

# EGM Tracing 2: Interesting ECG Tracing Cases 1-4



**Akihiko Nogami**

University of Tsukuba, Japan



# Korean Heart Rhythm Society COI Disclosure

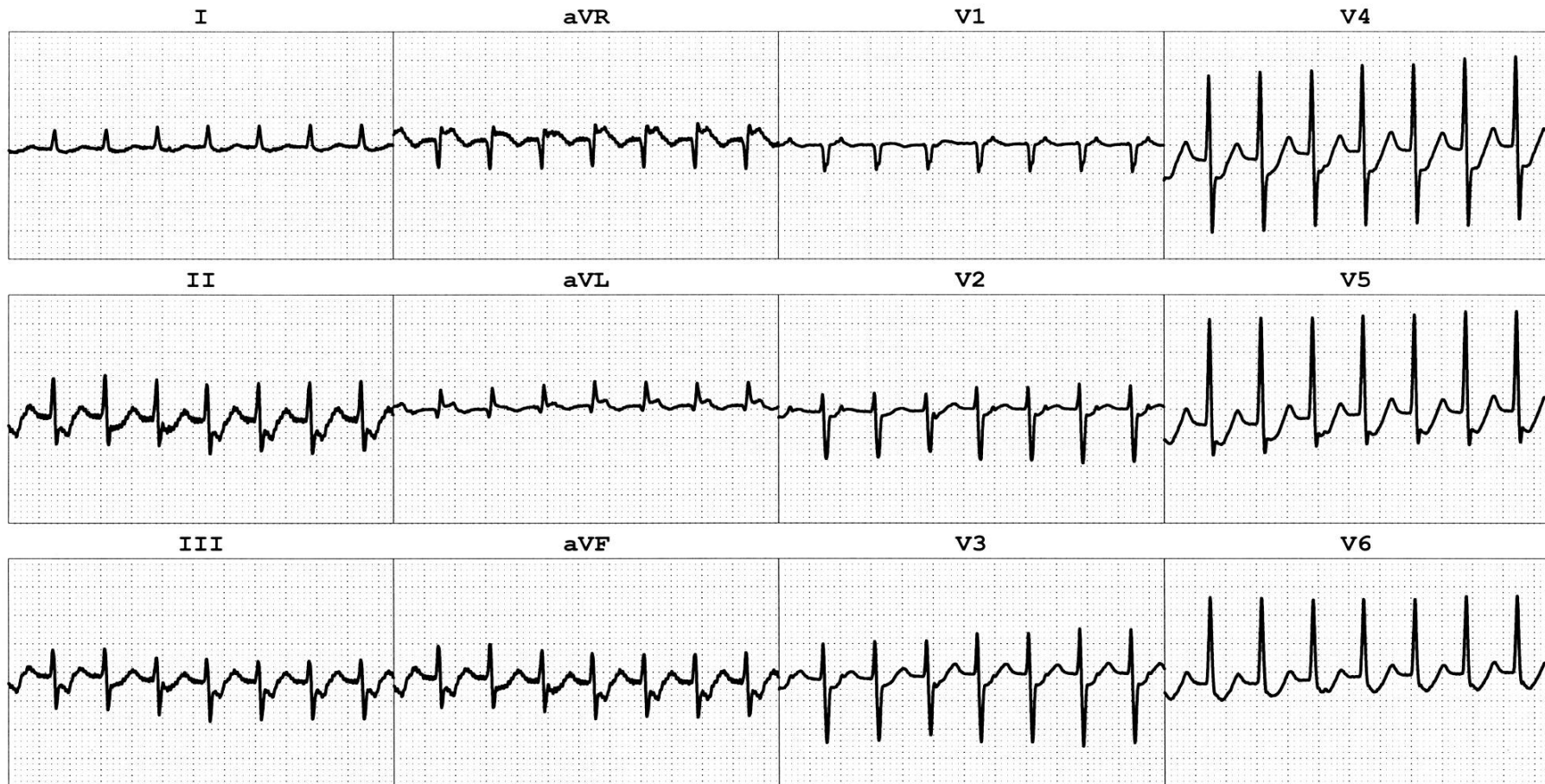
*Akihiko Nogami:*

Relationships with commercial interests:

- Grants/Research Support:  
Medtronic, DVx
- Speakers Bureau/Honoraria:  
Daiichi Sankyo, Abbott, Biosense Webster



# Case 1: 70M with Narrow QRS tachycardia



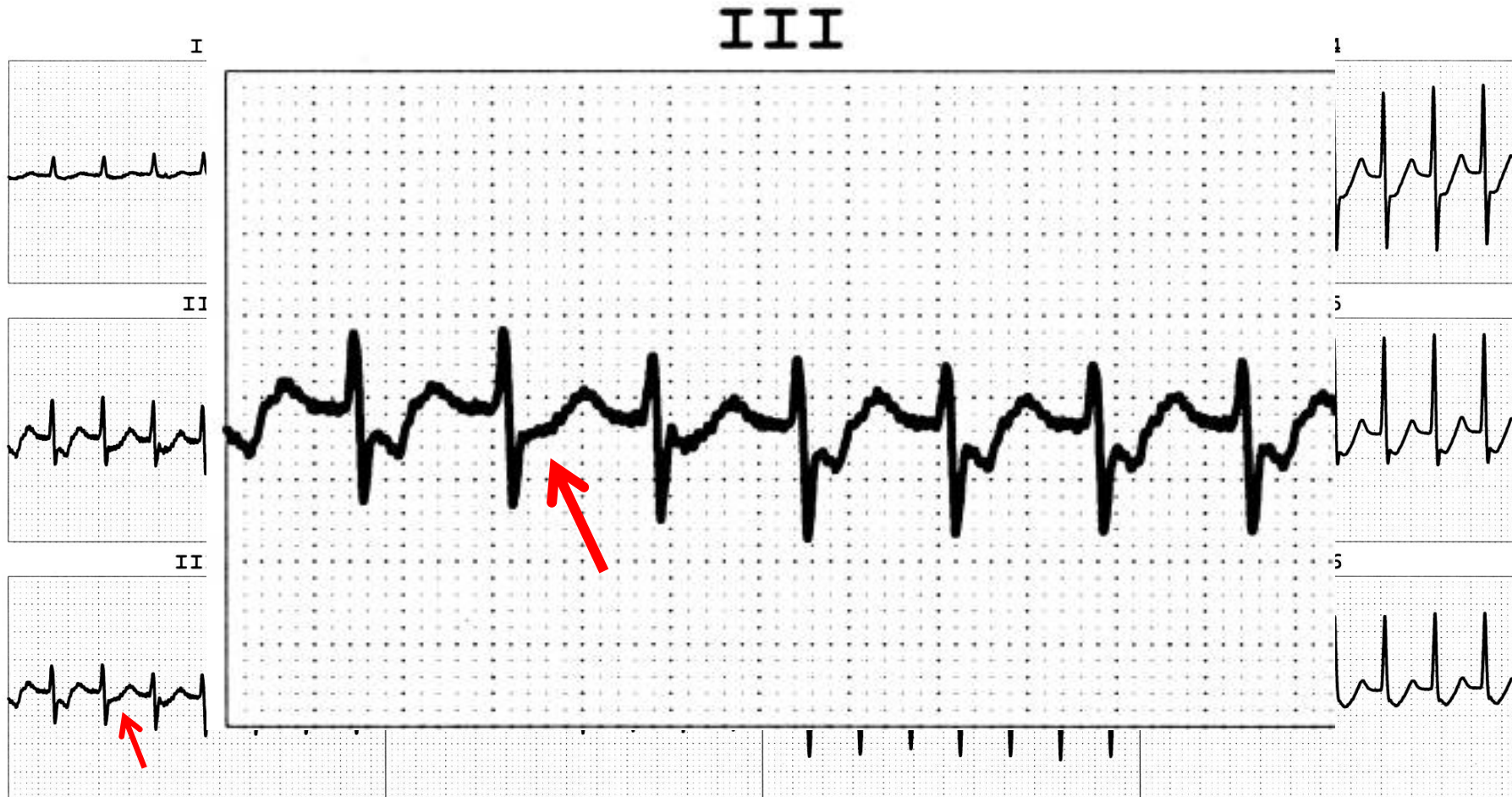


Q: What is the most likely diagnosis?

1. AT
2. AVNRT
3. AVRT (ORT)
4. Junctional tachycardia
5. Others
6. I don't know



# Case 1: 70M with Narrow QRS tachycardia





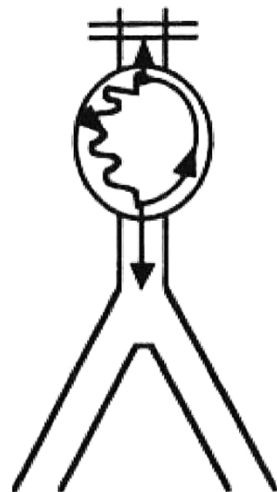
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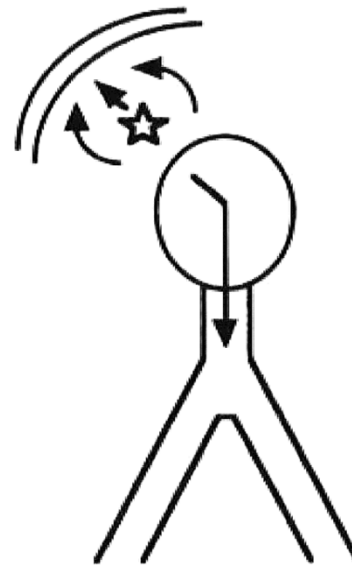


# SVT with VA Block: Differential Diagnosis

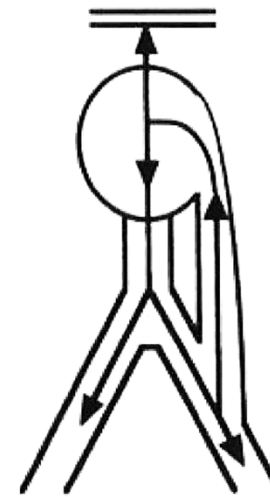
- AVNRT with upper common pathway (UCP)
- Non-reentrant junctional tachycardia
- AVRT (ORT) using a concealed nodo-ventricular or nodo-fascicular pathway as the retrograde limb
- Intra-Hisian reentry



**AVNRT**



**JT**



**N-F**



# SVT with VA Block: Differential Diagnosis

**TABLE 1**  
Criteria for Differential Diagnosis in Narrow Complex Tachycardia with Ventriculoatrial Block

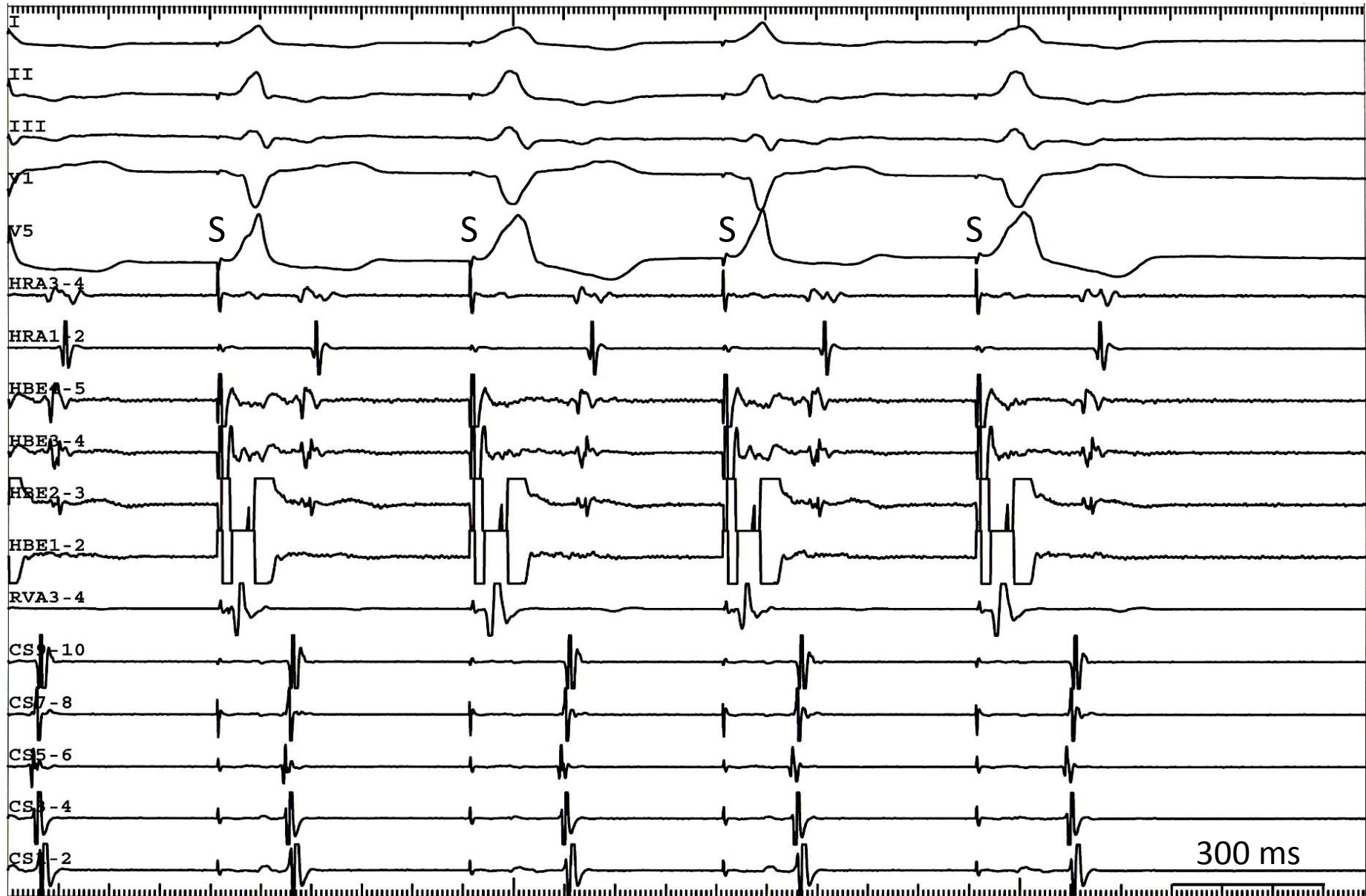
	<b>Automatic JT</b>	<b>NV or NF Tachycardia</b>	<b>AVNRT</b>
Initiation with critical AH delay	Absent	Often present	Present
Initiation with “double fire” response (single AE, two ventricles)	Absent	Often present	Rare
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Advancement of the next His with VE on refractory His	Absent	Often present	Absent
Changes in tachycardia cycle length with BBB appearance	Absent	Often present	Absent
Preexcitation	Absent	Often present	Absent

AE = atrial extrastimulus; JT = junctional tachycardia; NF = nodofascicular; NV = nodoventricular; VE =ventricular extrastimulus





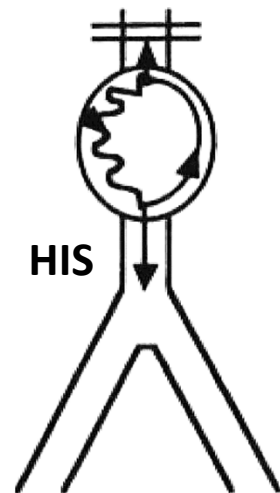
# Para-His Pace: No HELP



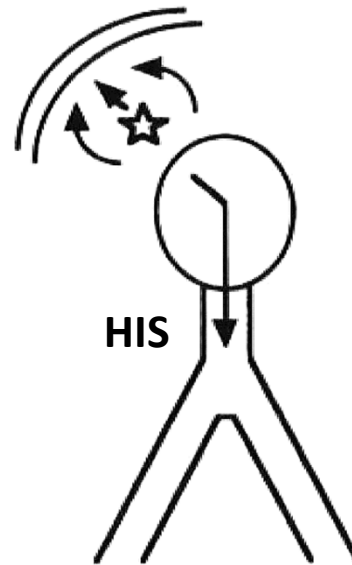


# SVT with VA Block: Differential Diagnosis

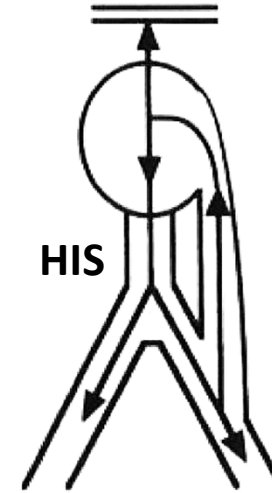
- AVNRT with upper common pathway (UCP)
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**AVNRT**



