



Differential Diagnosis of Pre-excited SVTs



Jong-ho, Shin

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Contents

1. Atypical bypass tracts

2. Pre-excited SVTs

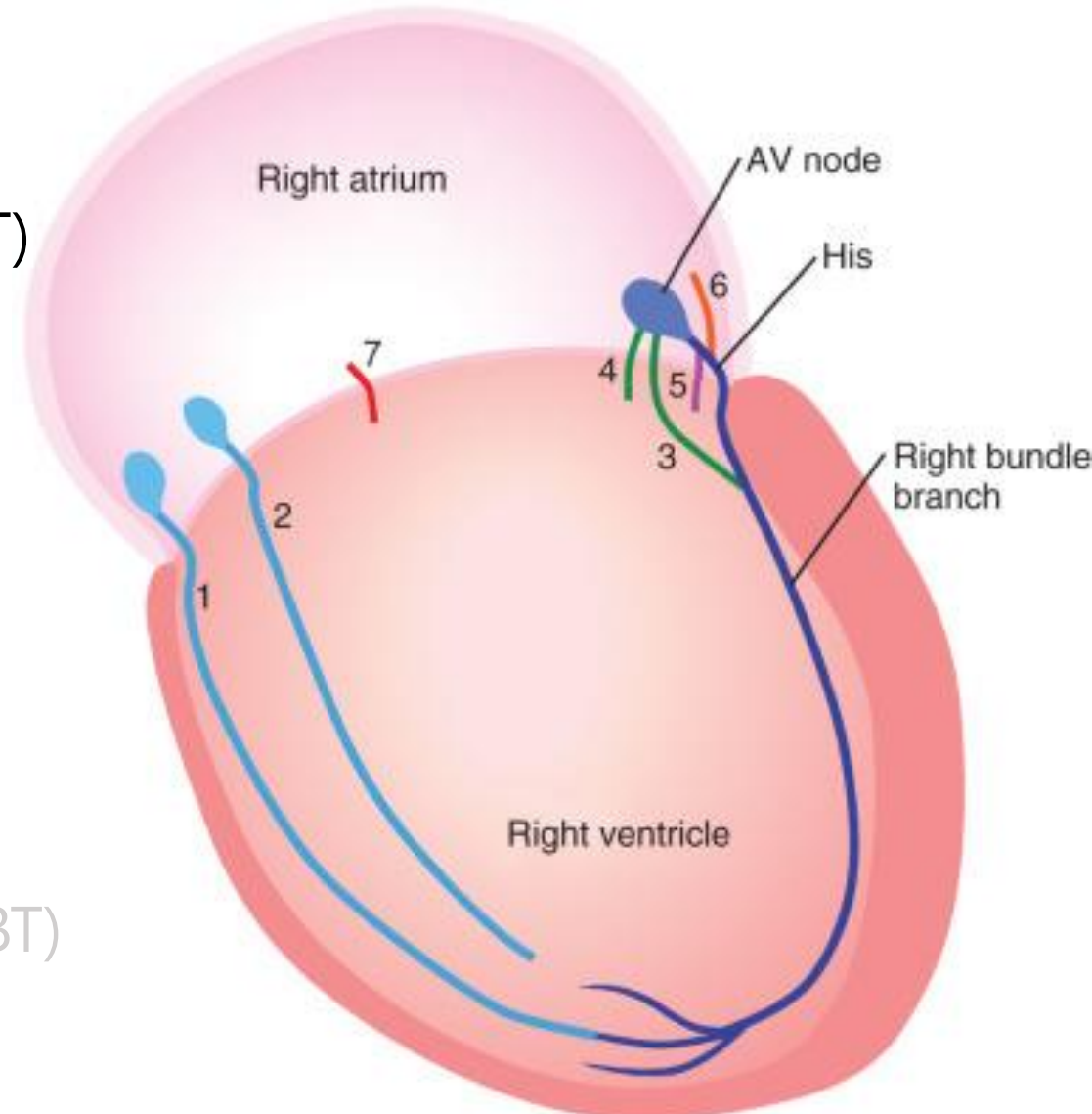


1. Atypical bypass tracts



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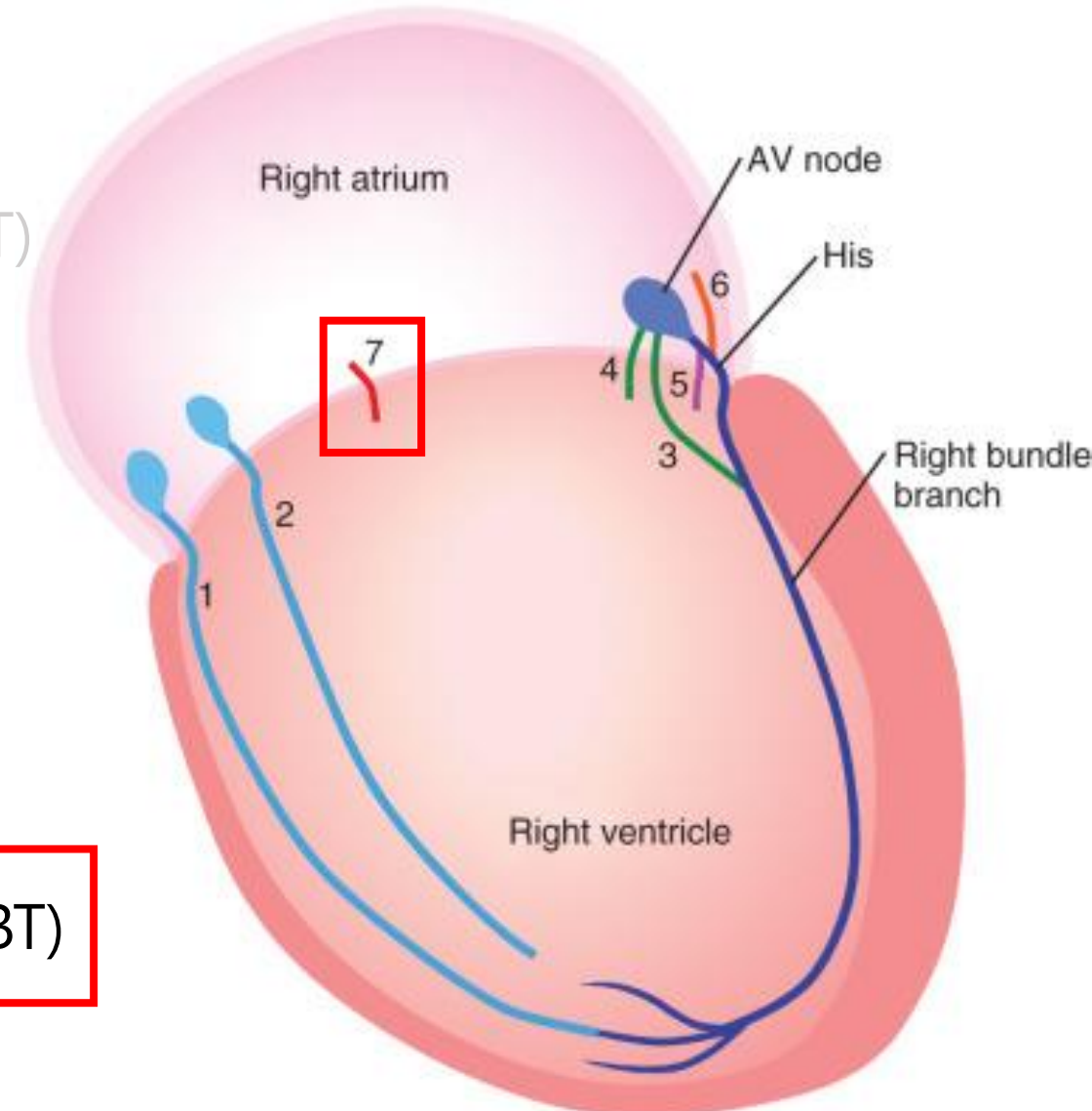
1. Atrio-fascicular bypass tract (AFBT)
2. Long atrio-ventricular bypass tract (long AVBT)
3. Nodo-fascicular bypass tract (NFBT)
4. Nodo-ventricular bypass tract (NVBT)
5. Fasciculo-ventricular bypass tract (FVBT)
6. Atrio-hisian bypass tract (AHBT)
7. Short atrio-ventricular bypass tract (short AVBT)



