

Update of pacing maneuver for discrimination of SVTs

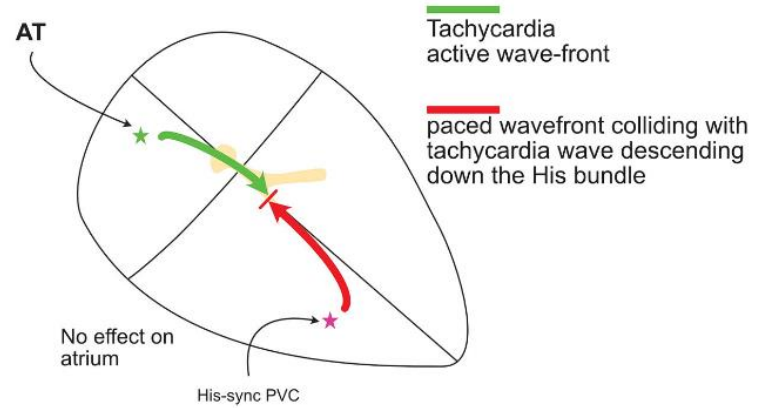
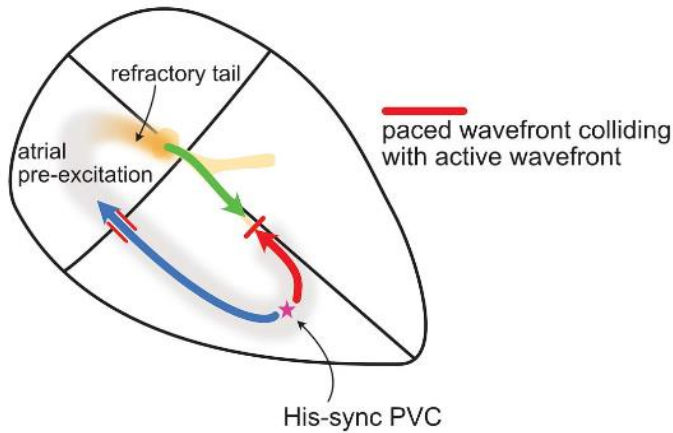
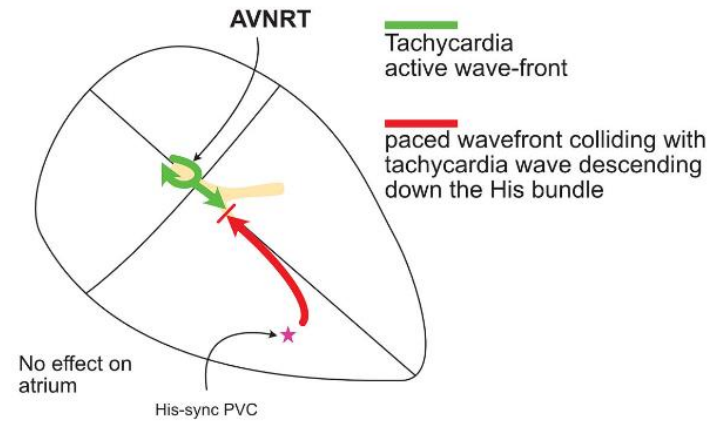
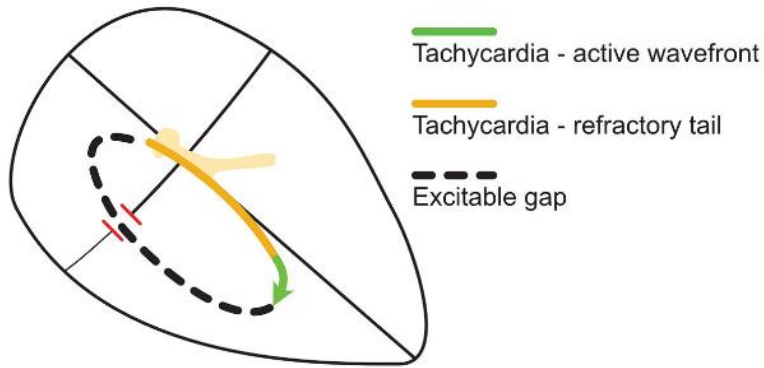
여수제일병원
유래한

Causes of Supraventricular Tachycardia

- Sinus tachycardia
- AV nodal reentrant tachycardia(AVNRT)
- AV reentrant tachycardia(AVRT)
- Atrial tachycardia(AT)
- Junctional ectopic tachycardia(JET)
- Atrial flutter(AFL)
- Atrial fibrillation(AF)
- Multifocal AT(MAT)

Reset PVC during tachycardia

HrPVC



— paced wavefront travelling orthodromically

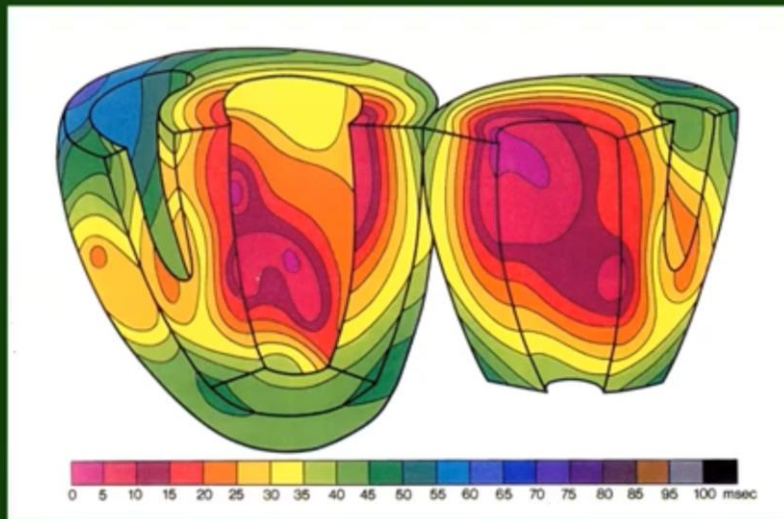
HrPVC



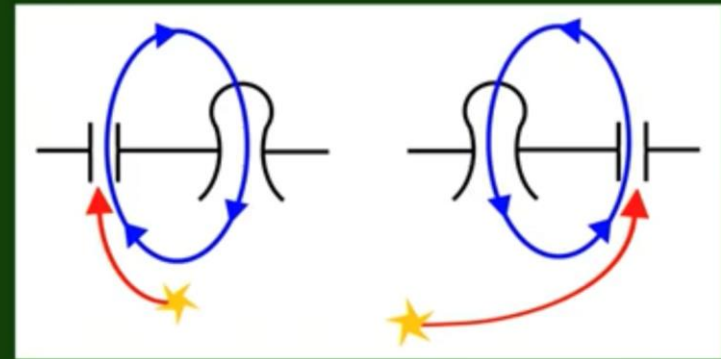
HrPVC



Septal VA conduction time



From: Durrer D et al., *Circulation* 1970; 41: 899-912



Right sided AP
 VA_{SVT}
=
VA starts SVT

Left sided AP
VA starts SVT
=
 $VA_{SVT} + \text{Transseptal conduction time}$
(30-60 msec)

* With AVRT the VA that starts SVT should be within 60 msec of the VA during SVT.

