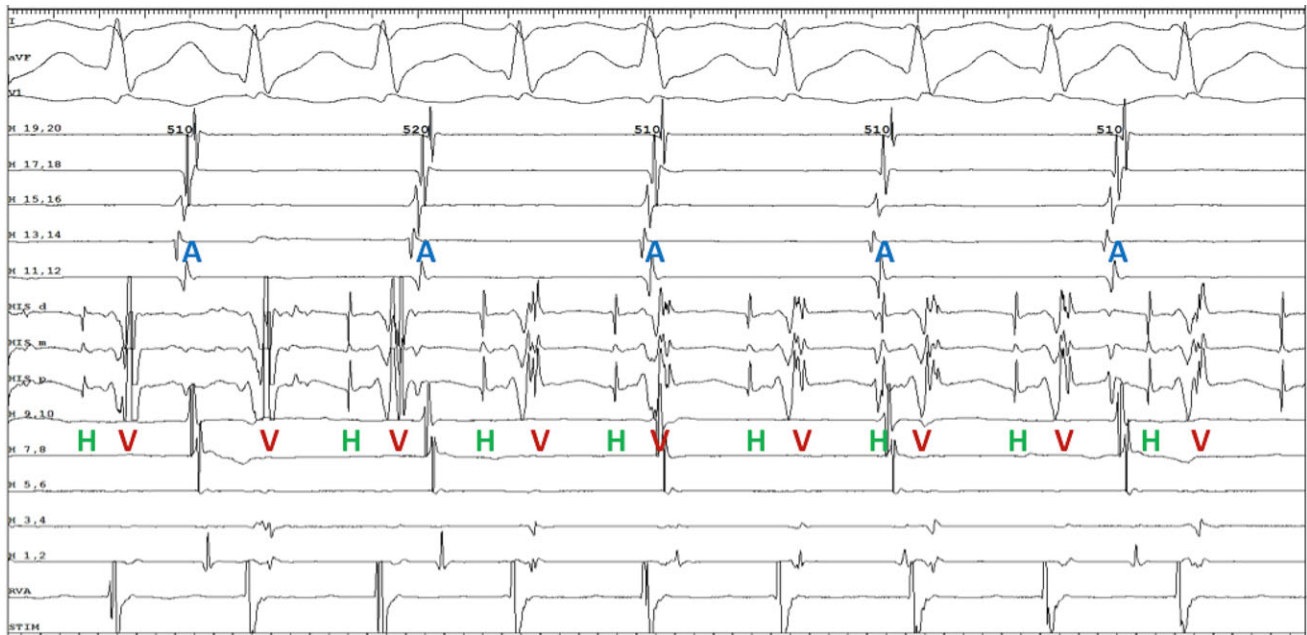


FIGURE 1 Electrogram during tachycardia showed atrial activities are totally dissociated. HV interval and H-H cycle length were 53 and 275 ms, respectively [Color figure can be viewed at wileyonlinelibrary.com]

was 2:1 or intermittent dissociation.⁵⁻⁷ None of these cases showed persistent and complete VA dissociation.

We considered that the basic mechanism was a reentry rather than an automaticity or triggered activity because: (1) the tachycardia was easily induced by AEST and terminated by overdrive pacing, and (2) there was no sign of warming up and down which is automaticity's characteristic. We know that junctional tachycardia (JT) is an automaticity process, and therefore, we excluded automaticity JT. The presence of VA dissociation during tachycardia was a proof that the atrium was not being required for tachycardia maintenance. Therefore, atrial tachycardia and AV reciprocating tachycardia were ruled out. During tachycardia, QRS durations and patterns were changed (LBBB to RBBB); however, H-H cycle length remained fixed (Figure 2A).

The occurrence of lower common block together with upper common block in the same patient is a rare finding. Das et al.⁸ had reported a case of AVNRT with simultaneous block in the upper and lower common pathway due to premature atrial contraction (PAC). A PAC penetrates the upper common pathway and fast pathway antegradely then concealed conduction to the lower common pathway. This mechanism explained how PAC made the block in the upper and lower common pathway at the same time during an ongoing tachycardia. In our case, we did not see the PAC before transition from LBBB to RBBB (Figure 2A). We speculated that "some" momentary block occurred below the His level, that changed the QRS pattern. Based on these findings, we can conclude that atrial, ventricle, nodofascicular connection, and bundle branch were not part of the reentry circuit. Nodofascicular connection with atrial dissociation may have a similar pattern as reported by Haissaguerre.⁹ However, our case showed several extrastimuli from the RV apex and close to the His failed to advance to His potential. The tachycardia was AVNRT based on the

exclusion. The tachycardia induced following "borderline" AH jump (55 ms), even though we could not see "critical" AH jump. No inducible tachycardia after slow pathway ablation provides strong suggestion that the tachycardia was AVNRT. However, controversy continues as to whether the slow and fast pathways connect directly with the atria or via an upper common pathway.⁵ We report a patient with AVNRT continuing despite the occurrence of VA dissociation, which suggests that an upper common pathway may exist. This was perceived as a link between the fast and slow pathways consisting of transitional cells and conducting to the atria through the transitional envelope.¹⁰ To the best of our knowledge, this case is the first report of AVNRT with persistent VA dissociation. Continuing AVNRT despite persistent VA dissociation may support the existence of upper common pathway.