1. Atypical bypass tracts

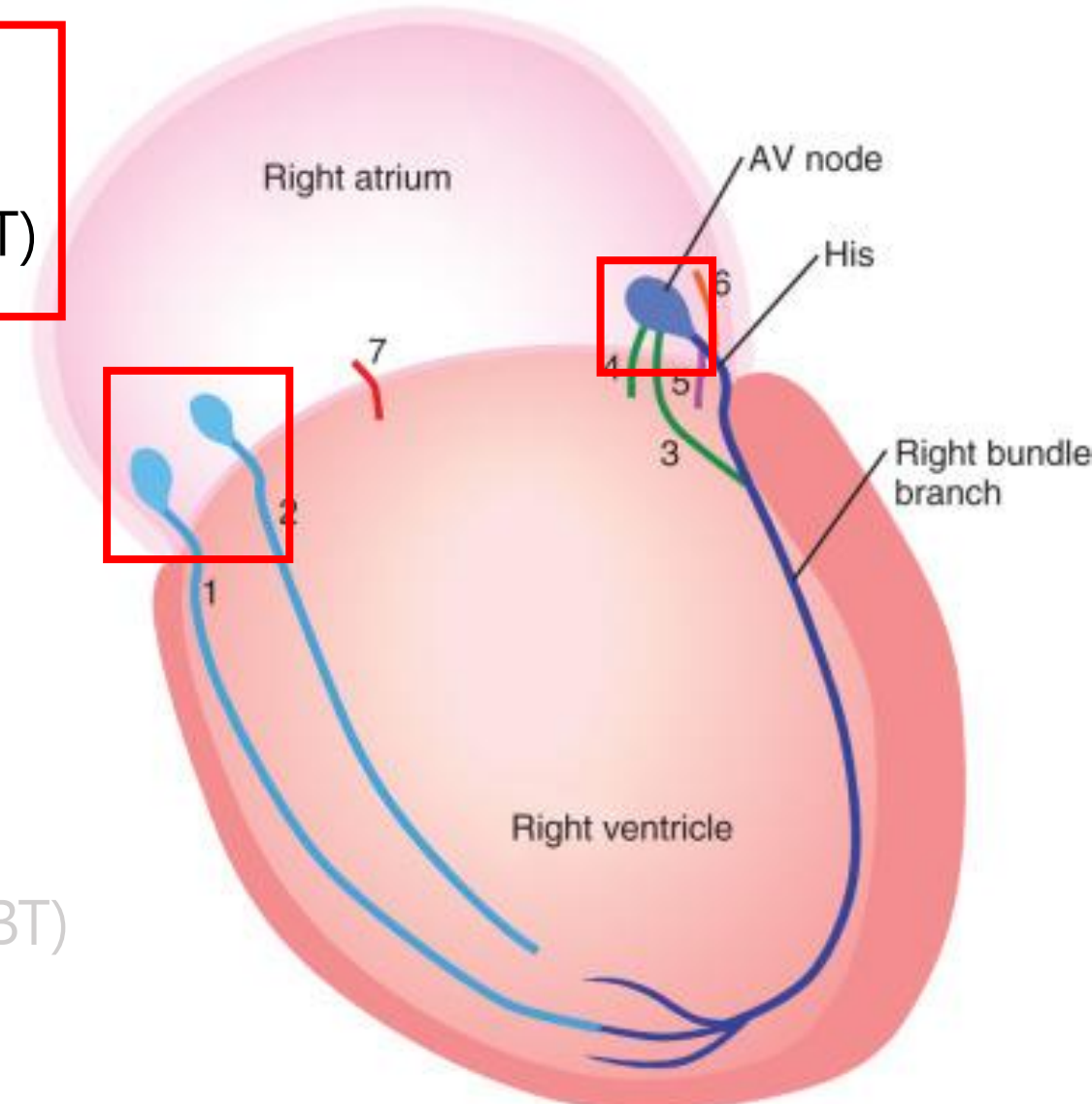
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1. Atypical bypass tracts

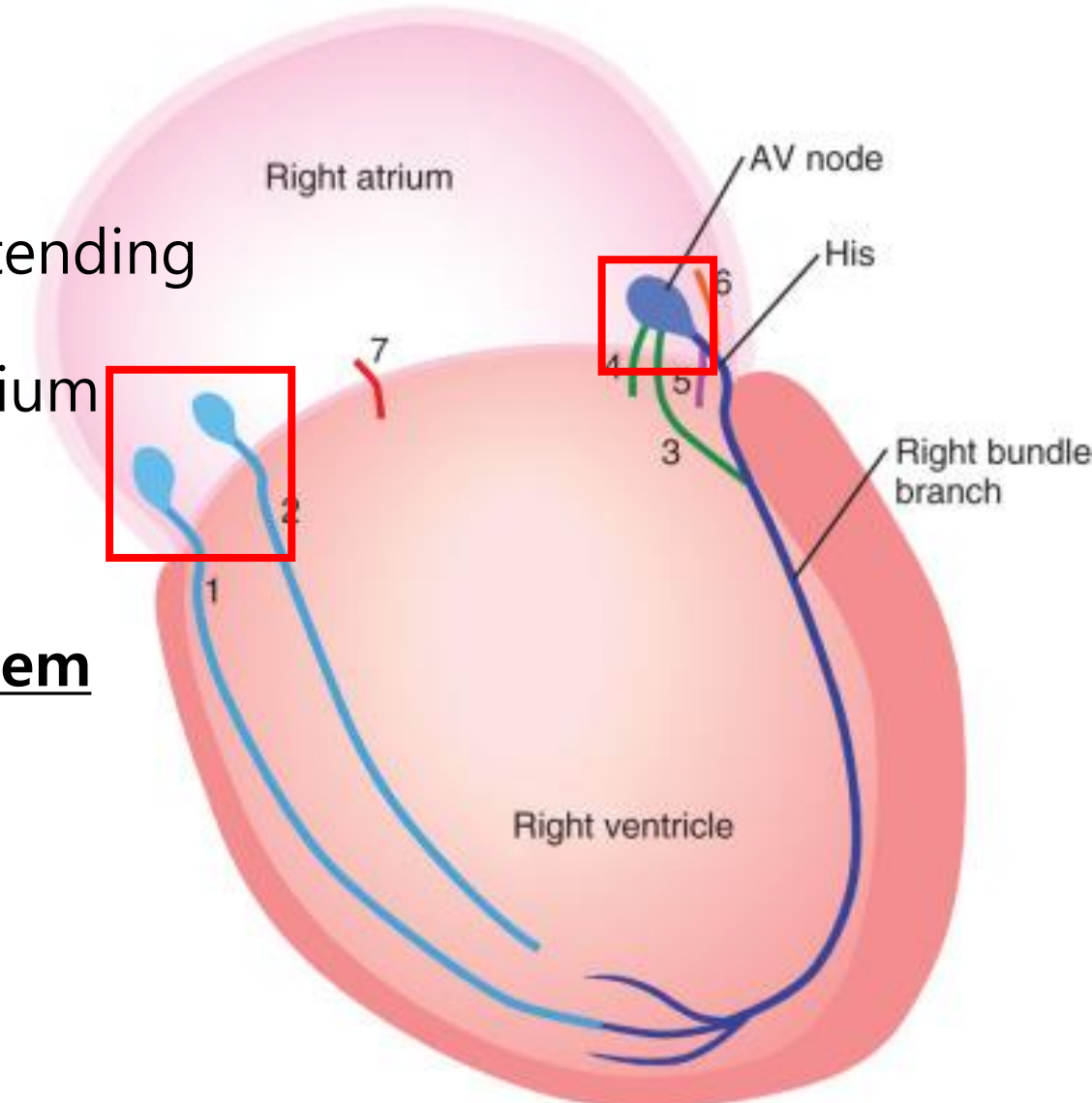
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1. Atypical bypass tracts