Diagnostic utility of early premature ventricular complexes in differentiating atrioventricular reentrant and atrioventricular nodal reentrant tachycardias



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BACKGROUND His-refractory premature ventricular complexes perturbing a supraventricular tachycardia (SVT) establish the presence of an accessory pathway (AP). Earlier premature ventricular complexes (ErPVCs) may perturb SVTs but are considered nondiagnostic.

OBJECTIVE The purpose of this study was to test the hypothesis that an ErPVC will always show a difference >35 ms in its advancement of the next atrial activation during atrioventricular nodal reentrant tachycardia (AVNRT). During atrioventricular reentrant tachycardia (AVRT), a PVC delivered close to the circuit can result in greater advancement of atrial activation due to retrograde conduction via an AP. Thus, an AP response, defined as ErPVC (H_1S_2) advancing the subsequent atrial activation (A_1-A_2) more than this minimum difference ($A_1A_2 \leq H_1S_2+35$ ms), establishes the presence of an AP.

METHODS Sixty-five consecutive patients with SVT were retrospectively evaluated. ErPVCs were defined when the ventricular pacing stimulus was >35 ms ahead of the His during tachycardia.

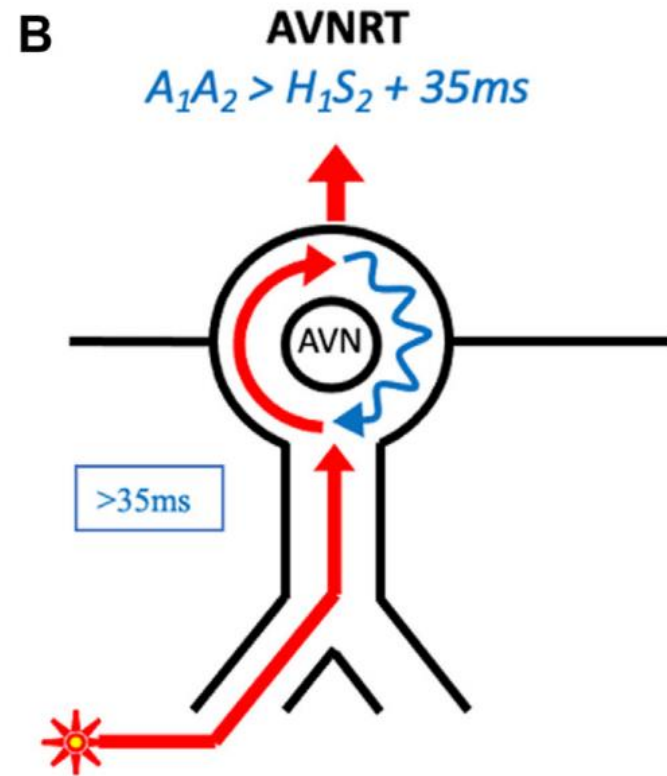
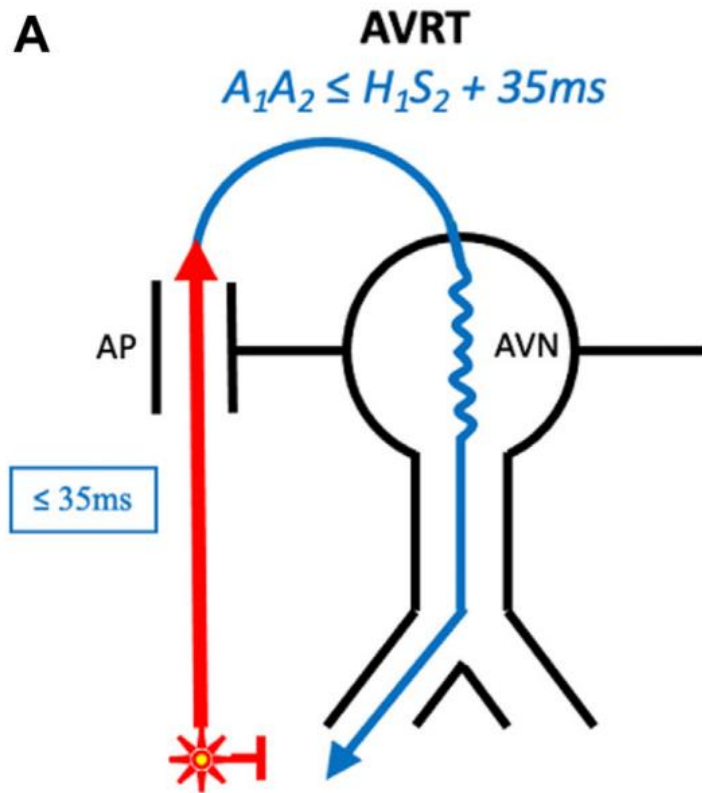
RESULTS Among the 65 cases, 43 were AVNRT and 22 AVRT. Fourteen AVRT cases had an AP response with a mean H_1S_2+35 ms of 336 ± 58 ms and A_1A_2 of 309 ± 51 ms. No AVNRT cases had an AP response. The specificity of an AP response to ErPVC in predicting AVRT was 100%.

CONCLUSION An AP response to PVCs ($A_1A_2 \leq H_1S_2+35$ ms) is 100% specific for the presence of an AP.

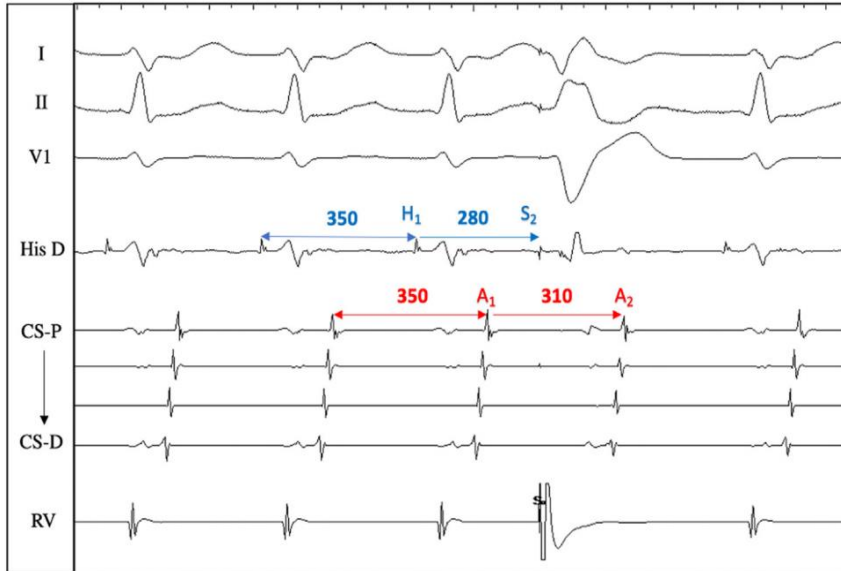
KEY WORDS Accessory pathway; Atrioventricular nodal reentrant tachycardia; Atrioventricular reentrant tachycardia; His-refractory premature ventricular complex; Premature ventricular complexes; Supraventricular tachycardia

(Heart Rhythm 2022;19:1836–1840) © 2022 Heart Rhythm Society. All rights reserved.