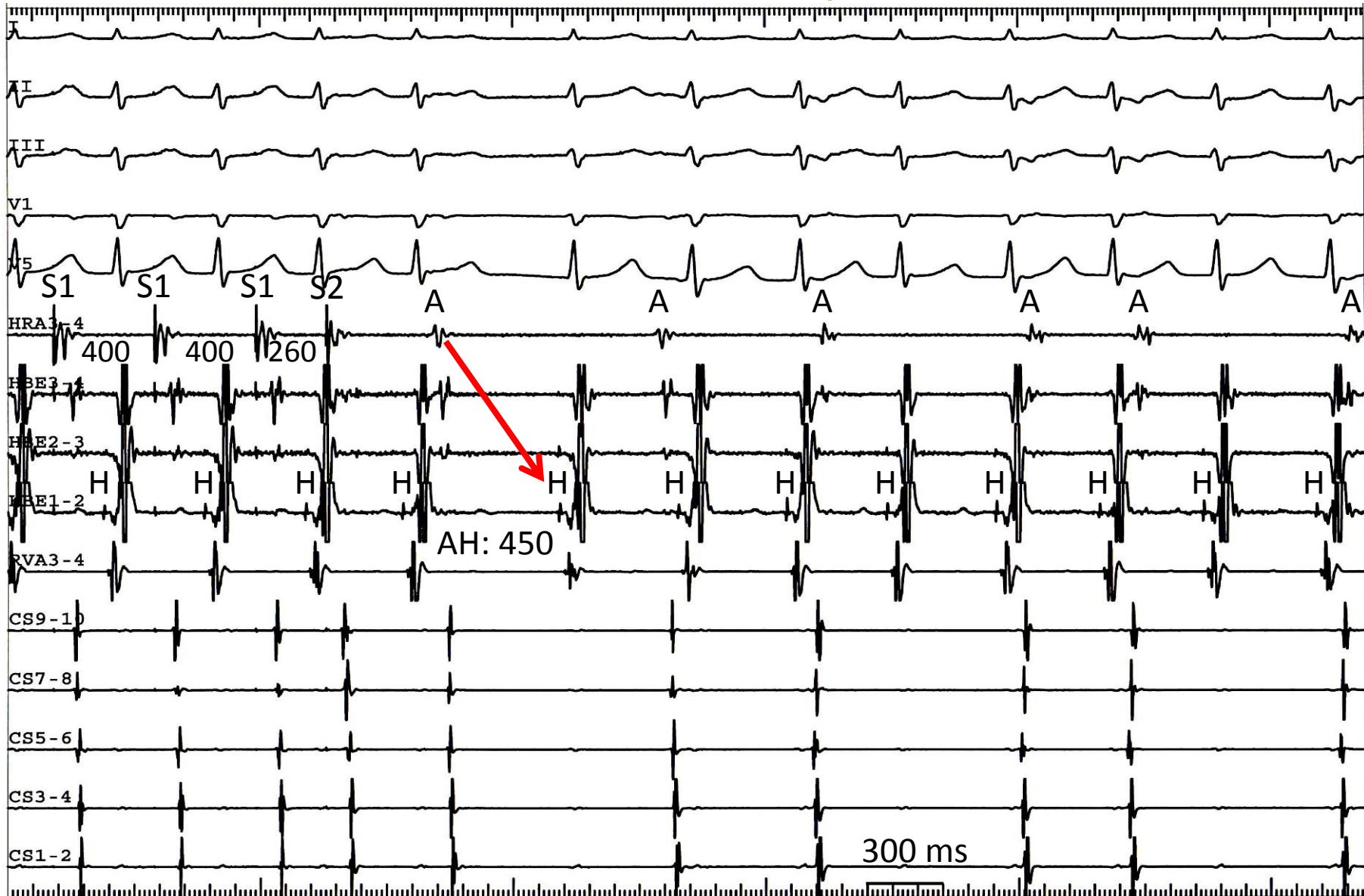
**JT**



**N-F**



# Initiation of Tachycardia



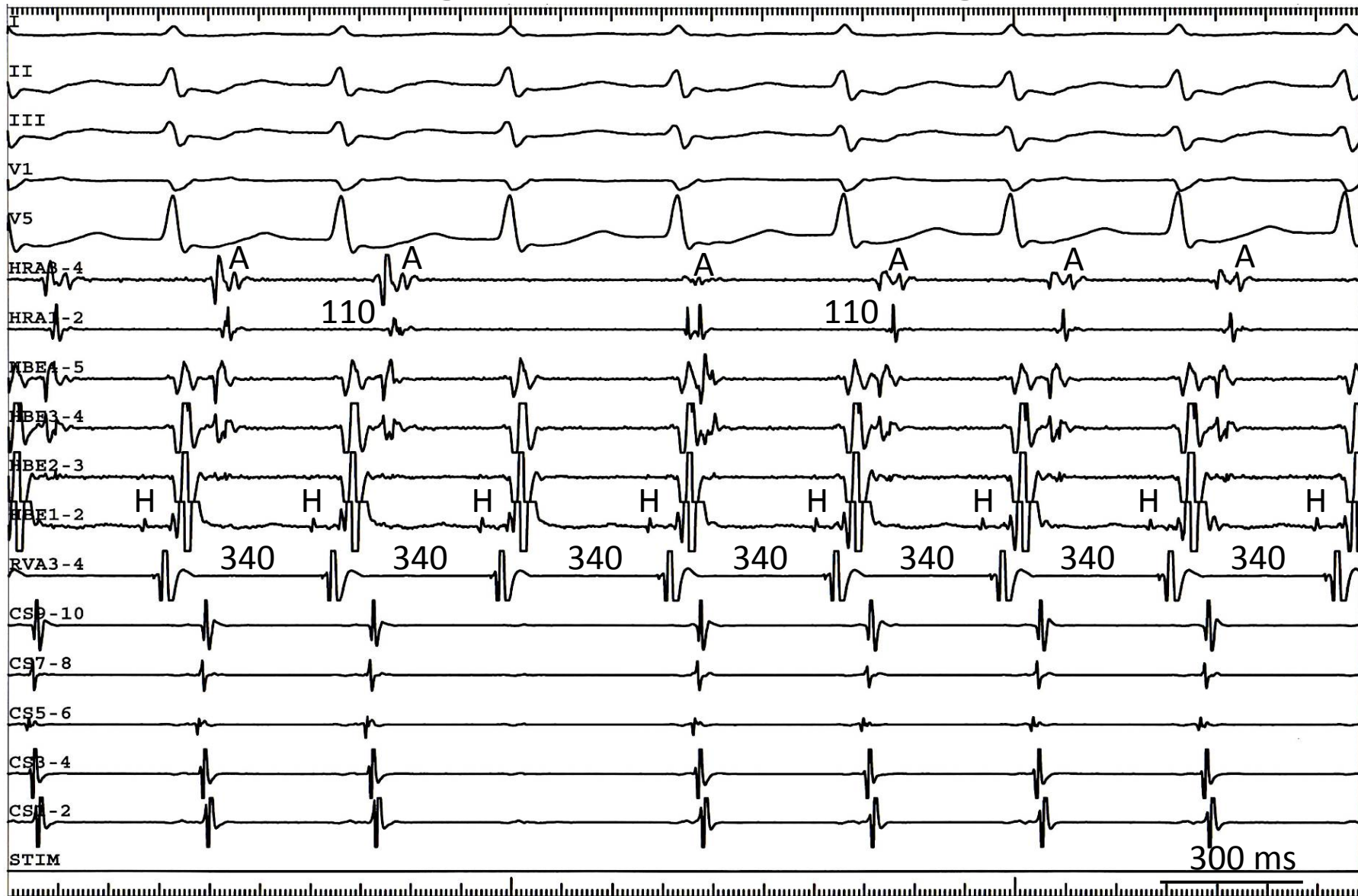


Q: What is the most likely diagnosis?

1. AT
2. AVNRT
3. AVRT (ORT)
4. Junctional tachycardia
5. Others
6. I don't know



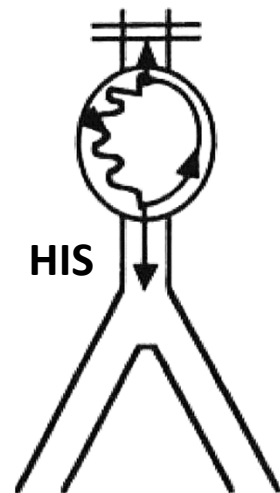
# Retrograde Block during SVT



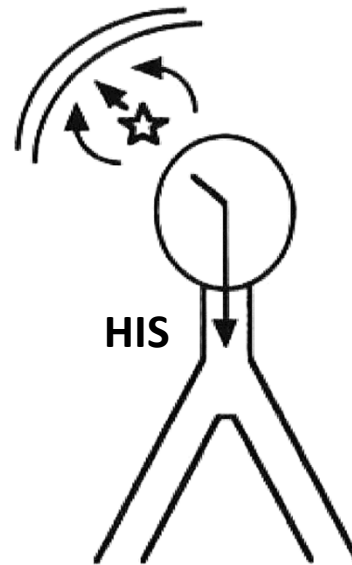


# SVT with VA Block: Differential Diagnosis

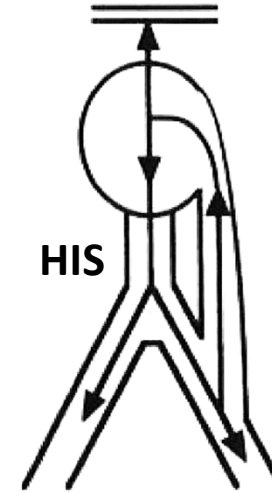
- AVNRT with upper common pathway (UCP)
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**AVNRT**



**JT**



**N-F**



# SVT with VA Block: Differential Diagnosis

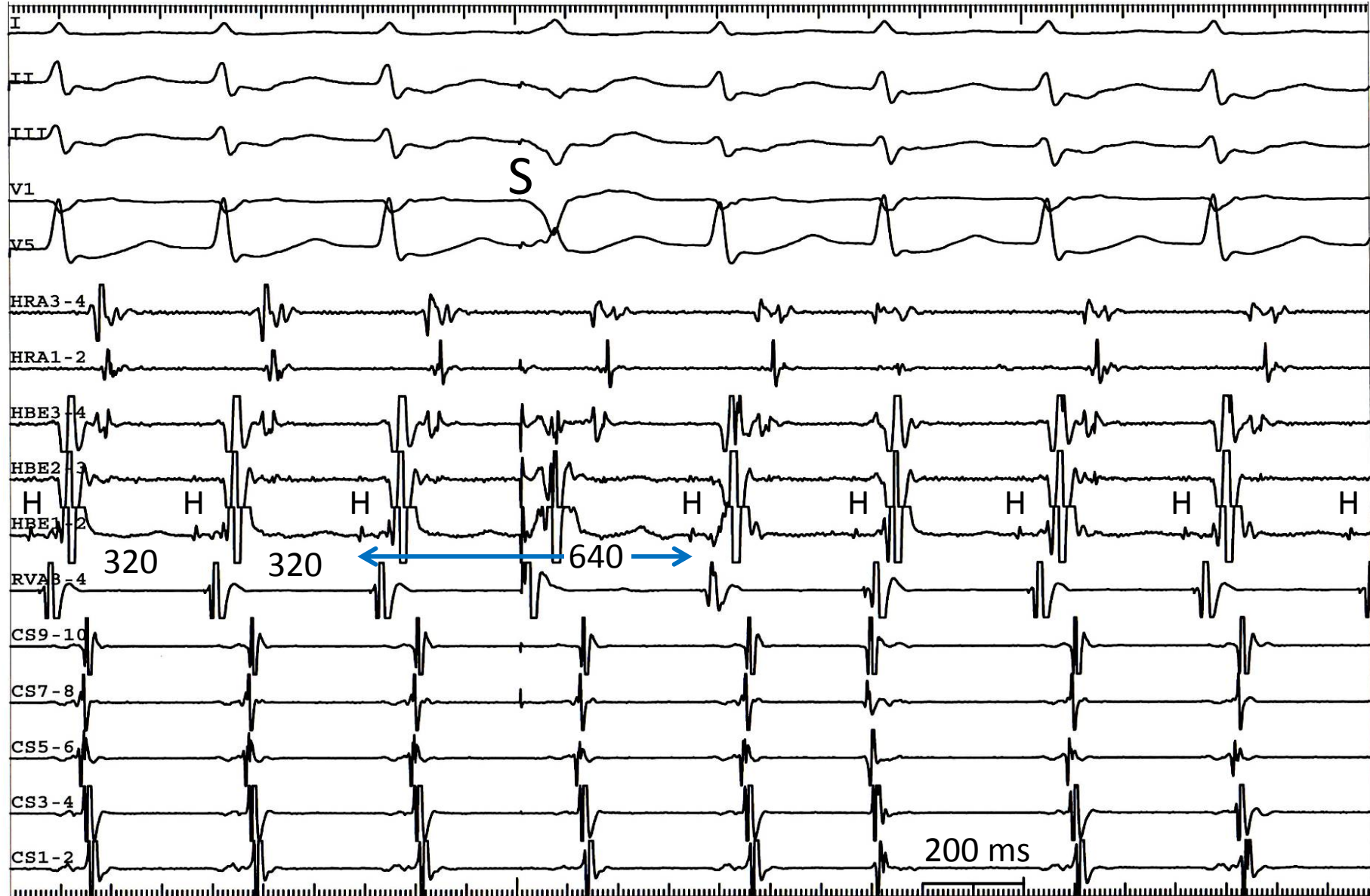
**TABLE 1**  
Criteria for Differential Diagnosis in Narrow Complex Tachycardia with Ventriculoatrial Block

	<b>Automatic JT</b>	<b>NV or NF Tachycardia</b>	<b>AVNRT</b>
Initiation with critical AH delay	Absent	Often present	Present
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AE = atrial extrastimulus; JT = junctional tachycardia; NF = nodofascicular; NV = nodoventricular; VE =ventricular extrastimulus



# V on His







## Q: What is the most likely diagnosis?

1. AF
- 2. AVNRT**
3. AVRT (ORT)
4. Junctional tachycardia
5. Others
6. I don't know



## Q: What is the most likely diagnosis?

1. AF
- 2. AVNRT with UCP Block**
3. AVRT (ORT)
4. Junctional tachycardia
5. Others
6. I don't know

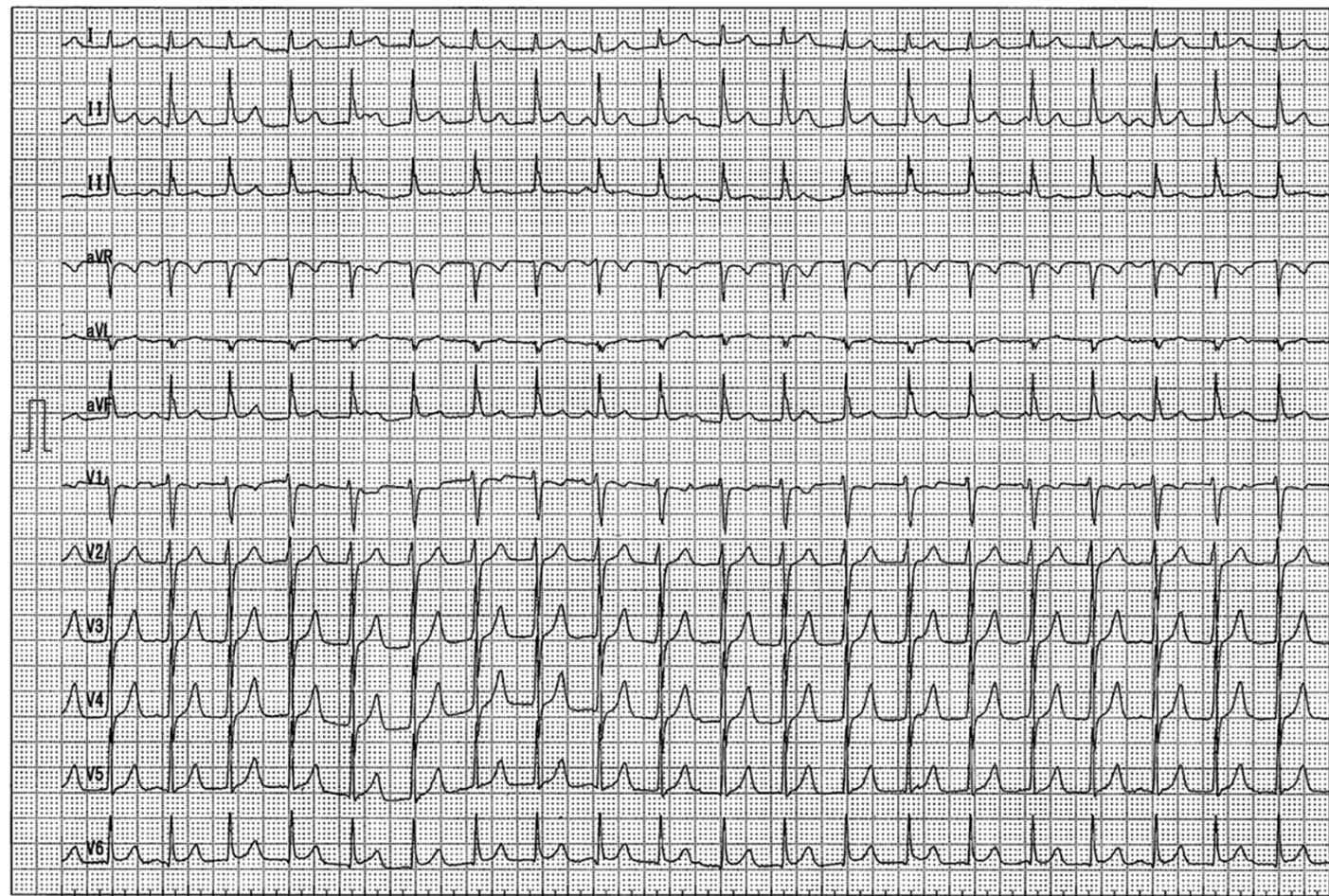
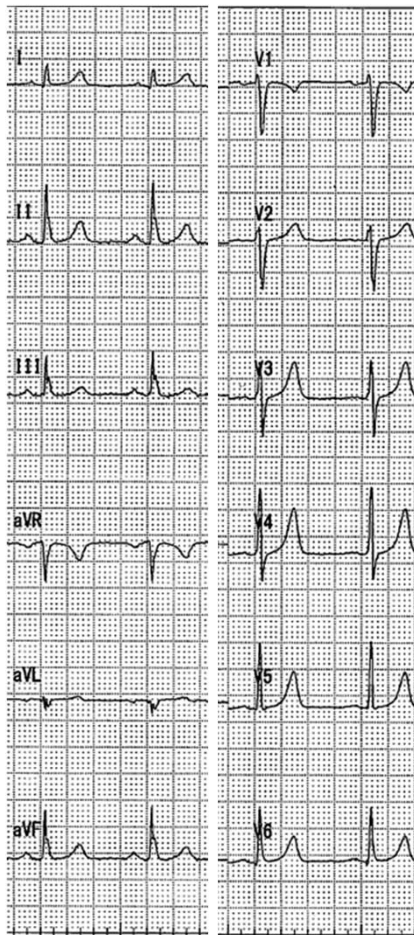