Mahaim fiber

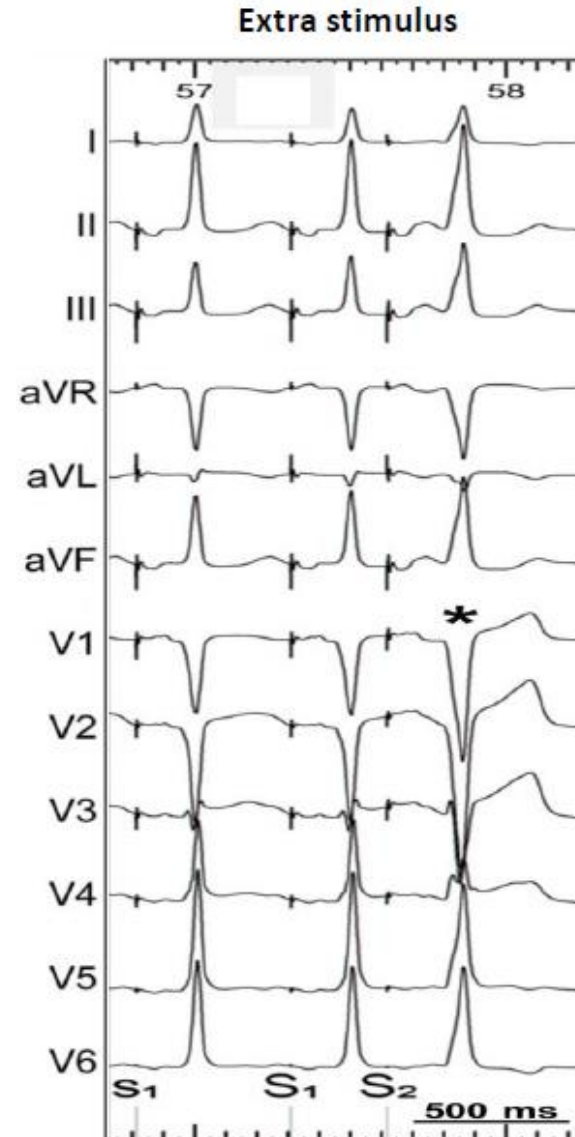
- Mahaim fiber is island of conducting tissue extending from the His bundle to the ventricular myocardium
- Most of **Mahaim fibers exist at RA**
- Duplications of **the AV nodal conducting system**