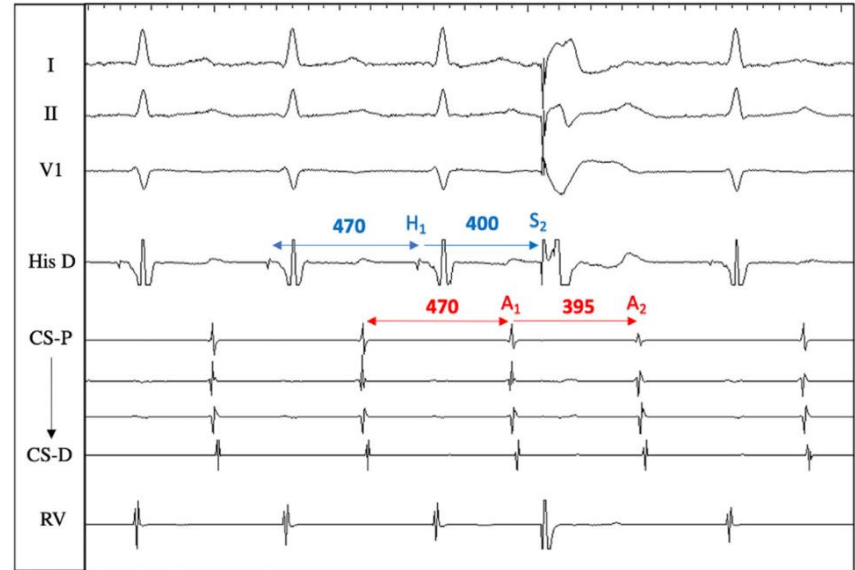
Early PVC



Early PVC



$A1-A2 < H1S2+35ms$
Left-sided accessory pathway



$A1-A2 < H1S2+35ms$
Rt-sided accessory pathway

Differentiating Atrioventricular Reentry Tachycardia and Atrioventricular Node Reentry Tachycardia Using Premature His Bundle Complexes

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BACKGROUND: Current maneuvers for differentiation of atrioventricular node reentry tachycardia (AVNRT) and atrioventricular reentry tachycardia (AVRT) lack sensitivity and specificity for AVRT circuits located away from the site of pacing. We hypothesized that a premature His complex (PHC) will always perturb AVRT because the His bundle is obligatory to the circuit. Further, AVNRT could not be perturbed by a late PHC (≤ 20 ms ahead of the His) due to the retrograde His conduction time. Earlier PHCs can advance the AVNRT circuit but only by a quantity less than the prematurity of the PHC.

METHODS: High-output pacing at the distal His location delivered PHCs. AVRT was predicted when late PHCs perturbed tachycardia or when earlier PHCs led to atrial advancement by an amount equal or greater than the degree of PHC prematurity.

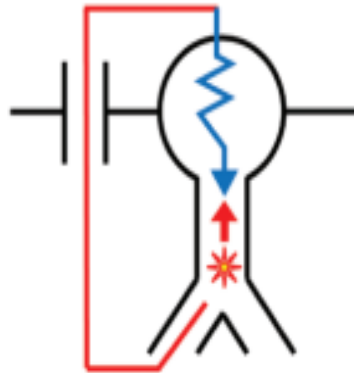
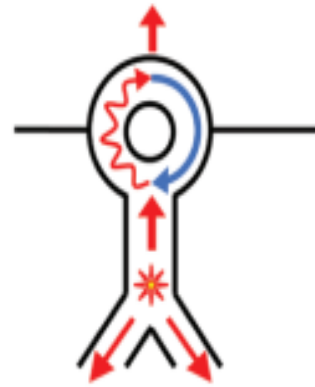
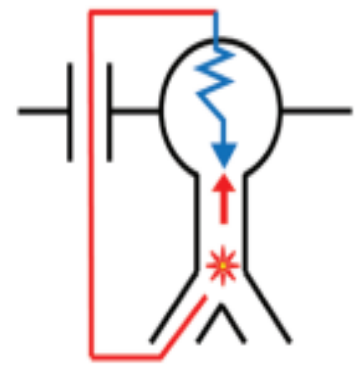
RESULTS: Among the 73 supraventricular tachycardias, the test accurately predicted AVRT ($n=29$) and AVNRT ($n=44$) in all cases. Late PHC advanced the circuit in all 29 AVRTs and none of the AVNRTs (sensitivity and specificity, 100%). With earlier PHCs, the degree of atrial advancement was equal or greater than the PHC prematurity in 26/29 AVRTs and none of the AVNRTs (90% sensitivity and 100% specificity). The mean prematurity of the PHC required to perturb AVNRT was 48 ms (range, 28–70 ms) and the advancement less than the prematurity of the PHC (mean, 32 ms; range, 18–54 ms).

CONCLUSIONS: The responses to PHCs distinguished AVRT and AVNRT with 100% specificity and sensitivity.

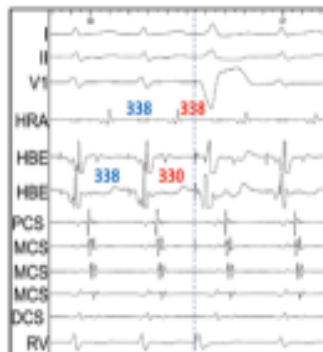


VISUAL OVERVIEW: A visual overview is available for this article.

Key Words: Bundle of His ■ electrophysiology ■ tachycardia, supraventricular

A**Late PHC**AVNRT
No effectAVRT
Perturbed**B****Early PHC**AVNRT
 $\Delta PHC > \Delta A_1A_2$ AVRT
 $\Delta PHC = \Delta A_1A_2$ **C**