# Case 2: 39F with Narrow QRS tachycardia

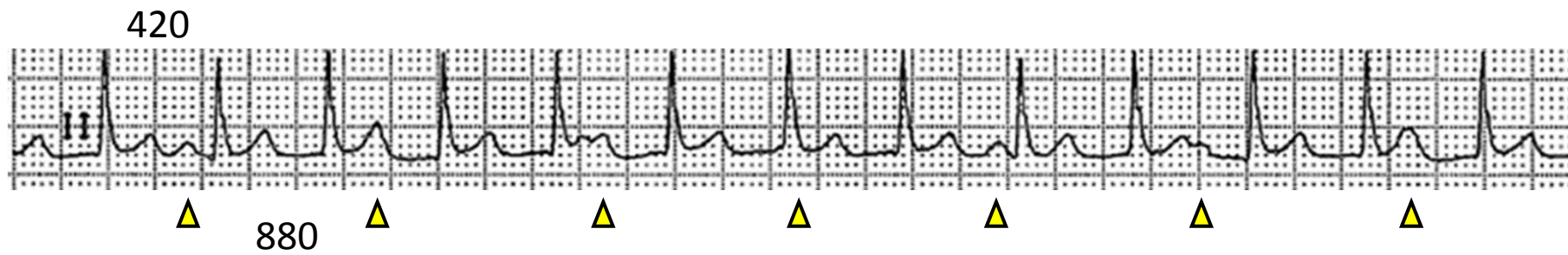
Sinus Rhythm

SVT (CL: 480 ms)



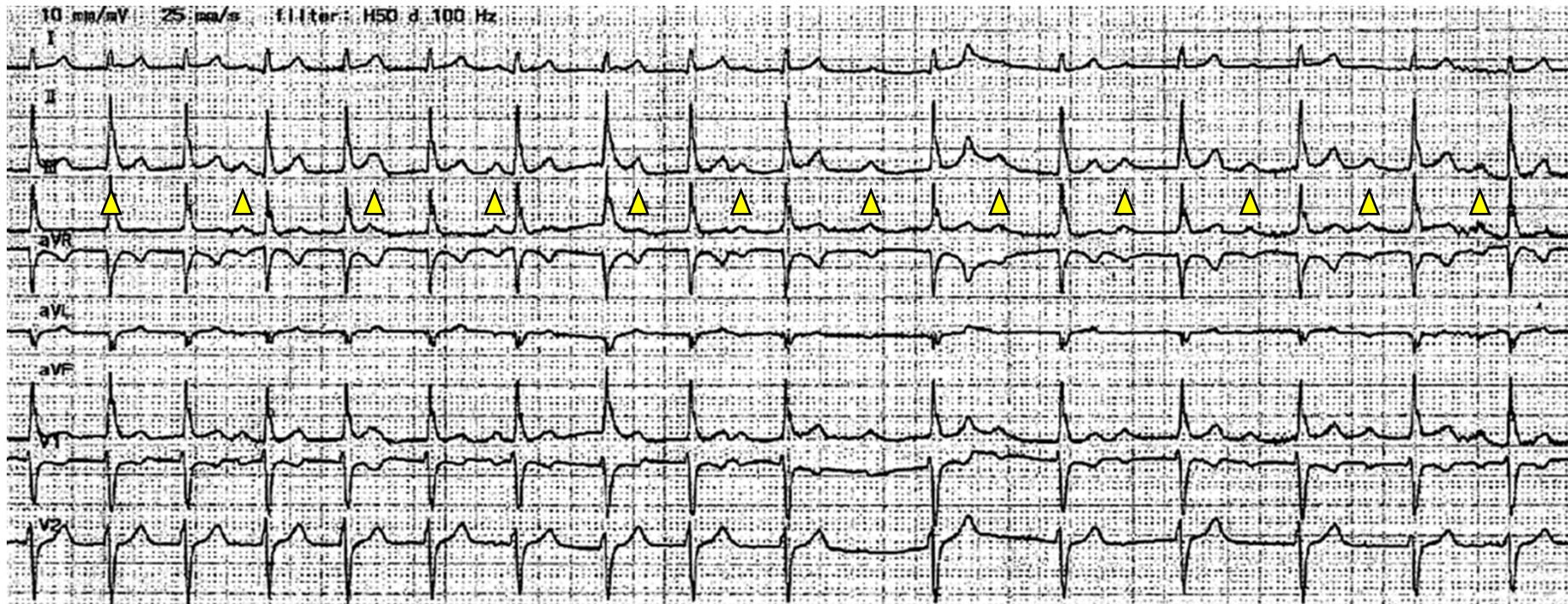


# AV Dissociation



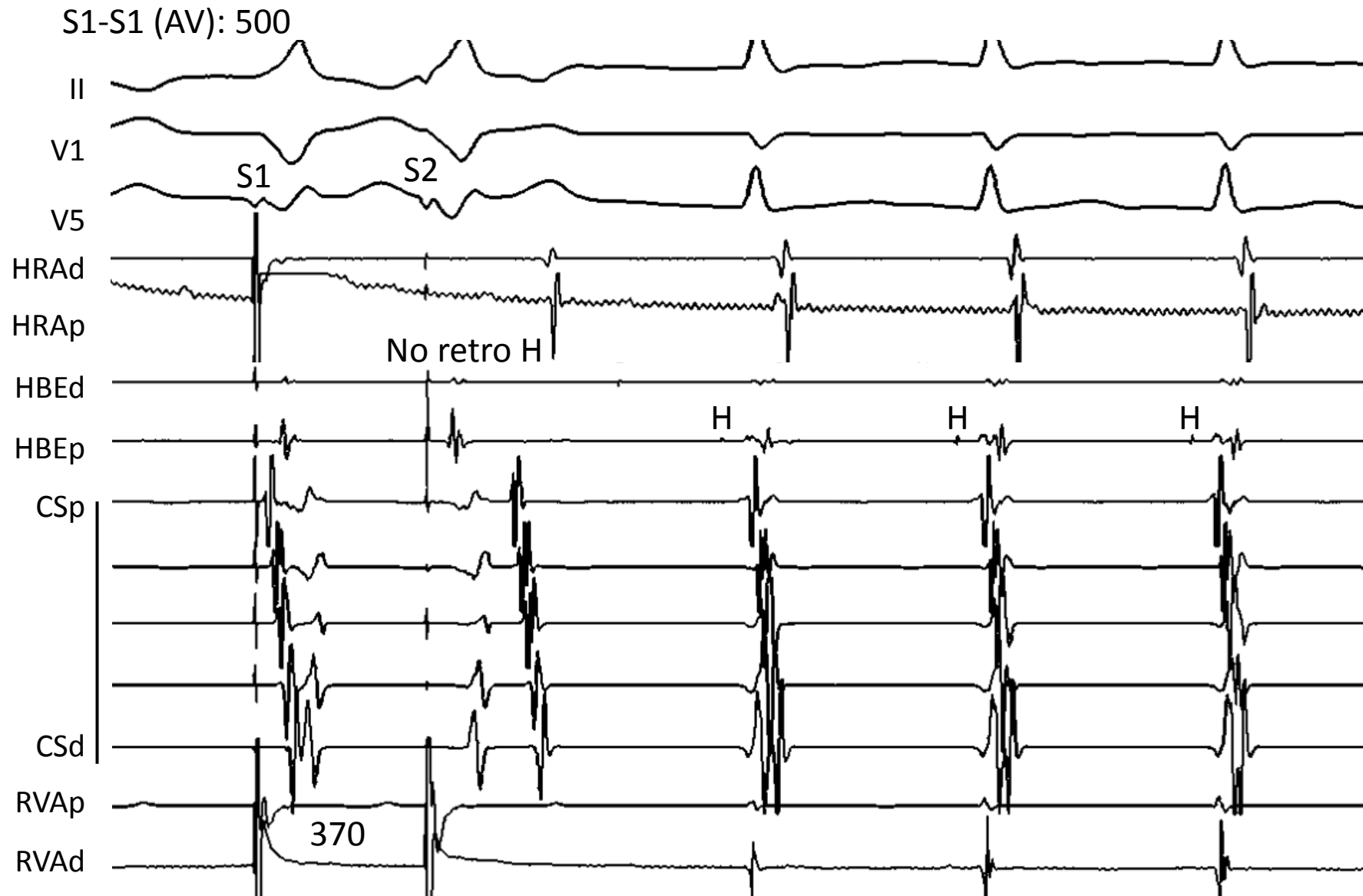


# Adenosine Triphosphate 20 mg Bolus





# Initiation of SVT by PVS





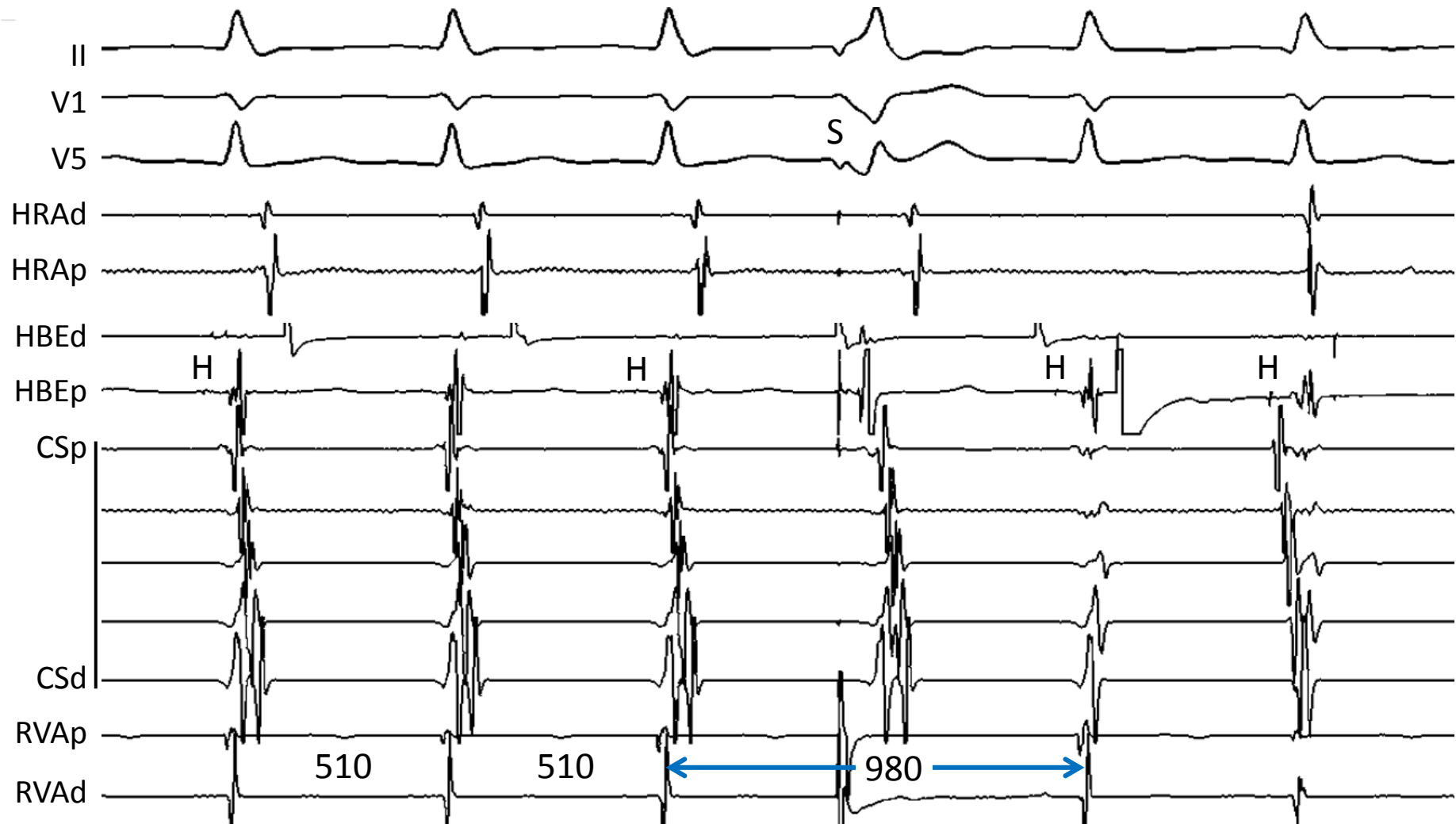
# Wenckebach VA Block during SVT







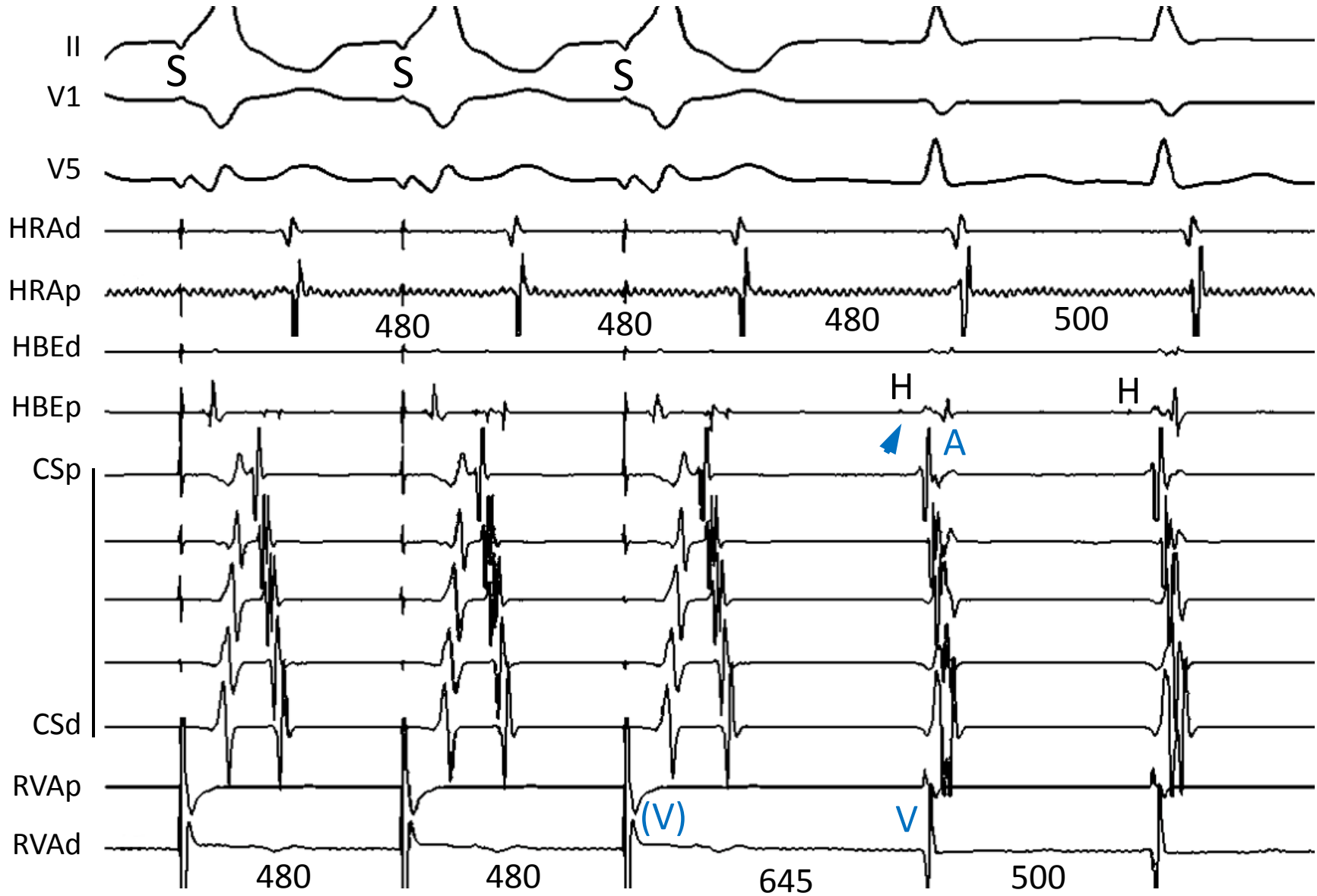
## Advancement of the Next His with VE on Refractory His