4 | LIMITATION

There are several limitations of this case: (1) We were not able to fully clarify the electrophysiology behavior of the upper common pathway. Thus, further investigation is needed to determine the precise nature of the mechanism of the upper common pathway in AVNRT. (2) We realized that JT could not be excluded 100% in this case. However, we conclude that the tachycardia mechanism is reentry as mentioned before (2nd paragraph in the discussion section). And also, the initiating tachycardia by "borderline" AH jump (55 ms) and no sign and recurrence of tachycardia during 3 years of follow-up after slow pathway ablation made the diagnosis of AVNRT more likely than JT. (3) We could not determine the exact mechanism of lower common block in this case, since we did not see any PAC which can interfere with the lower common pathway.

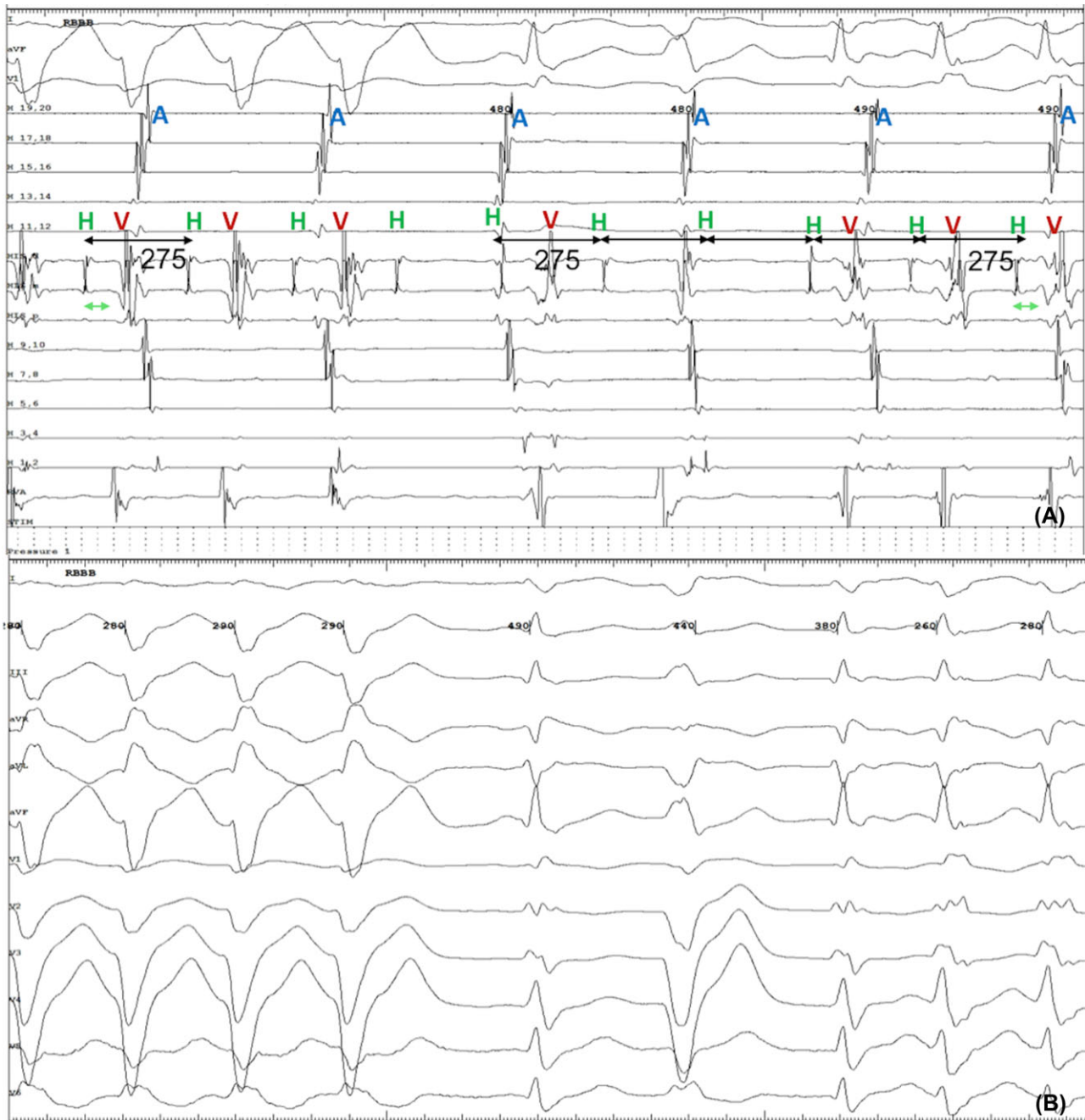


FIGURE 2 Electrogram during tachycardia showed LBBB change to RBBB without interrupting the tachycardia. Atrial activities are totally dissociated. H-H cycle length remained constant (275 ms) despite change of QRS morphology (panel A). Surface ECG during tachycardia showed LBBB change to RBBB (panel B). ECG = electrocardiogram; LBBB = left bundle branch block; RBBB = right bundle branch block [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.com)]

5 | CONCLUSION

Continuing AVNRT despite complete VA dissociation may support the existence of upper common pathway. In such cases, exclusion of other tachycardia may play an important role to confirm correct diagnosis.

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None.

DISCLOSURES

The authors declare no conflicts of interest.

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