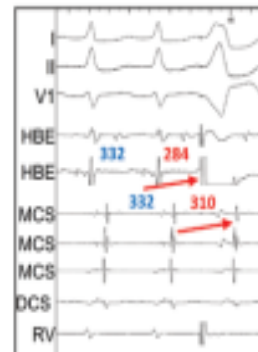
PVC



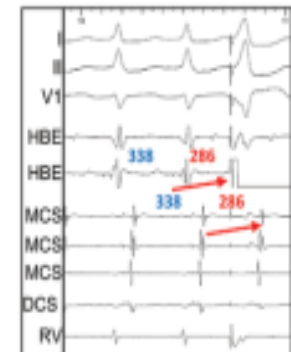
PHC

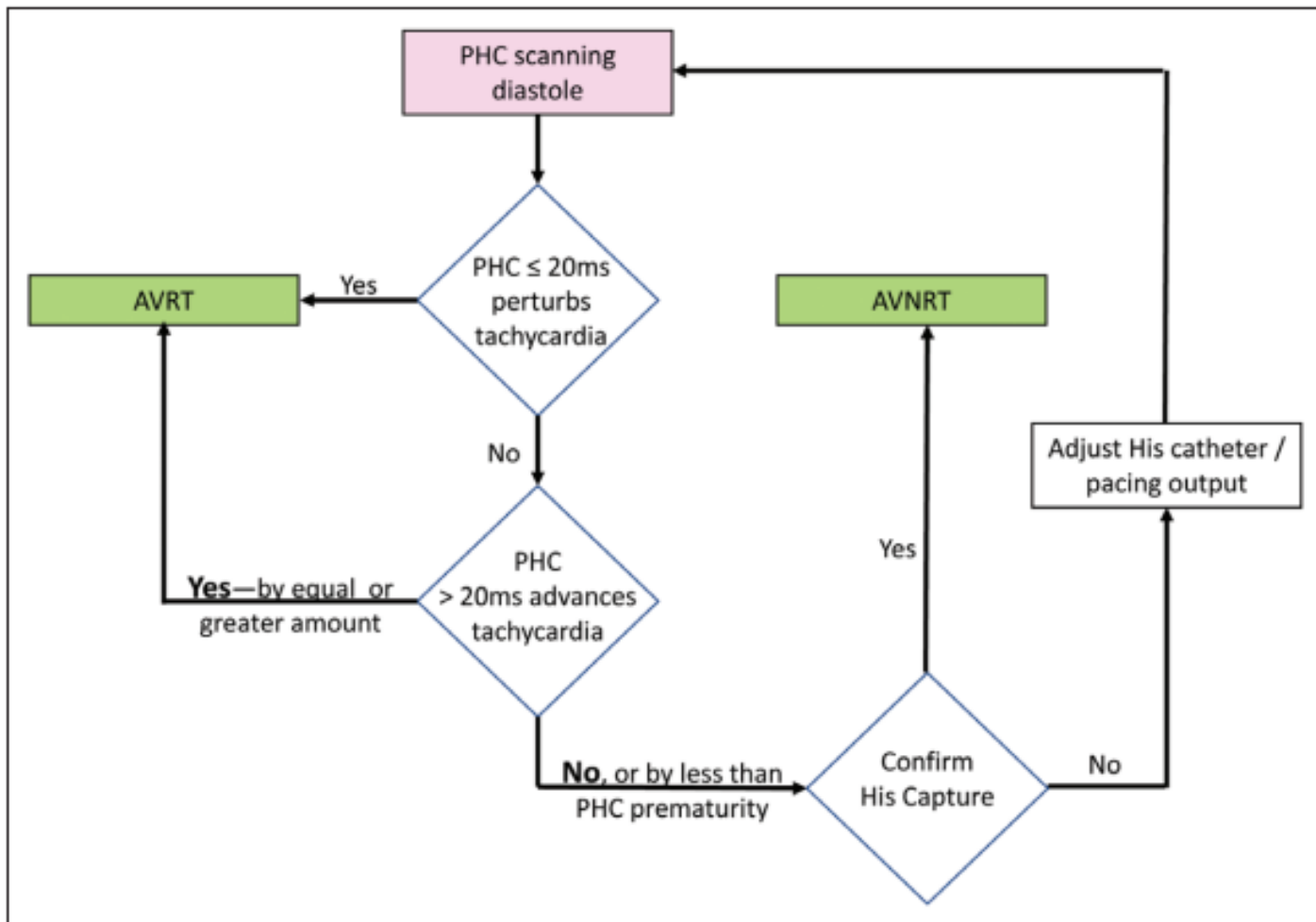