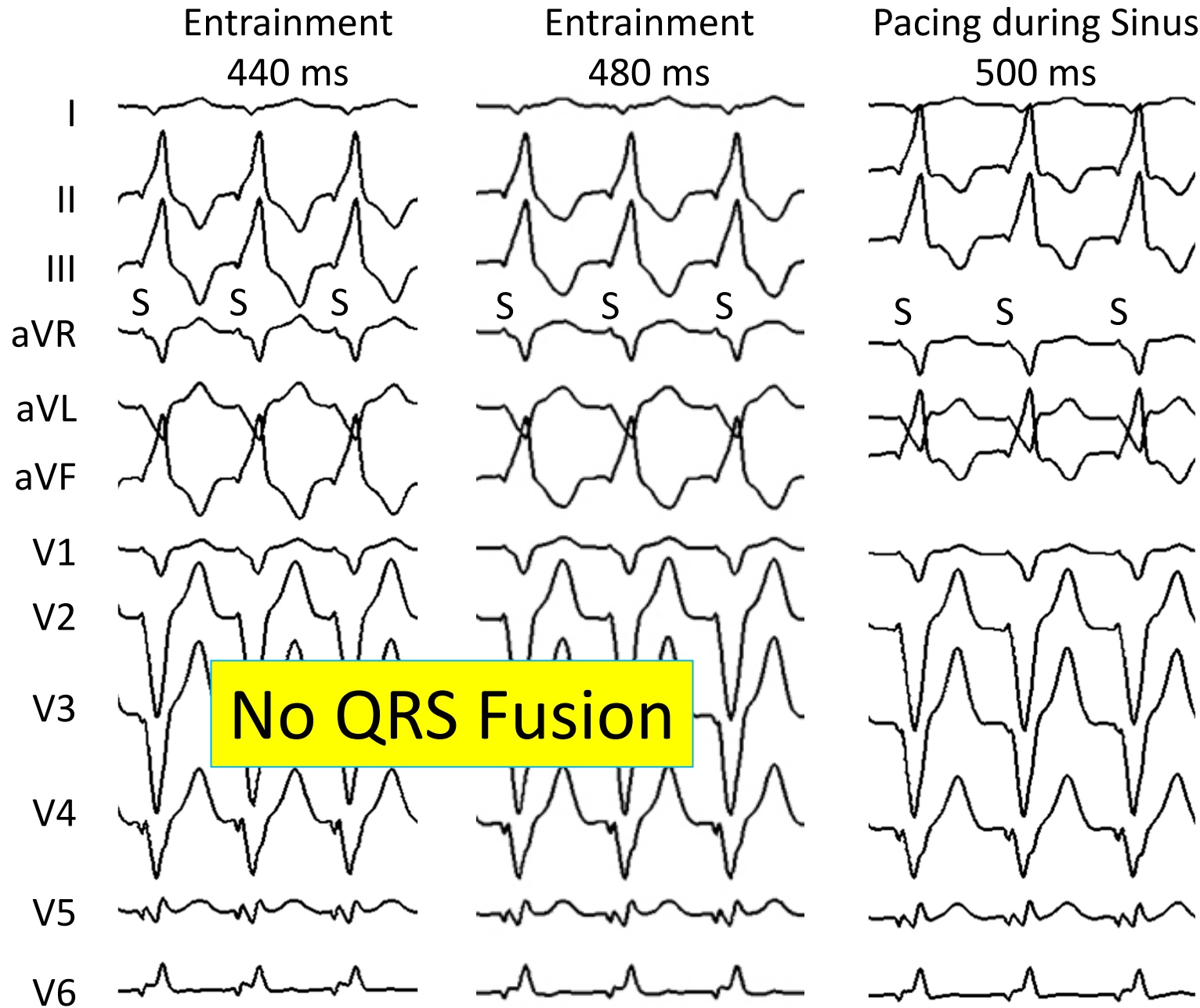


V-V-A Response  
PPI-TCL=145



# Entrainment







Q: What is the most likely diagnosis?

1. AVNRT with UCP
2. Junctional tachycardia
3. Nodoventricular ORT
4. Nodofascicular ORT
5. Others
6. I don't know



## Q: What is the most likely diagnosis?

1. AVNRT with UCP
2. Junctional tachycardia
3. Nodoventricular ORT
- 4. Nodofascicular ORT**
5. Others
6. I don't know



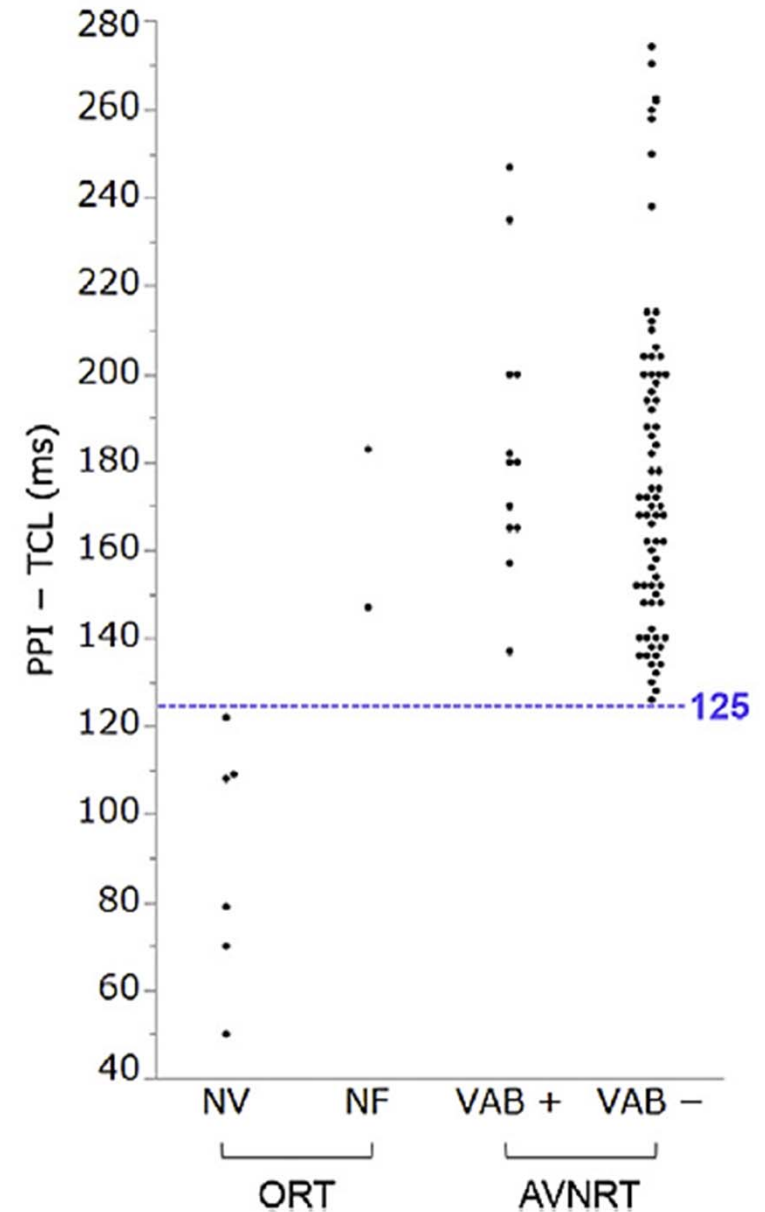
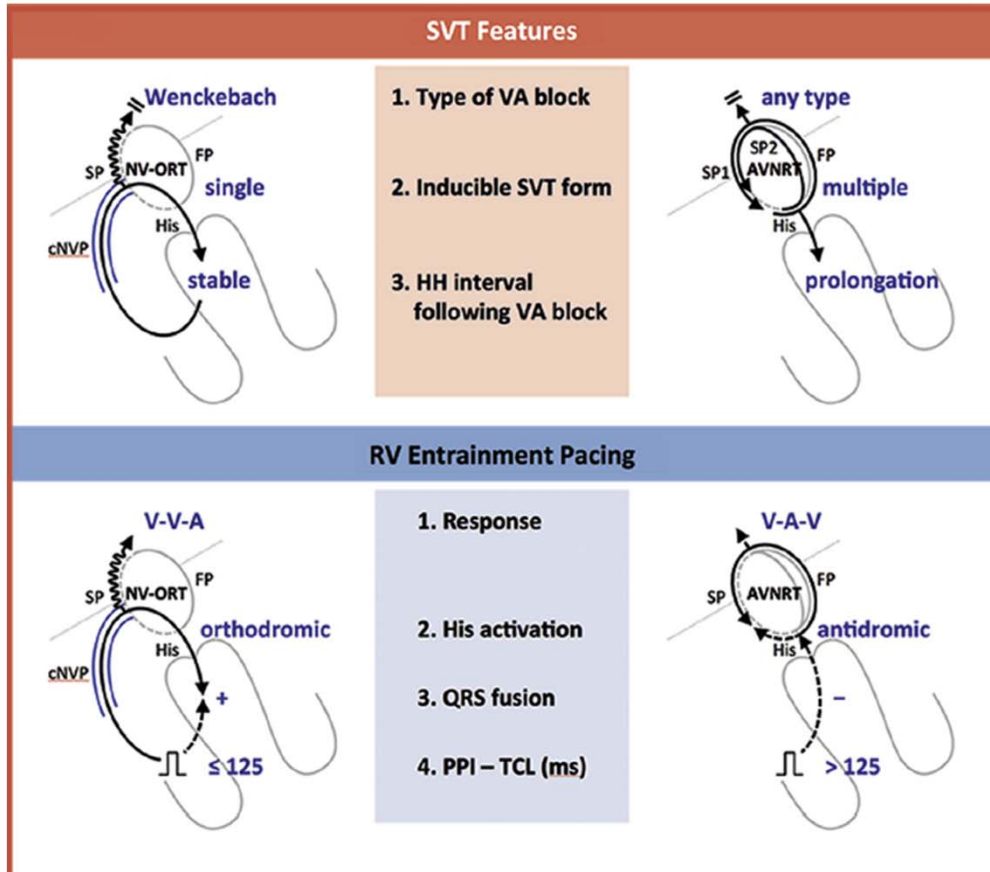
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AE = atrial extrastimulus; JT = junctional tachycardia; NF = nodofascicular; NV = nodoventricular; VE =ventricular extrastimulus

# Novel Diagnostic Observations of Nodoventricular/Nodofascicular Pathway-Related Orthodromic Reciprocating Tachycardia Differentiating From Atrioventricular Nodal Re-Entrant Tachycardia





# SVT with VA Block: Differential Diagnosis

	AVNRT w/UCP	NF-ORT	NV-ORT
Inducible SVT	Multiple	Single	Single
VA Block during SVT	Mobitz II or 2:1	Wenckebach	Wenckebach
His Refractory PVC	No reset	Reset	Reset
Entrainment from RV Orthodromic His Capture	No	Yes	Yes
Entrainment from RV V-V-A Response	No	Yes	Yes
Entrainment from RV PPI-TCL	>125 ms	>125 ms	≤125 ms
Progressive QRS fusion during RV entrainment	No	No	Yes





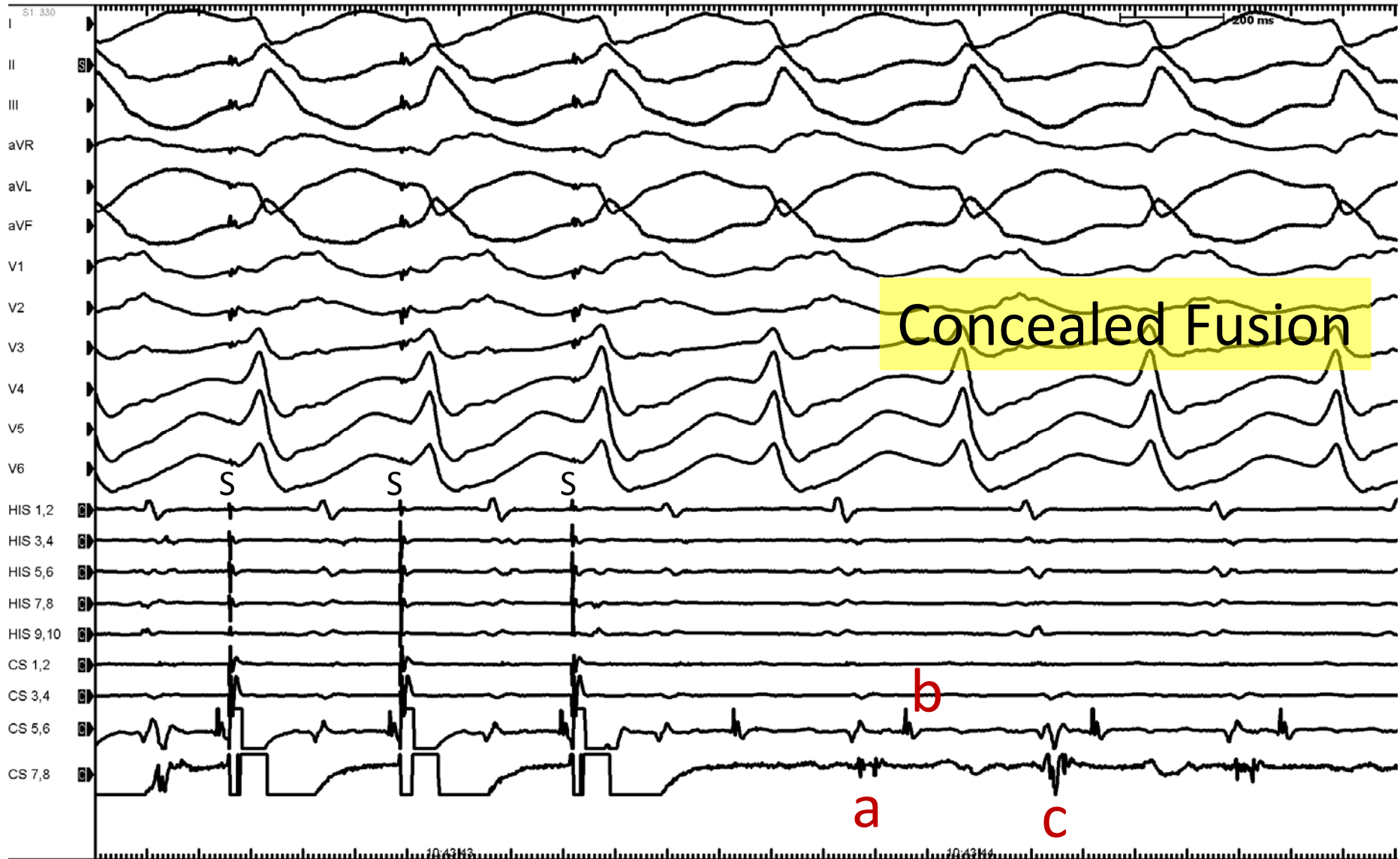
# SVT with VA Block: Differential Diagnosis

	AVNRT w/UCP	NF-ORT	NV-ORT
Inducible SVT	Multiple	<b>Single</b>	<b>Single</b>
VA Block during SVT	Mobitz II or 2:1	<b>Wenckebach</b>	<b>Wenckebach</b>
His Refractory PVC	No reset	<b>Reset</b>	<b>Reset</b>
Entrainment from RV Orthodromic His Capture	No	<b>Yes</b>	<b>Yes</b>
Entrainment from RV V-V-A Response	No	<b>Yes</b>	<b>Yes</b>
Entrainment from RV PPI-TCL	>125 ms	<b>&gt;125 ms</b>	≤125 ms
Progressive QRS fusion during RV entrainment	No	<b>No</b>	Yes





# Case 3: 65M with NICM and VT



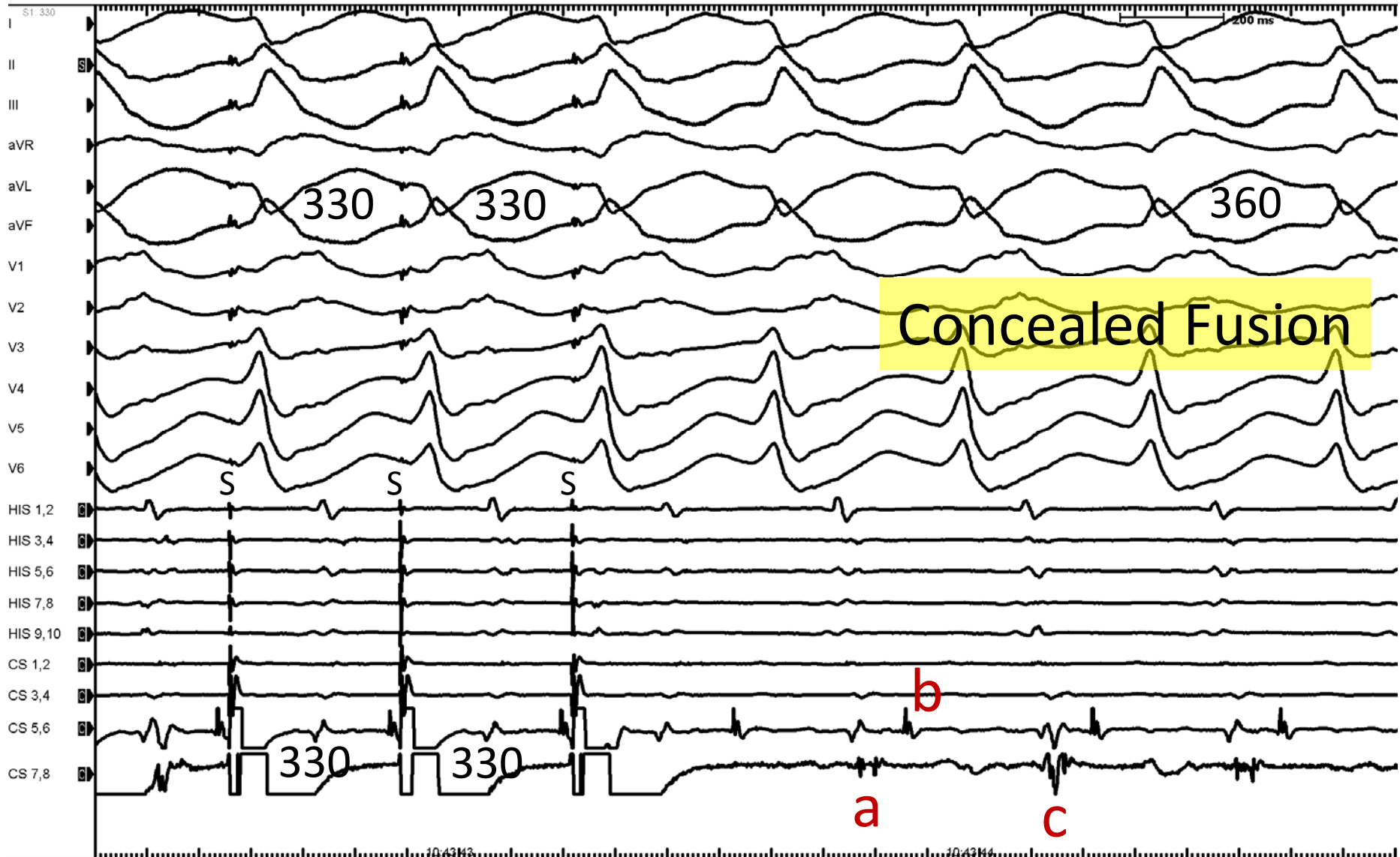


Q: Which electrogram is located  
in the circuit?