1. Atypical bypass tracts

Mahaim fiber

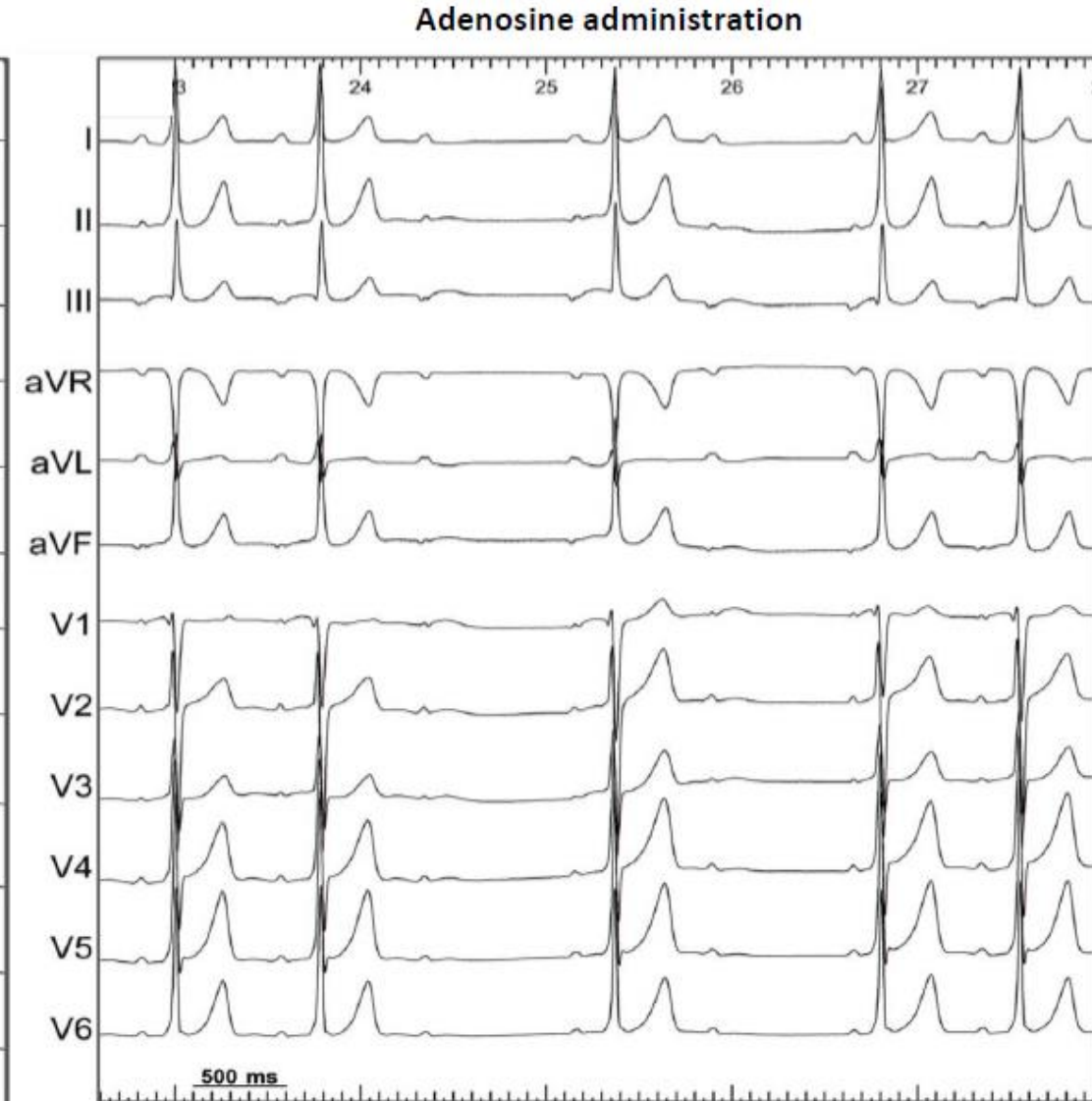
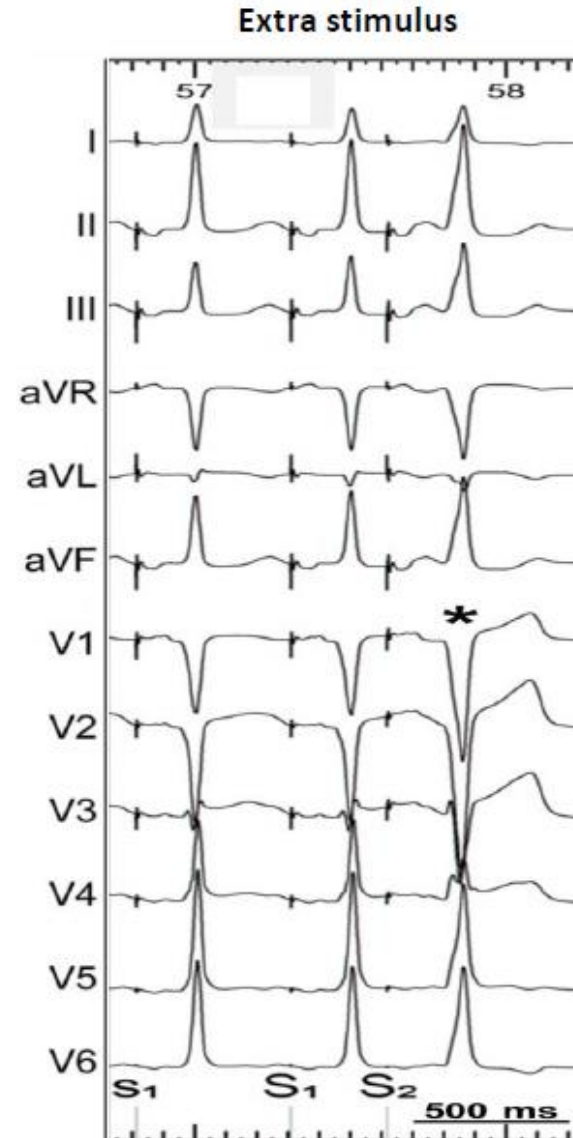
- Decremental property