**D**

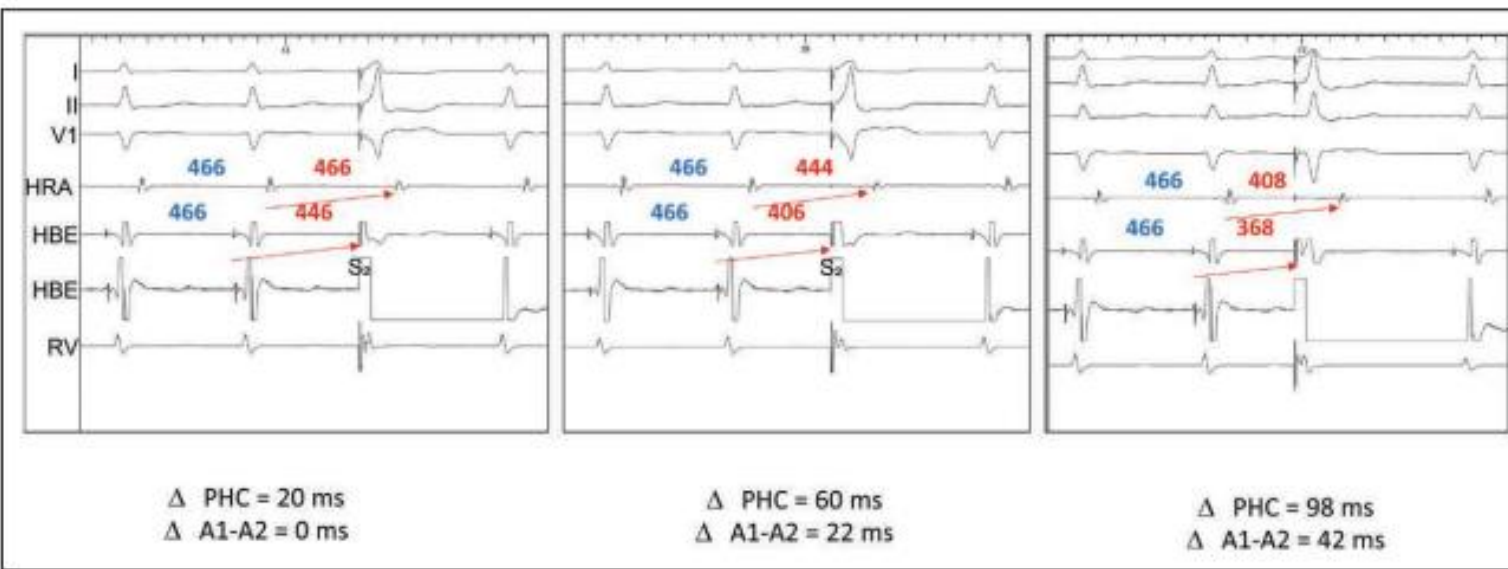
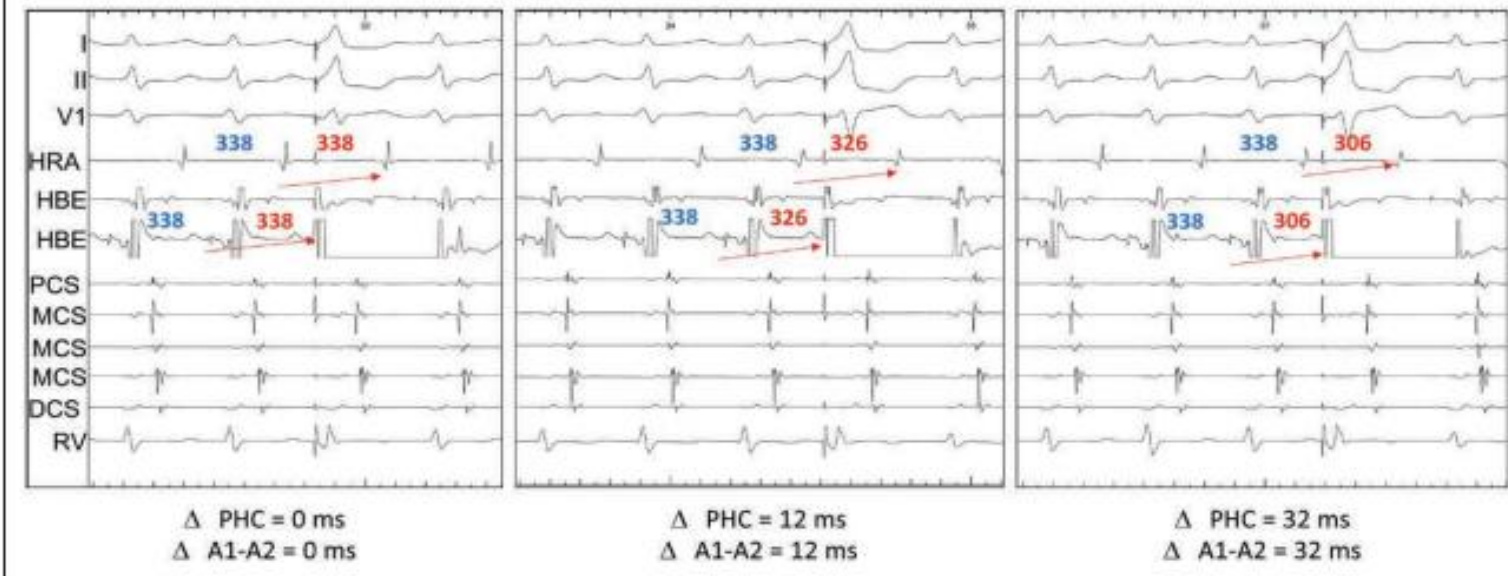
PVC