1. a
2. b
3. c
4. None of them

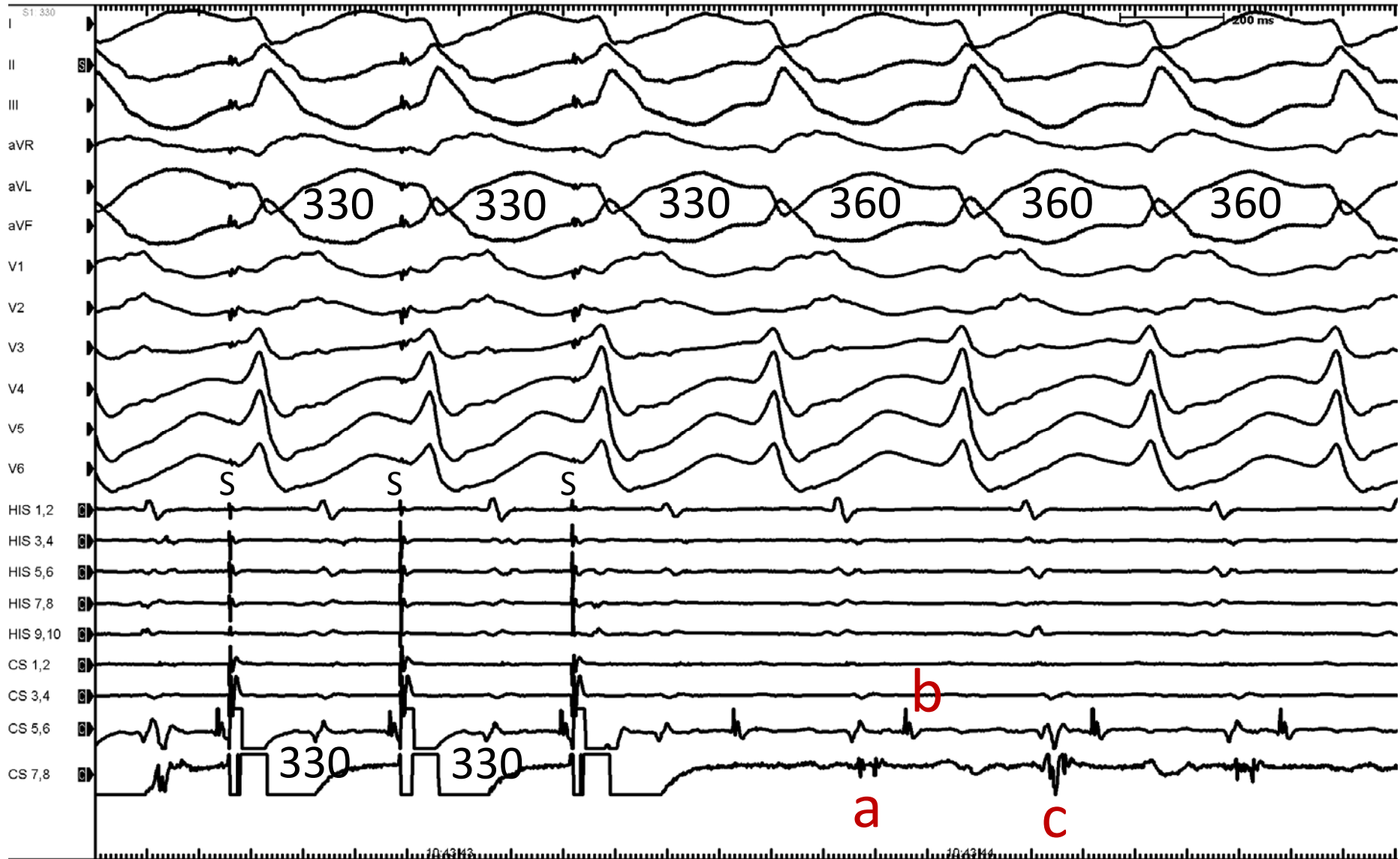


# Case: 65M with NICM and VT



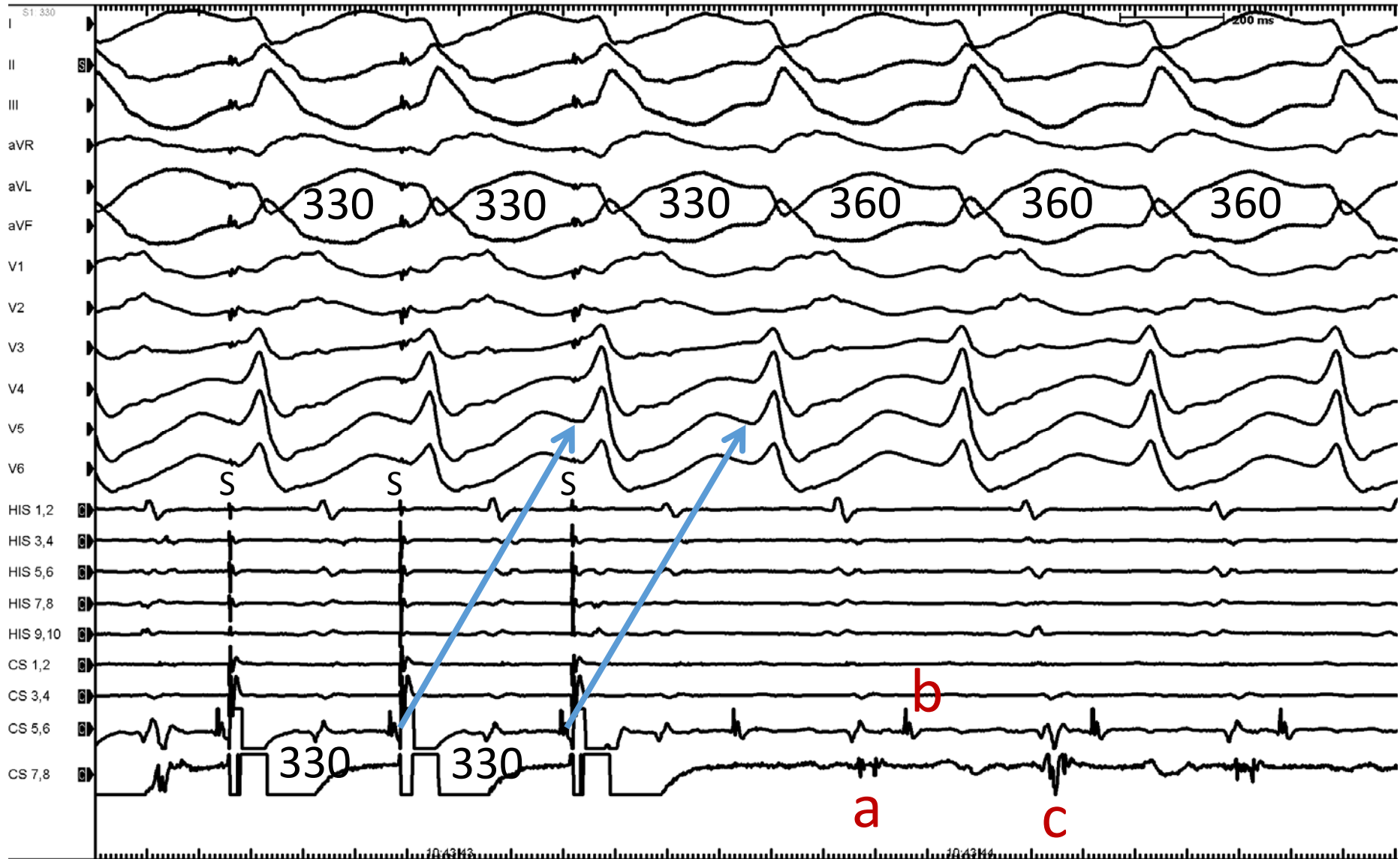


# Case: 65M with NICM and VT



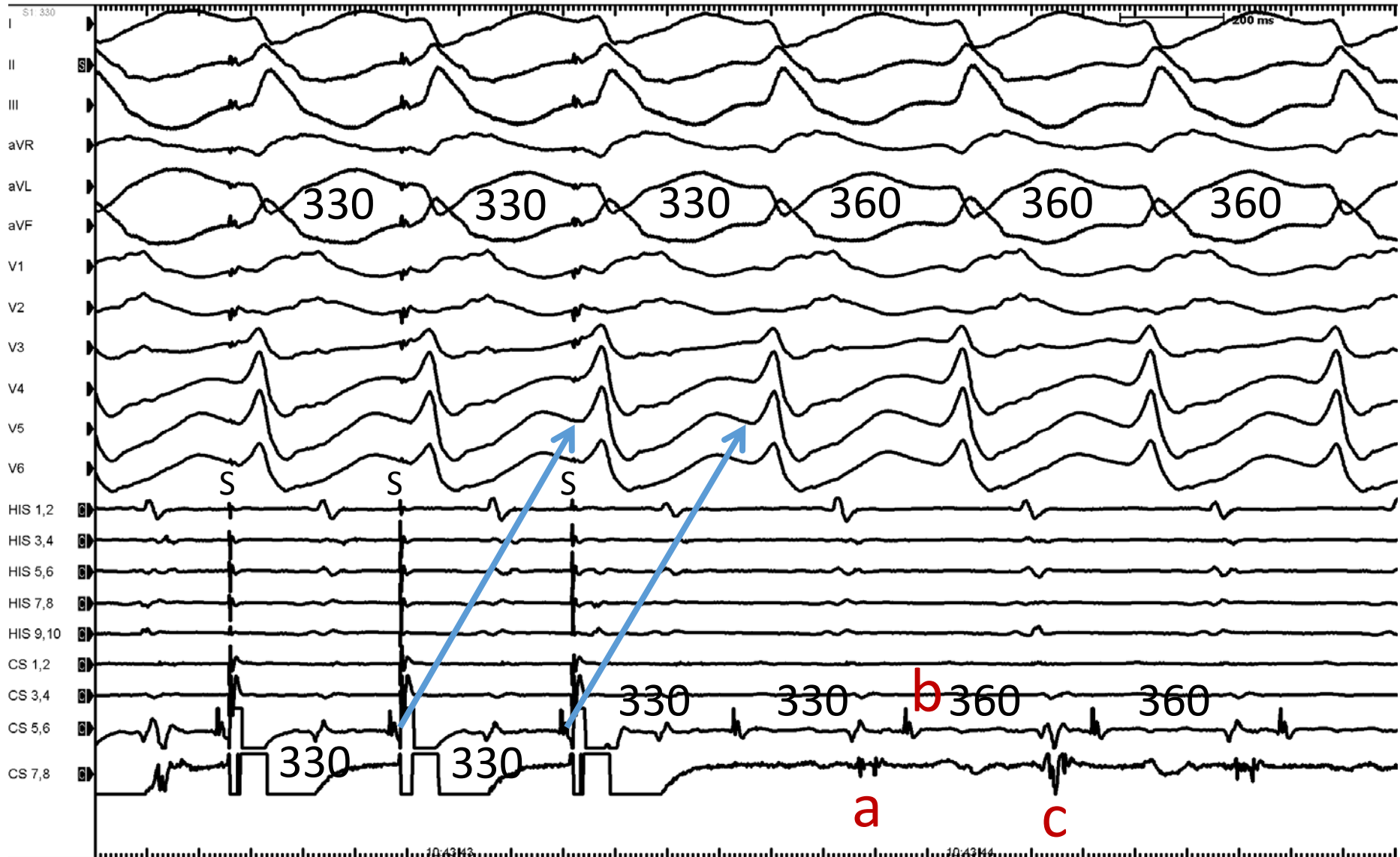


# Case: 65M with NICM and VT





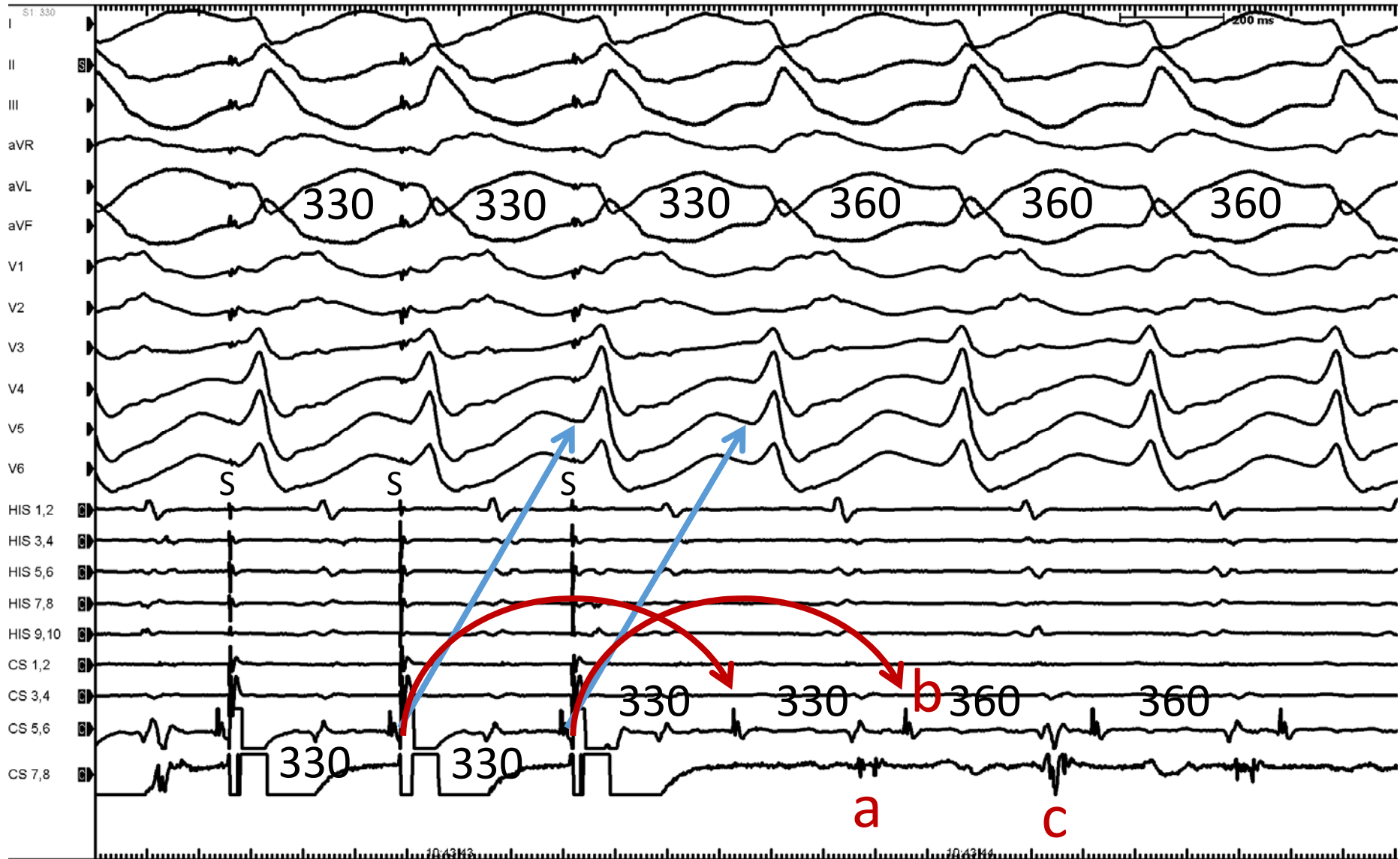
# Case: 65M with NICM and VT





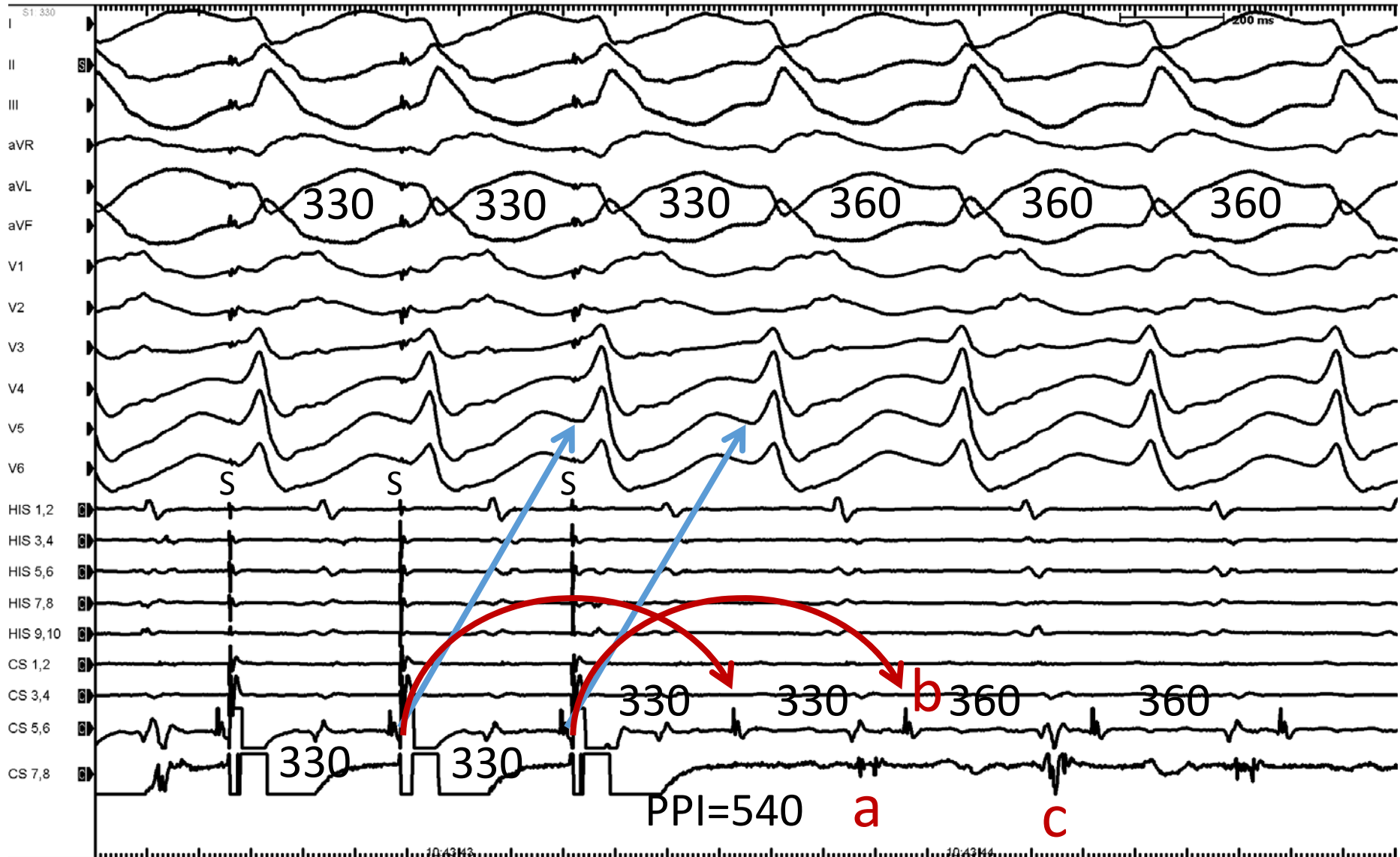


# Case: 65M with NICM and VT





# Case: 65M with NICM and VT





Q: Which electrogram is located  