1. Atypical bypass tracts

Mahaim fiber

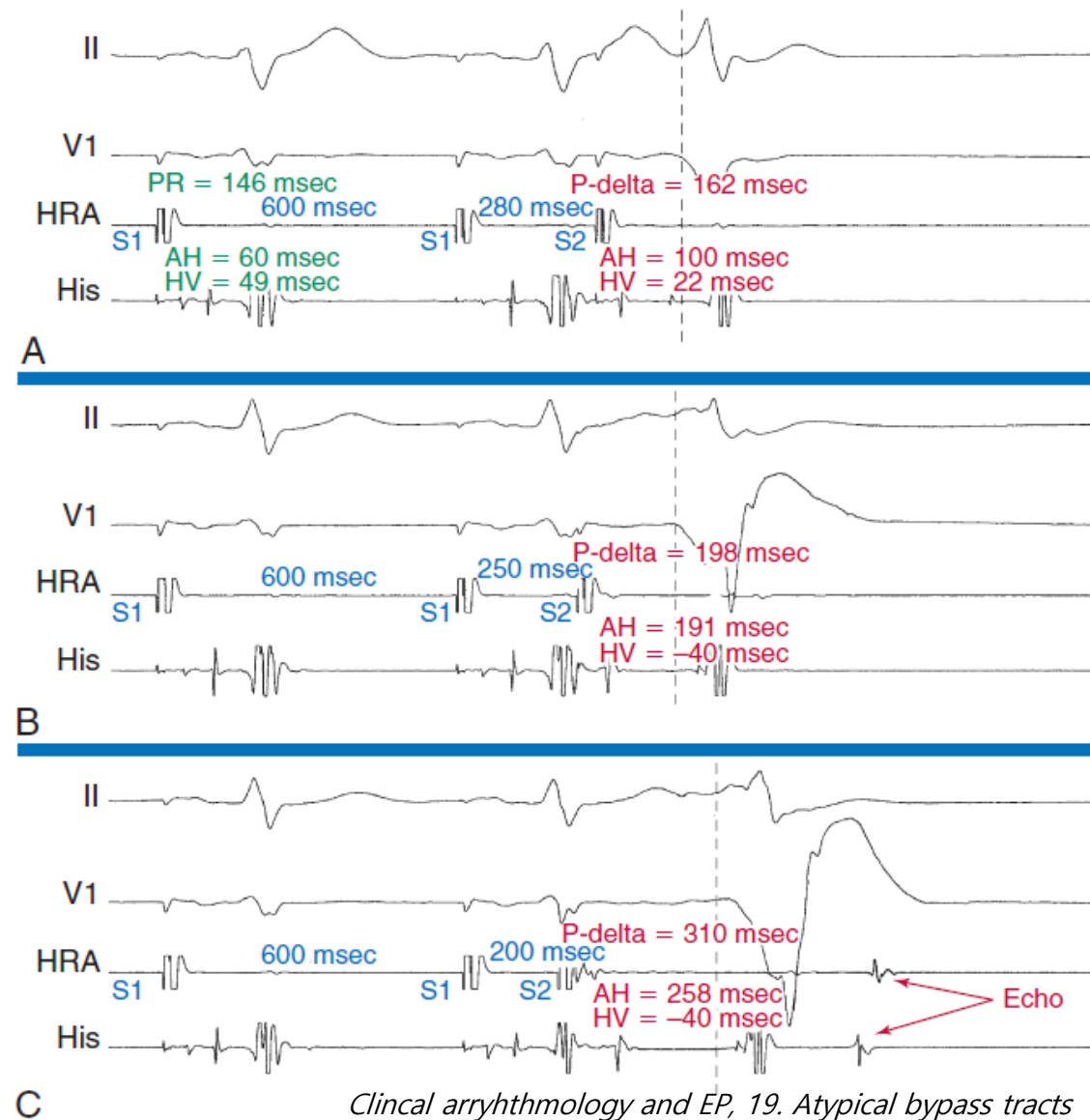
- Decremental property
- Adenosine sensitive



1. Atypical bypass tracts

- HRA 600-280ms : P-delta 162ms, AH 100ms, HV 22ms
- HRA 600-250ms : P-delta 198ms, AH 191ms, HV -40ms
- HRA 600-200ms : P-delta 310ms, AH 258ms, HV -40ms