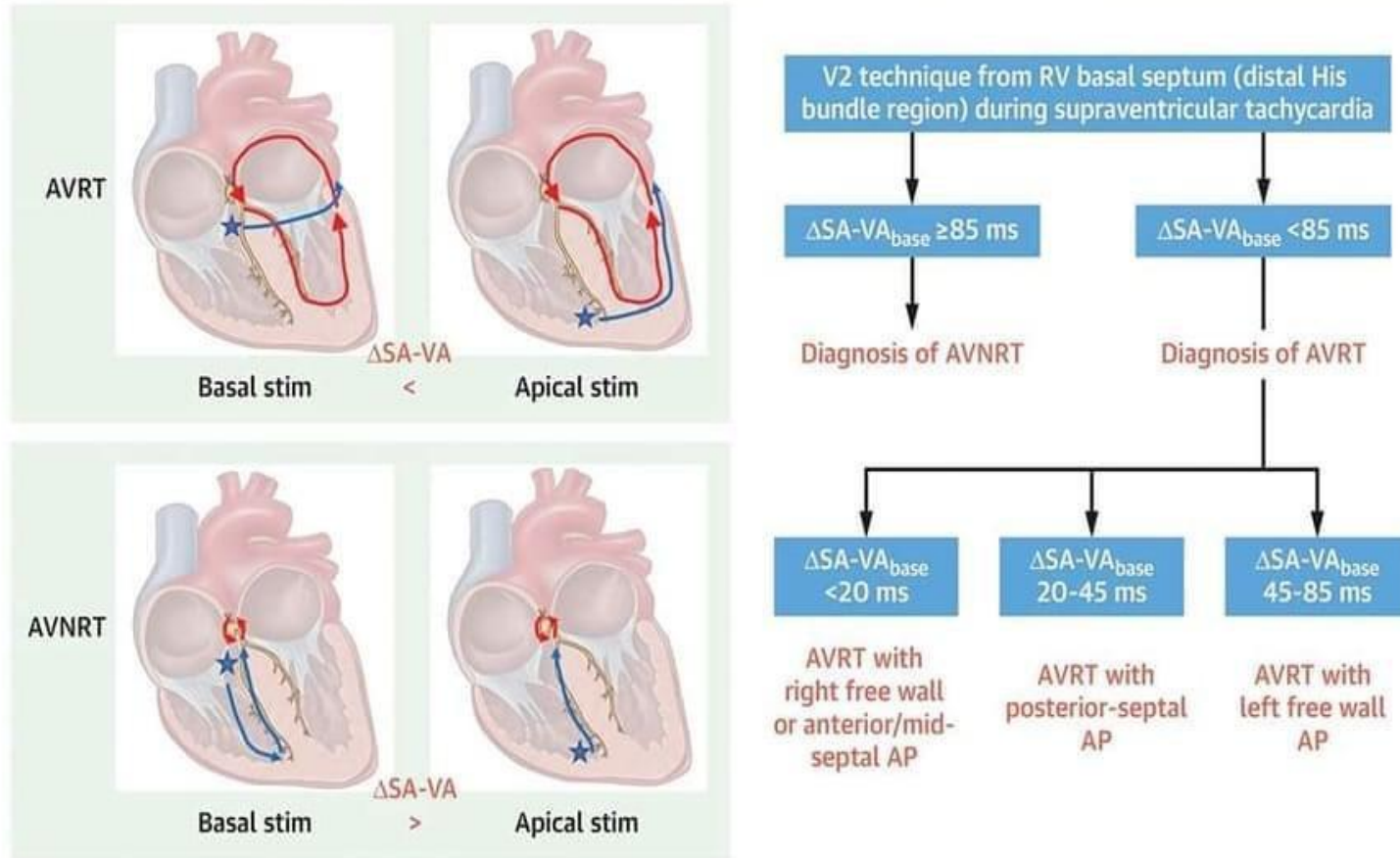
PHC







CENTRAL ILLUSTRATION: Significance of the $\Delta SA-VA_{base}$

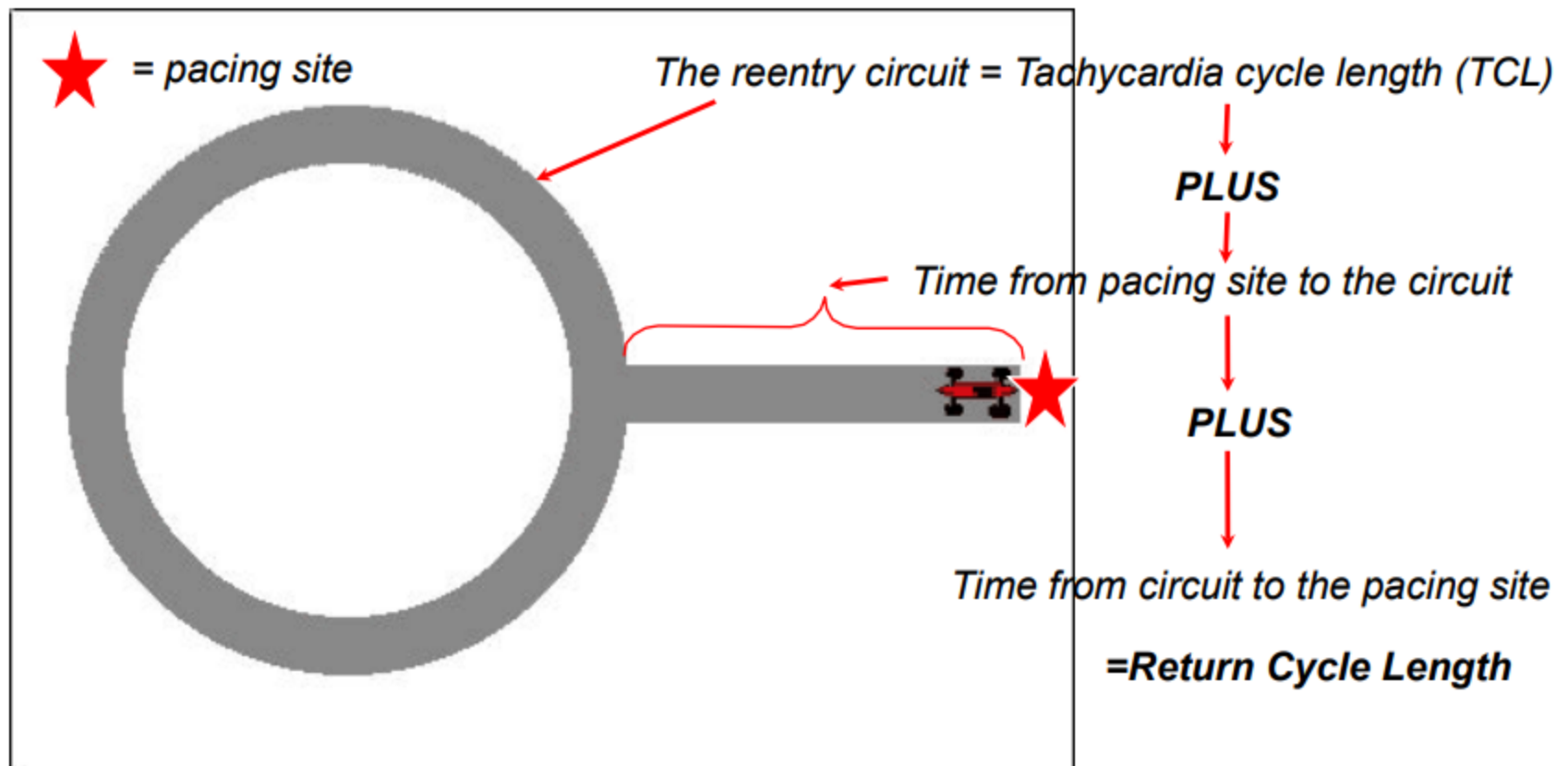


Higuchi S, et al. J Am Coll Cardiol EP. 2023;9(2):219-228.

OVP during tachycardia

Reentrant Circuits and Pacing Maneuvers – Entrainment – Post Pacing Interval

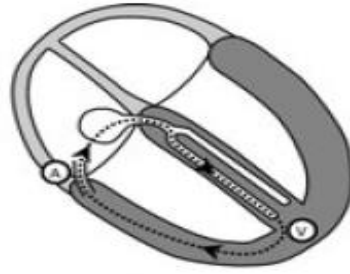
- This is known as the Return Cycle Length, or the Post Pacing Interval (PPI) and it is the time it takes for the tachycardia to resume after pacing is stopped.
- If the pacing occurred outside of the tachycardia circuit, the time it takes for the tachycardia to resume will be longer than if it were inside the circuit.



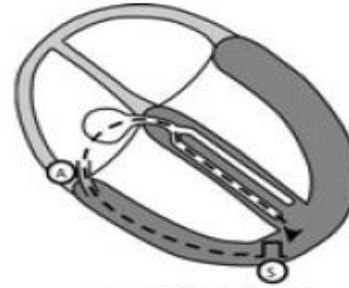
$$\text{Return cycle length} = (\text{Time from pacing site}) \times 2 + \text{TCL}$$

Post Pacing Interval(PPI)