in the circuit?

1. a
2. b
3. c
4. None of them



**Q: Which electrogram is located in the circuit?**

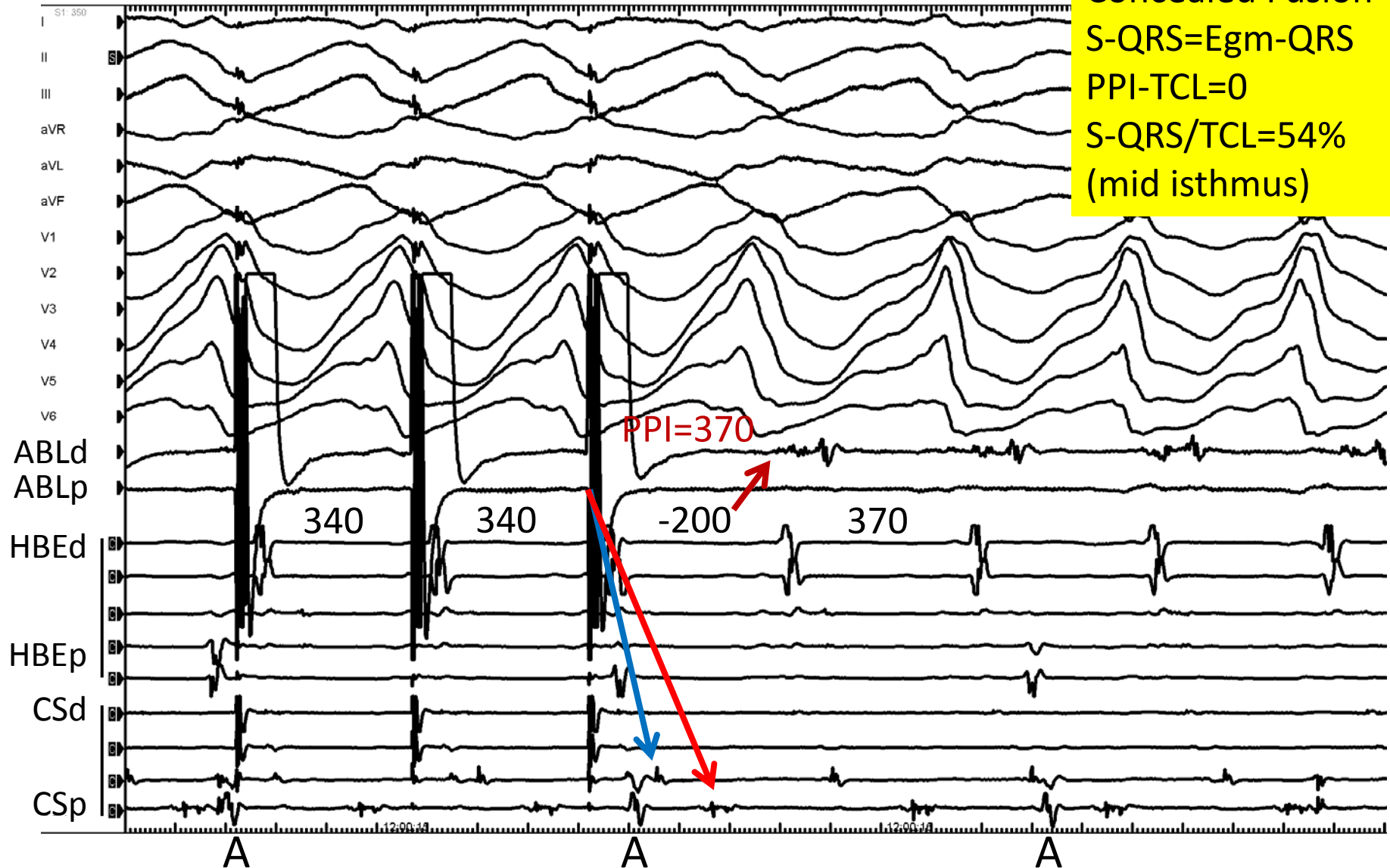
1. a (bystander, PPI-TCL=180)
2. b (late potential)
3. c (atrial potential)
- 4. None of them**



# VT2 Termination Site

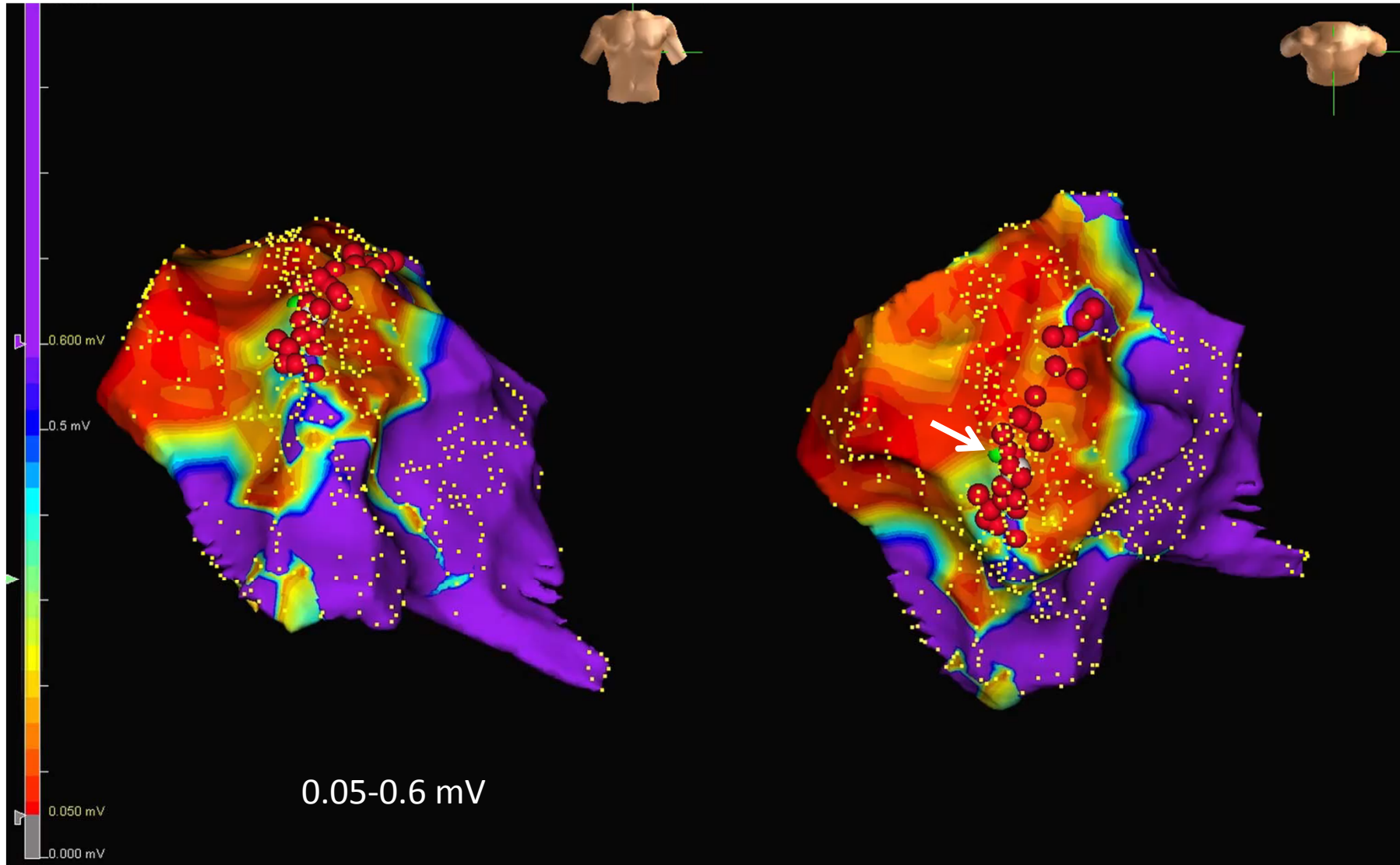
S-QRS=200

Concealed Fusion  
S-QRS=Egm-QRS  
PPI-TCL=0  
S-QRS/TCL=54%  
(mid isthmus)