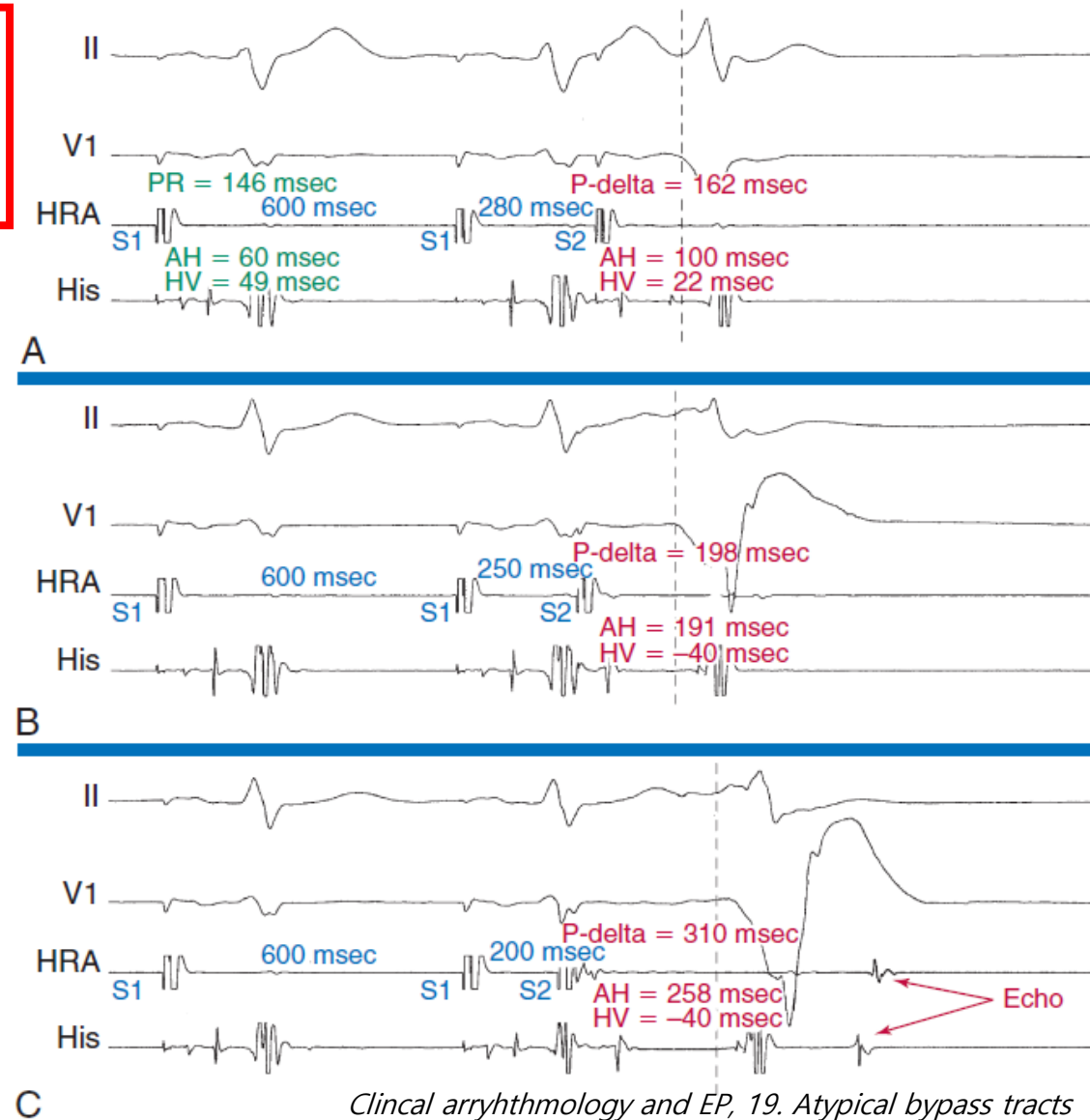
Decremental property



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- HRA 600-280ms P-delta 162ms, AH 100ms, HV 22ms
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Pre-excitation