ORT



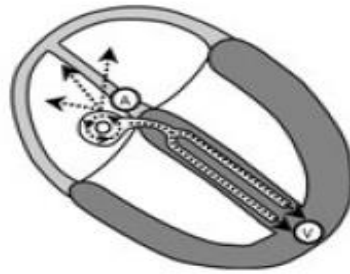
SVT circuit



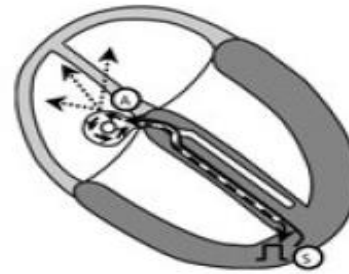
Post-VOP circuit

PPI-TCL < 115
SA-VA < 85

AVNRT



SVT circuit

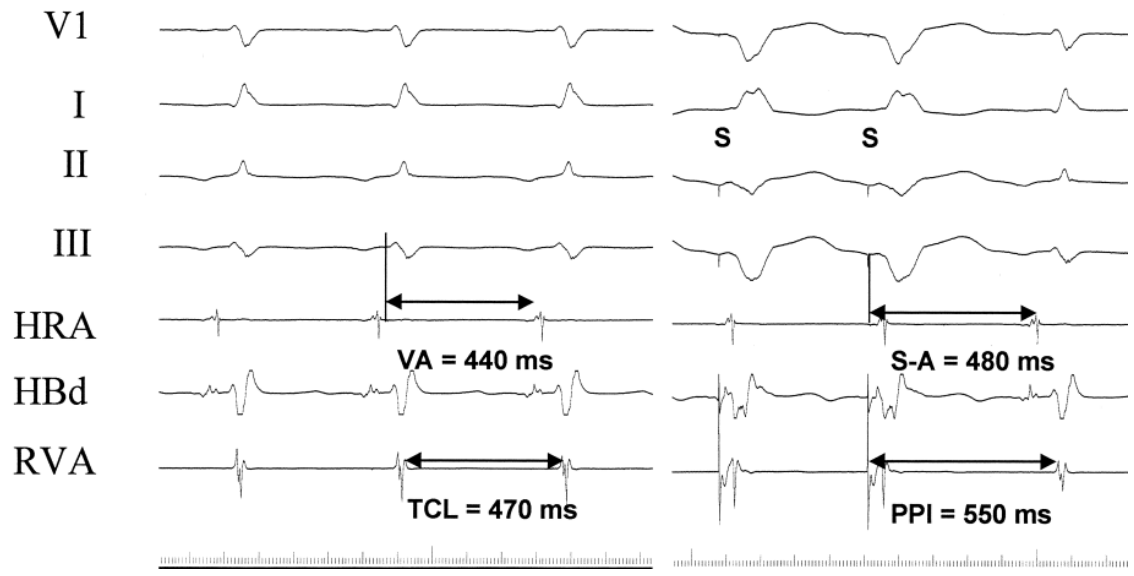
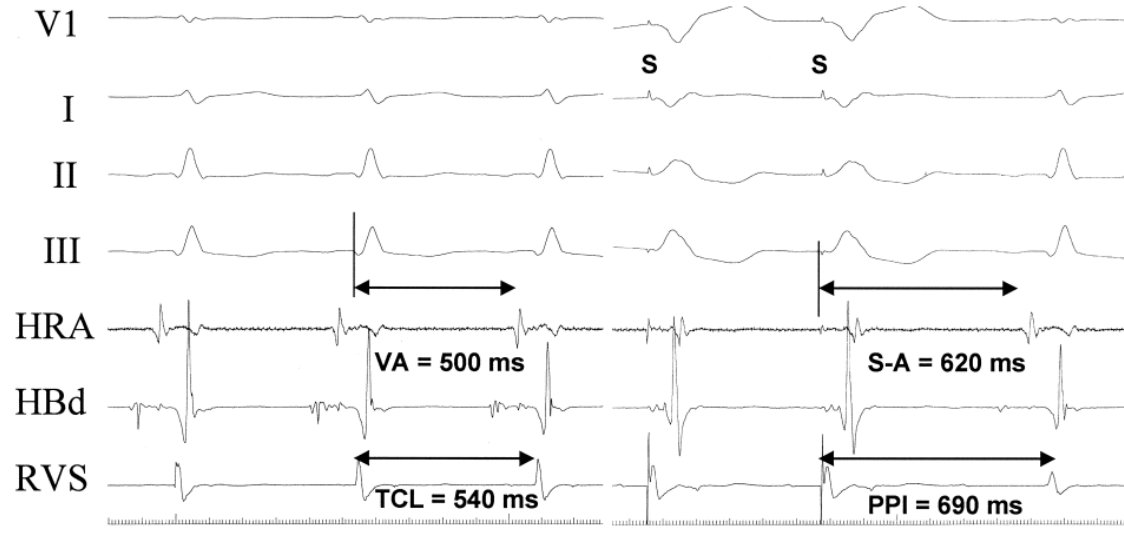


Post-VOP circuit

PPI-TCL > 115
SA-VA > 85

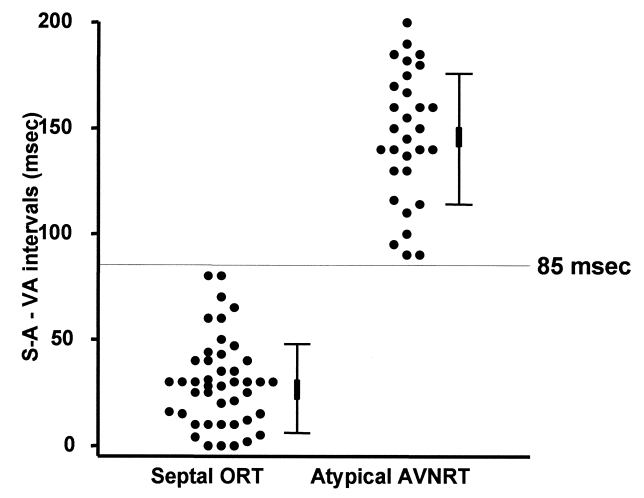
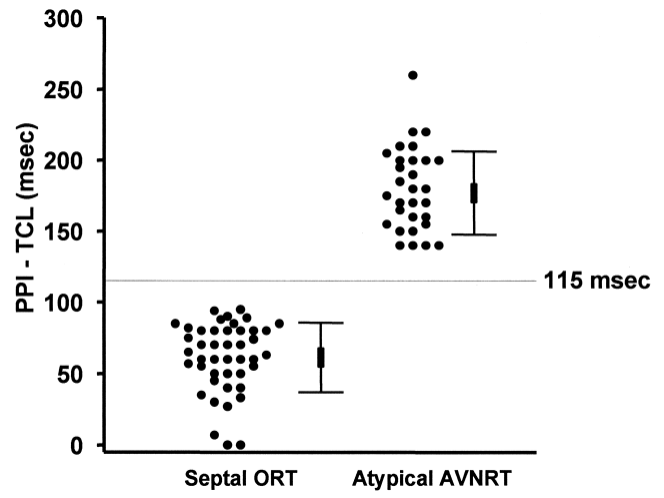
PPI TCL was 115 ms and the Stim to A V to A was 85 ms.