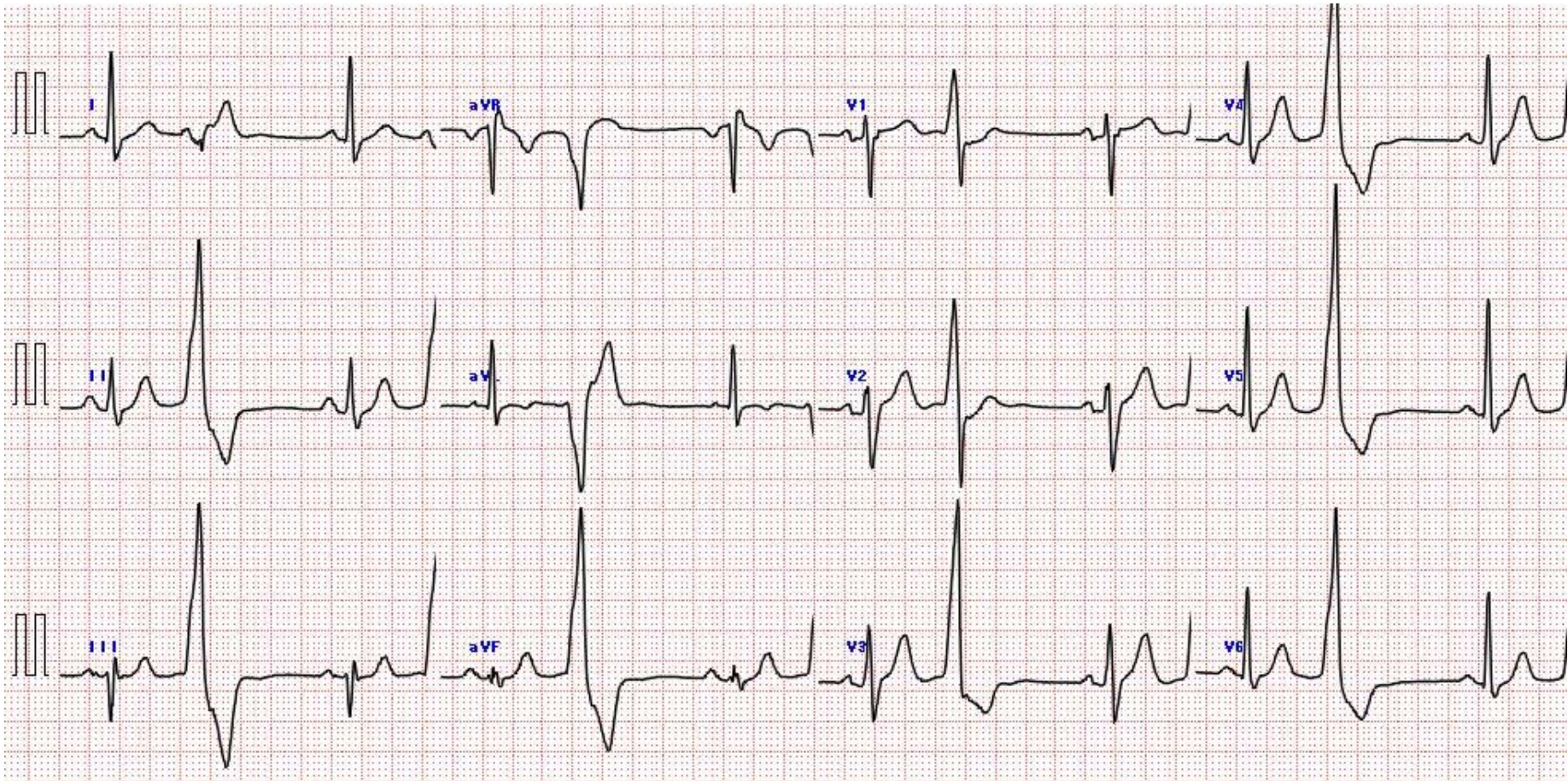
# VT2 Activation







# Case 4: 62M with Frequent Outflow VPC after Failed RFCA (RVOT, LCC, LVOT, GCV)

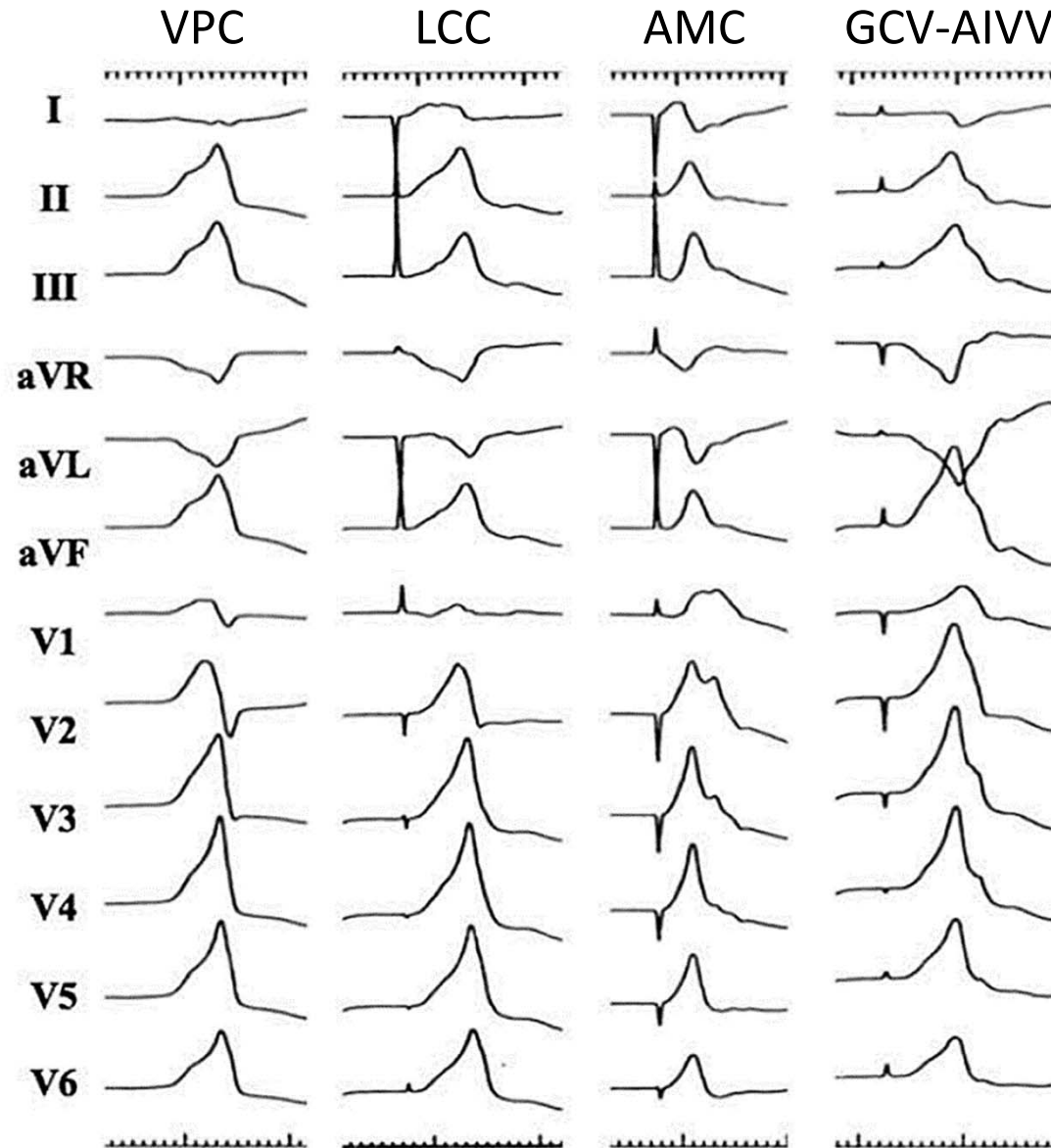


VPCs with Non-BBB Pattern and Inferior-axis





## RFCA at the Previous Session





## Q: What is the next target?

1. LCC
2. LVOT/AMC
3. GCV
4. Epicardium
5. Other

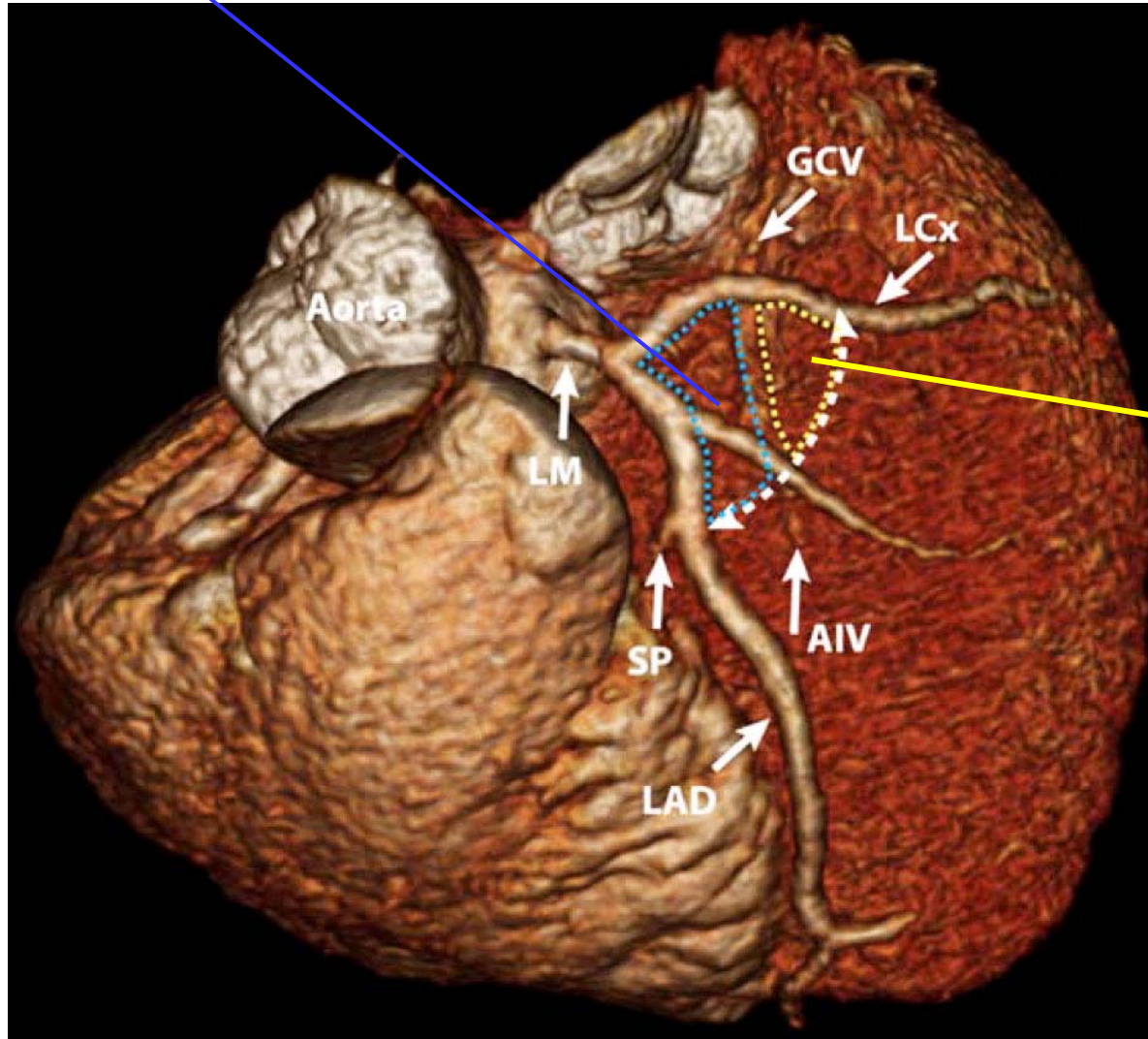


## Q: What is the next target?

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3. GCV
4. Epicardium
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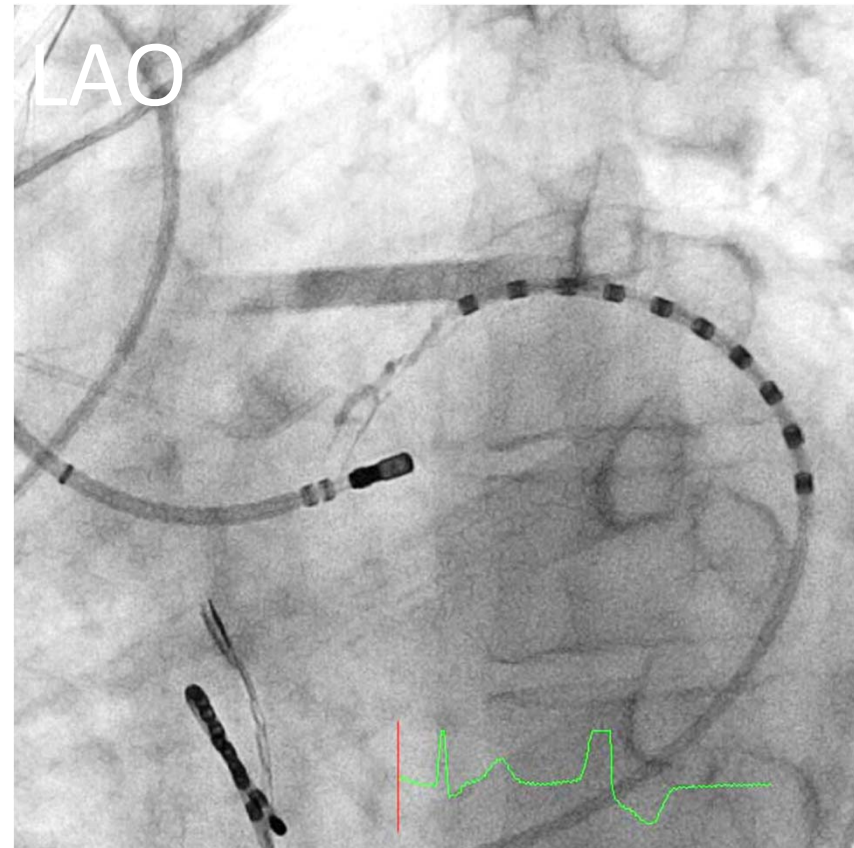
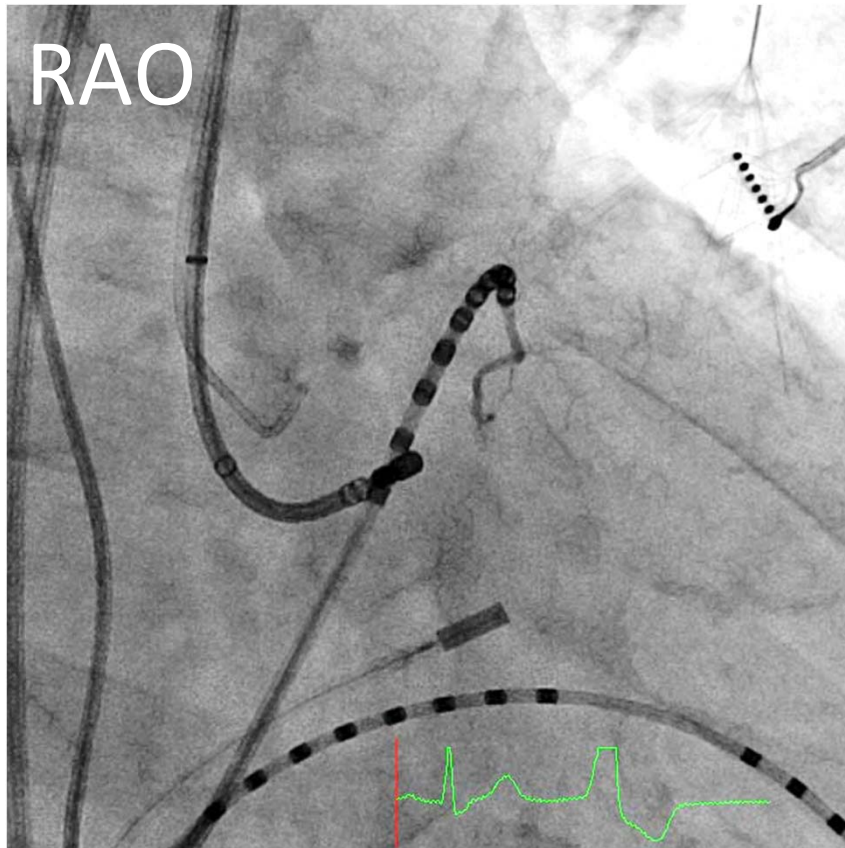
less accessible area



accessible area

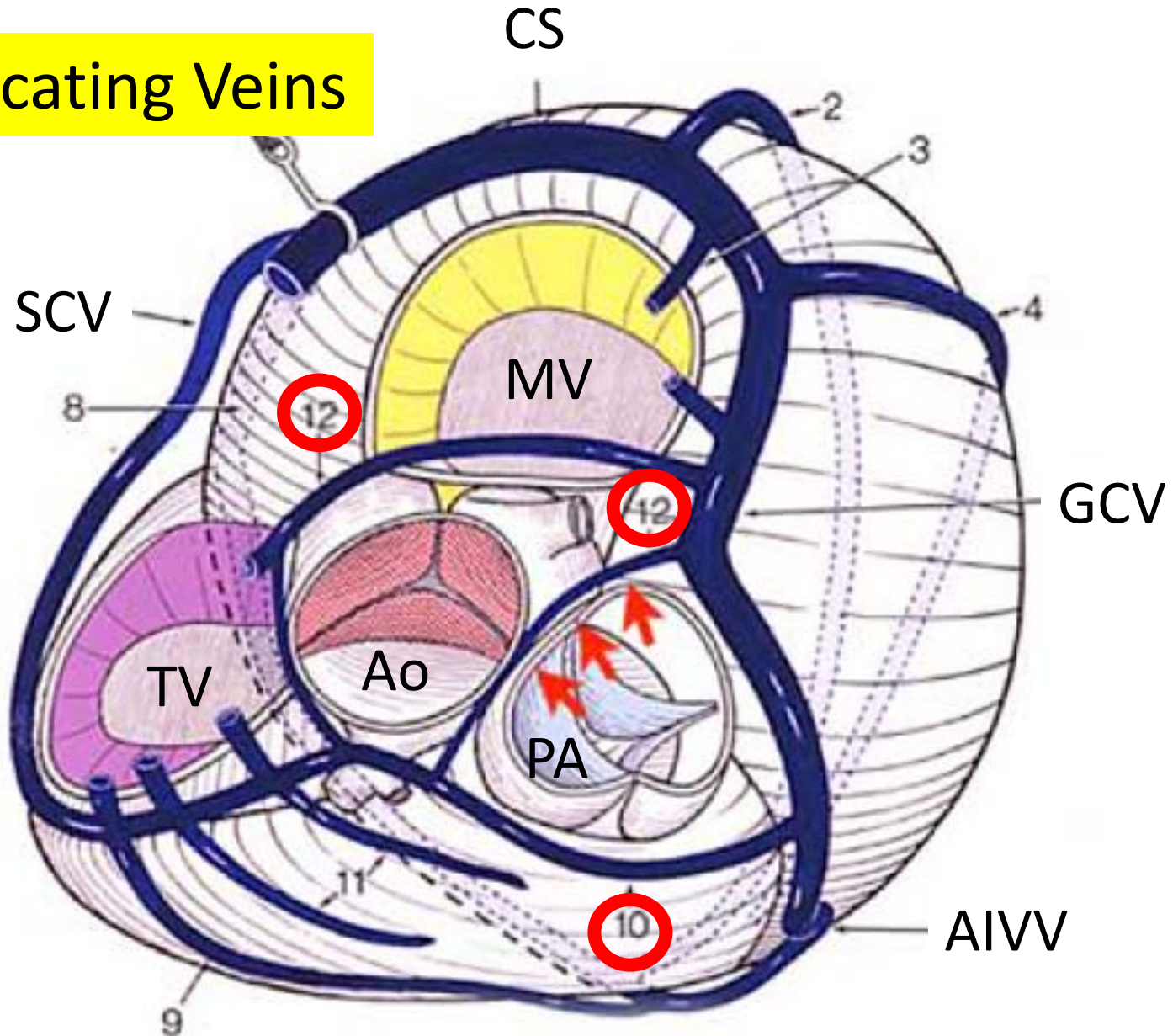


# Summit Communicating Vein



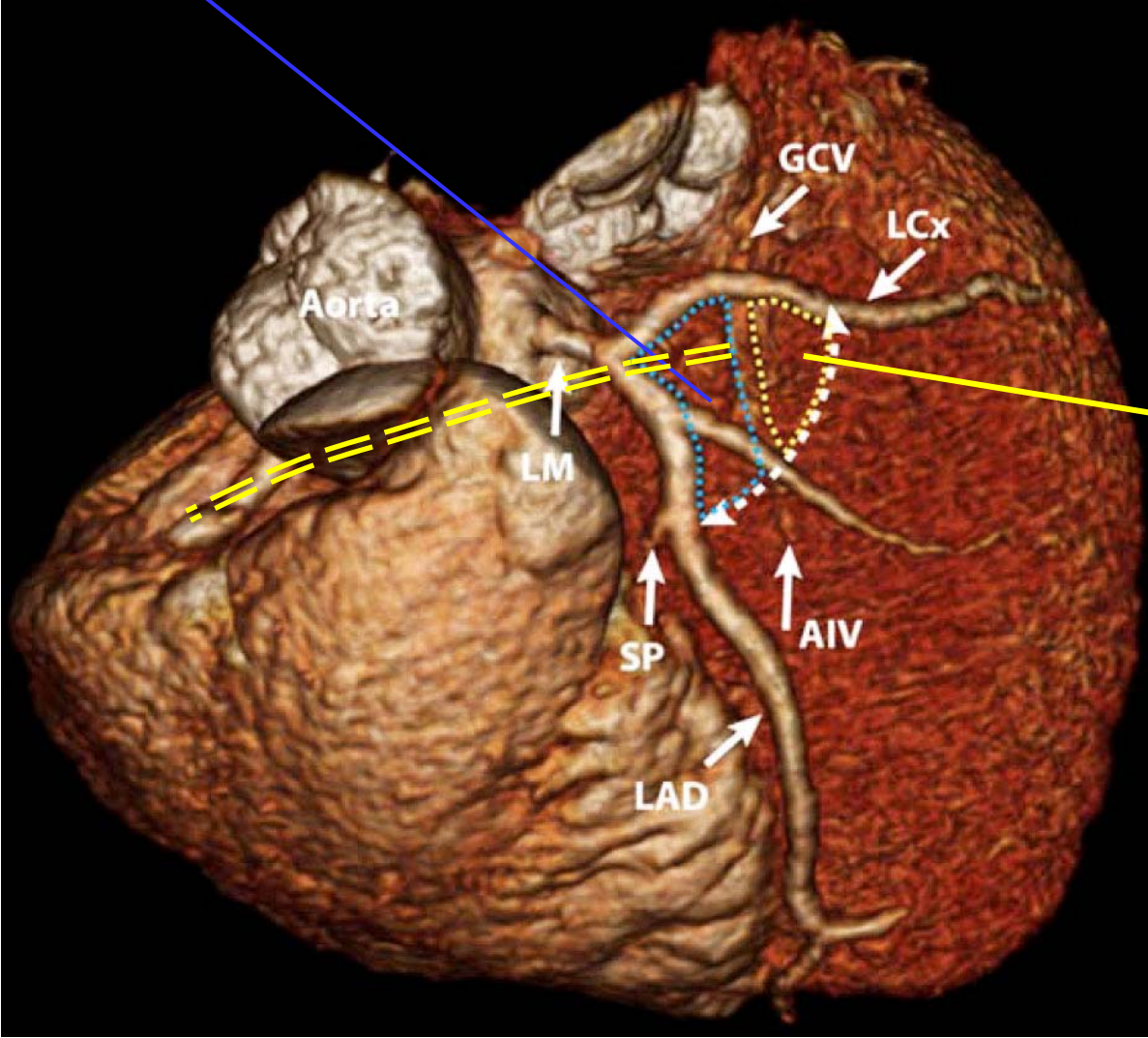


# Communicating Veins





less accessible area



accessible area

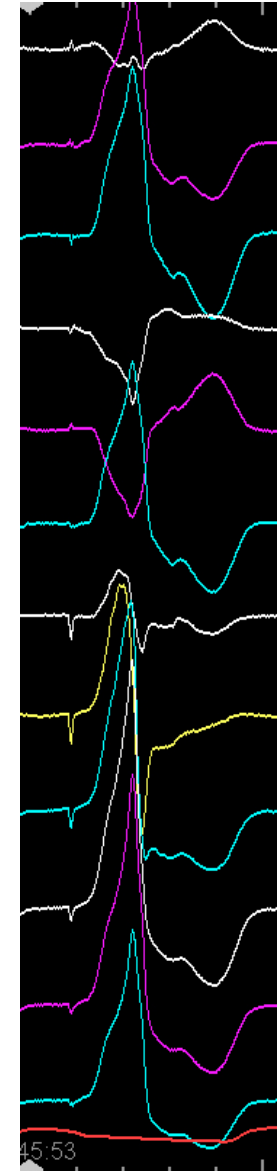
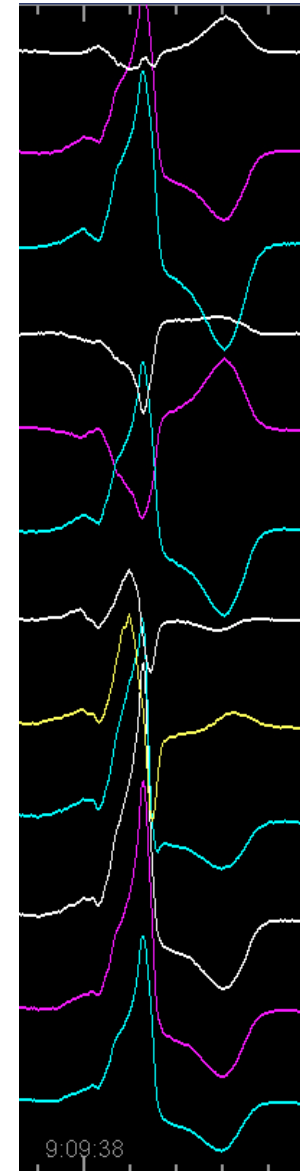
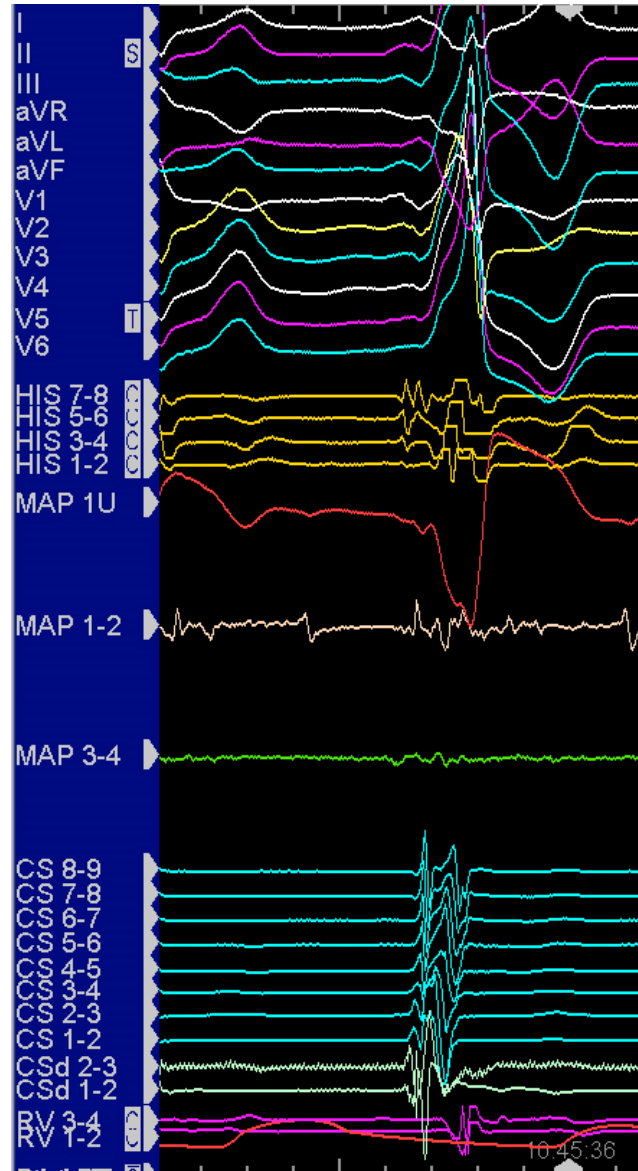
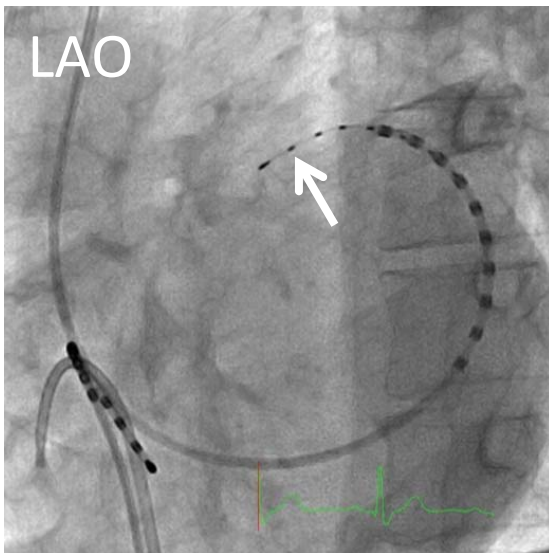
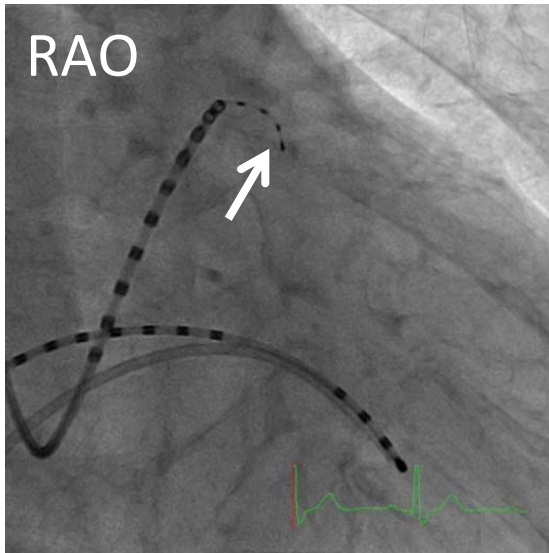


# 2-Fr Electrode Cath

# VPC

# VPC

# 2-3Pace





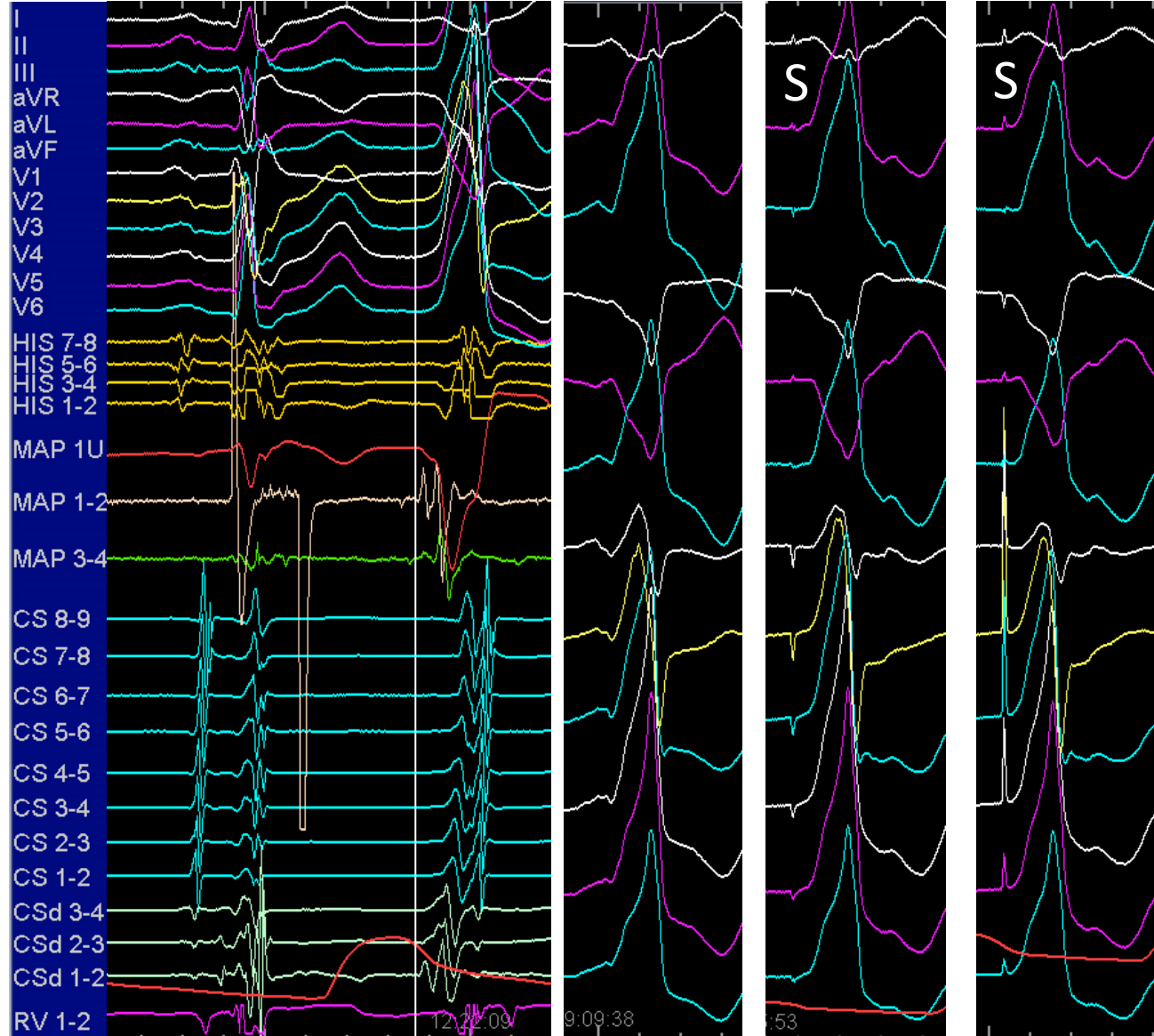
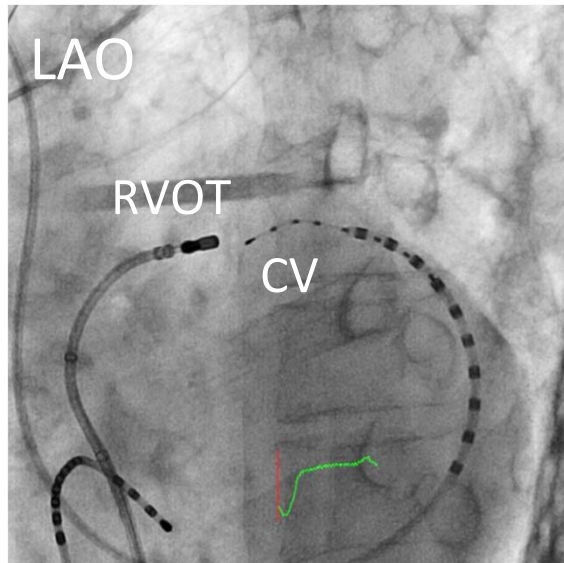
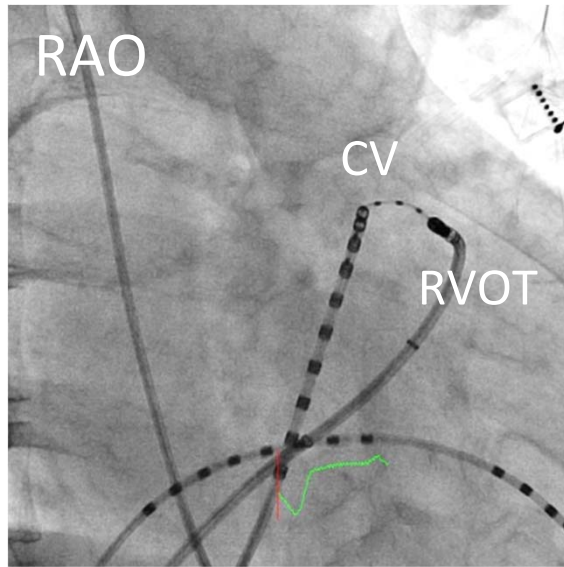


## Q: What is the next target?

1. LCC
2. LVOT/AMC
3. GCV
4. Epicardium
5. **Other**



Pacemap





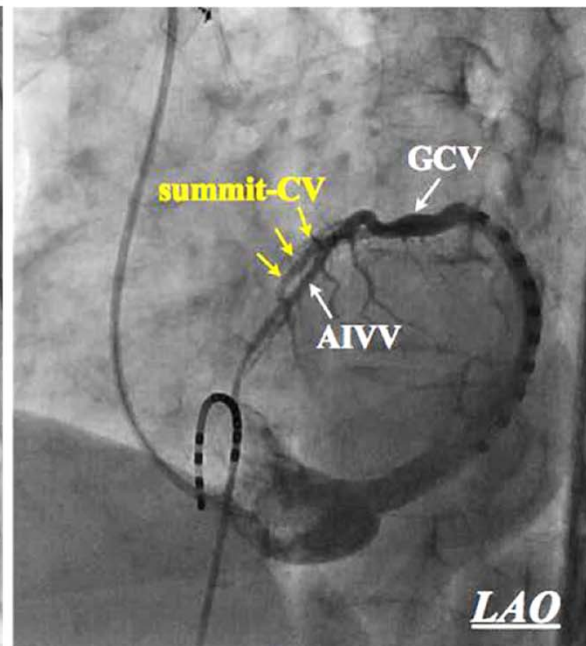
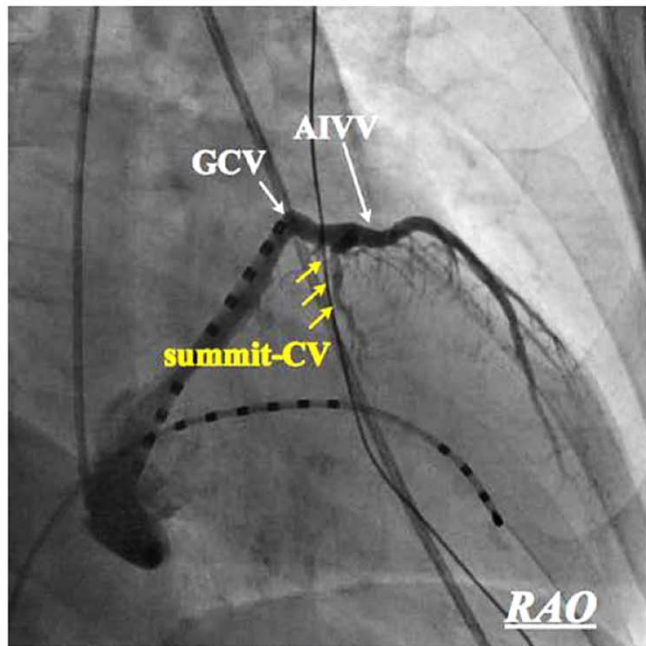
**ORIGINAL ARTICLE**



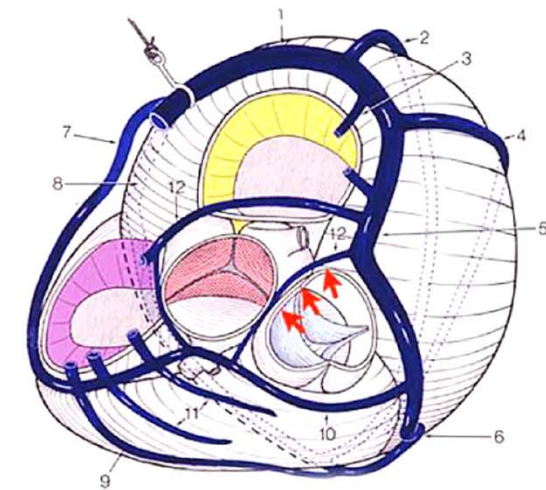
Yuki Komatsu, MD  
 Akihiko Nogami, MD  
 Yasutoshi Shinoda, MD  
 Keita Masuda, MD  
 Takeshi Machino, MD  
 Kenji Kuroki, MD  
 Hiro Yamasaki, MD  
 Yukio Sekiguchi, MD  
 Kazutaka Aonuma, MD

# Idiopathic Ventricular Arrhythmias Originating From the Vicinity of the Communicating Vein of Cardiac Venous Systems at the Left Ventricular Summit

**A**



**B**



- |                      |                           |                   |
|----------------------|---------------------------|-------------------|
| 1. Coronary Sinus    | 5. Great Vein             | 9. Right Marginal |
| 2. Posterior L.V.    | 6. Ant. Interventricular  | 10. Conus         |
| 3. Oblique L. Atrial | 7. Small Cardiac          | 11. Anterior R.V. |
| 4. Obtuse Marginal   | 8. Post. Interventricular | 12. Communicating |



## Q: What is the next target?

1. LCC
2. LVOT/AMC
3. GCV
4. Epicardium
5. Other (Summit CV guided)



*Thank You*