AVNRT or AVRT

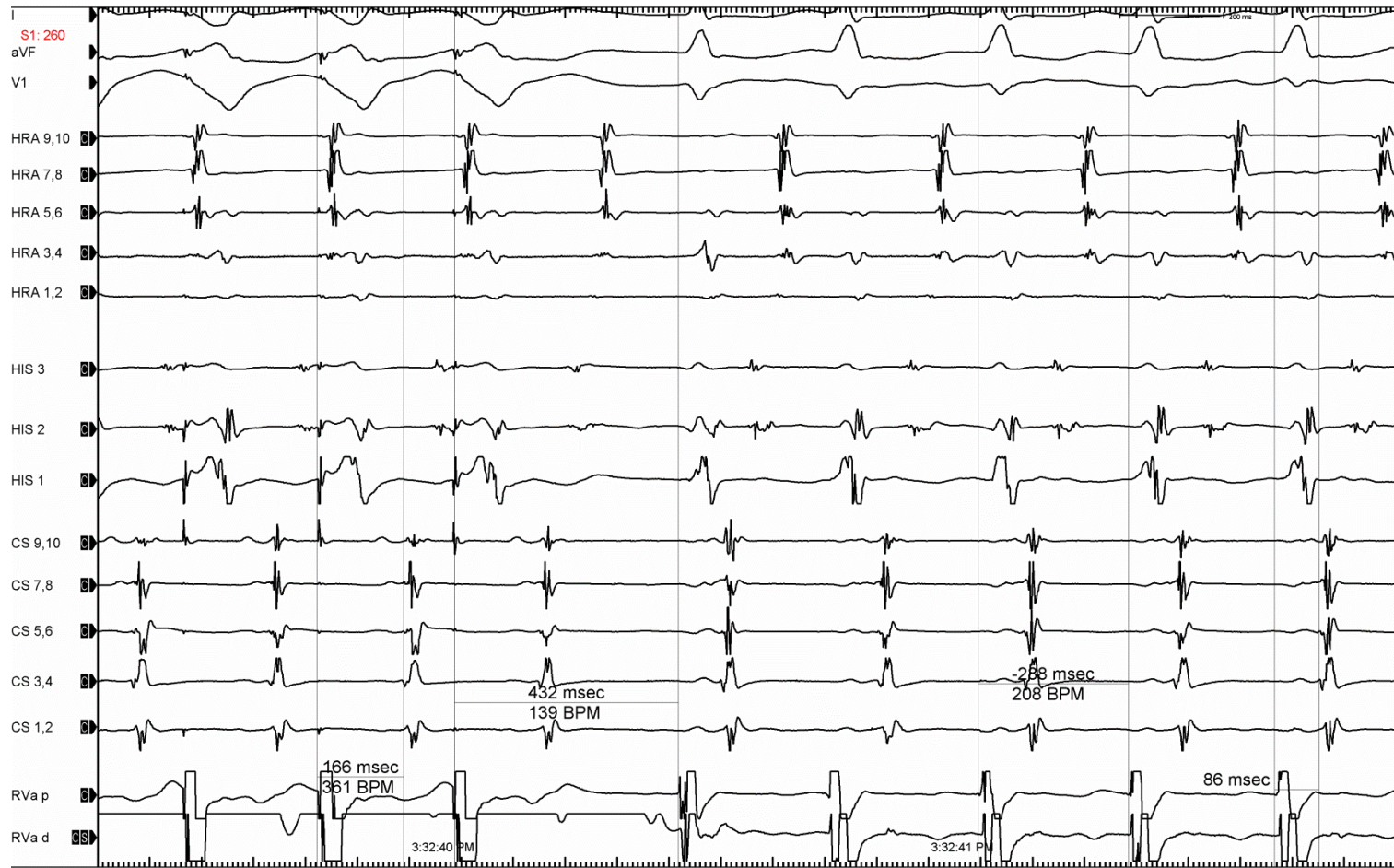


Atypical AVNRT
(n = 30)

ORT Using a
Septal AP (n = 44)



Lt side AP

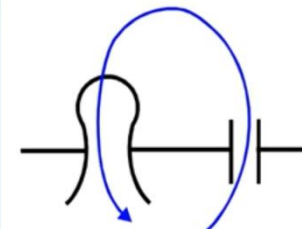


PPI-TCL=164 PA-VA=80

VAAV response

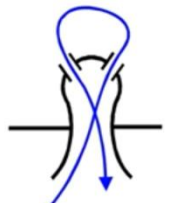


AVRT



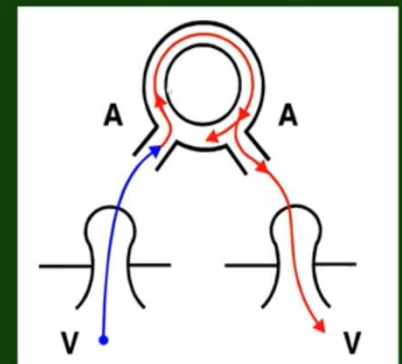
V - A - V

AVNRT



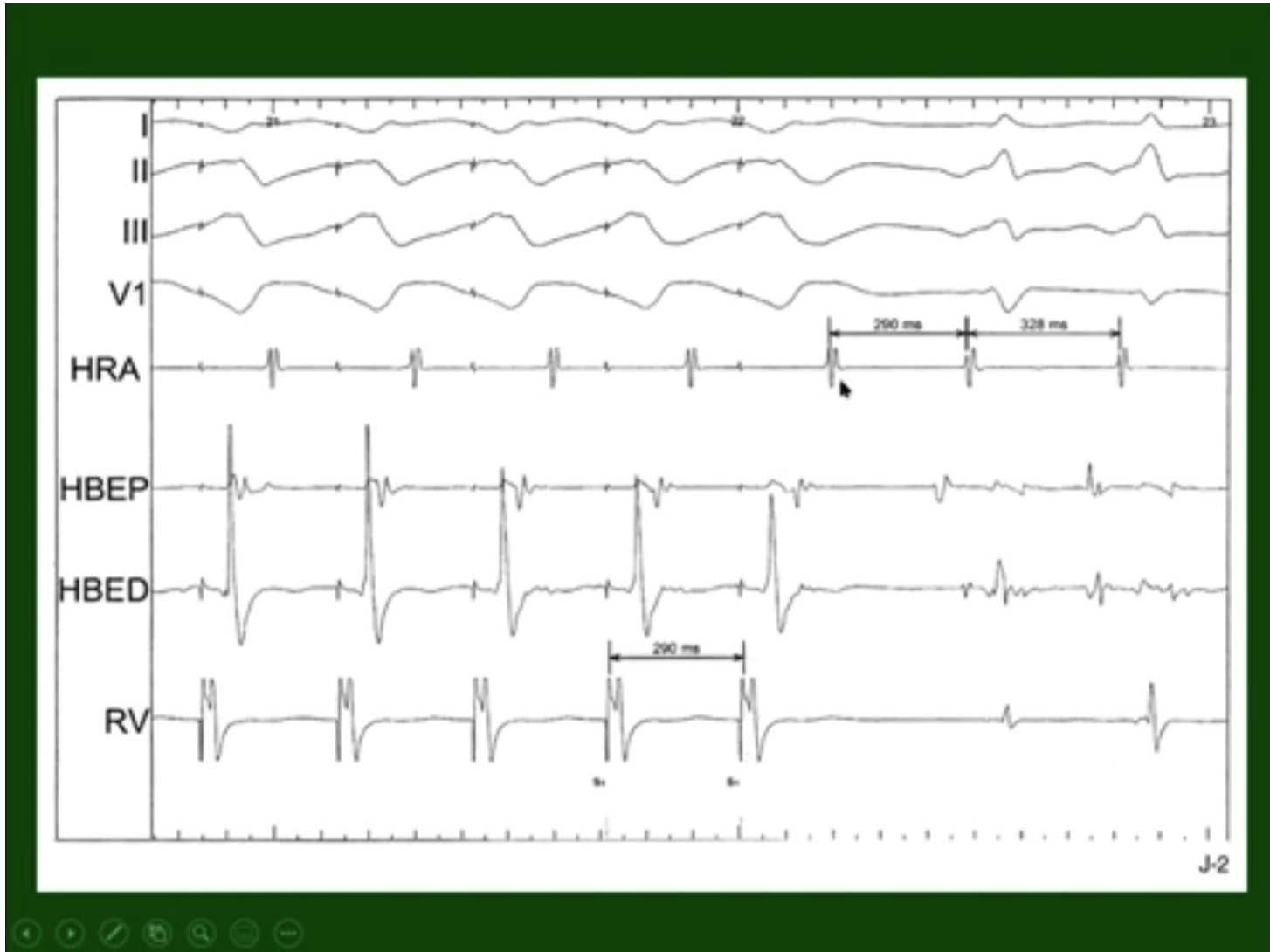
V - A - V

Atrial Tachycardia



V - A - V

Pseudo VAAV response



summary

- Basal pacing can have a more dramatic effect
- Early PVC=A1-A2 and H1S2+35ms
- PHC to be efficient in advance

경청해 주셔서 감사합니다!!