1. Atypical bypass tracts

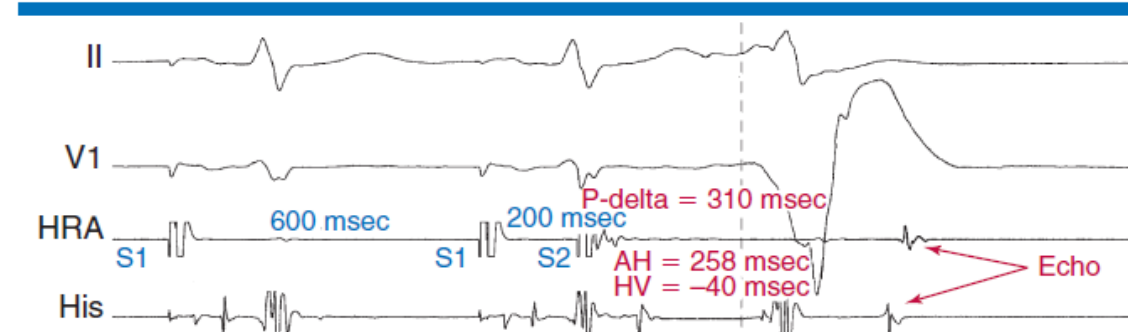
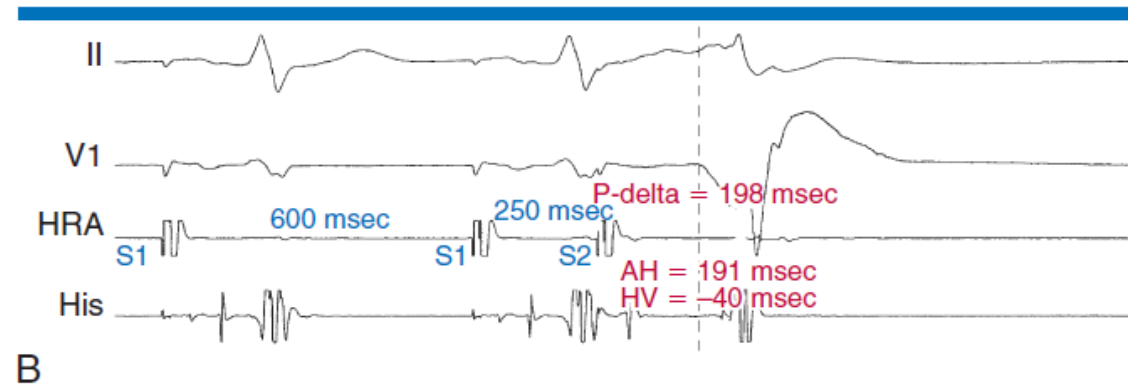
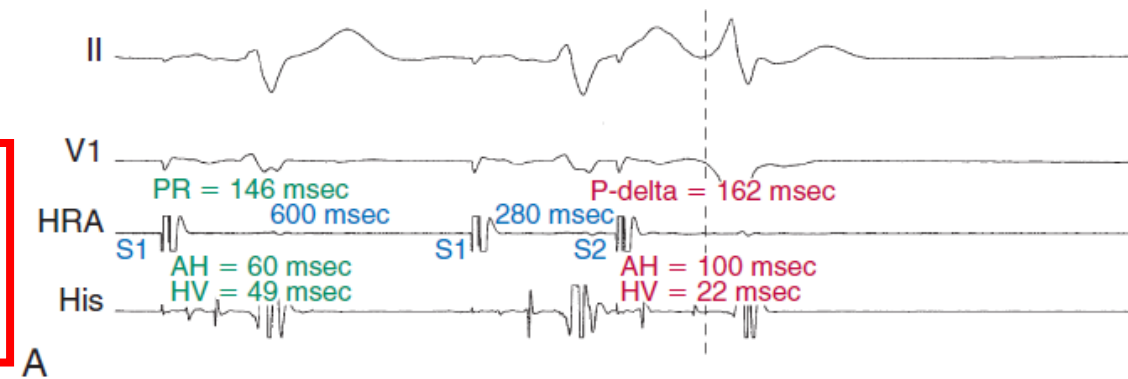
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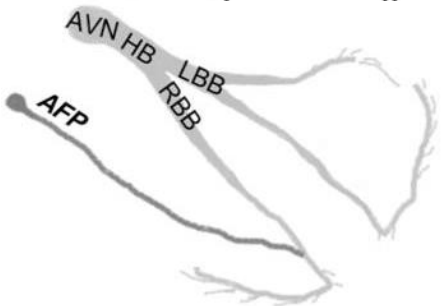
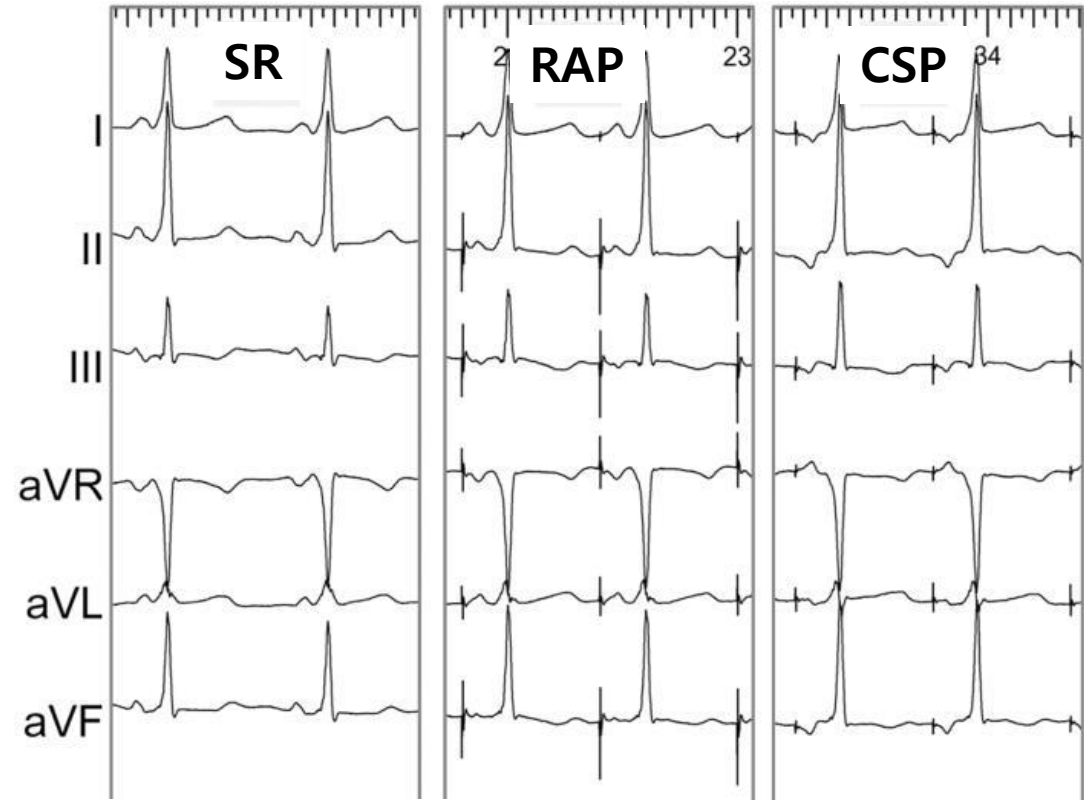
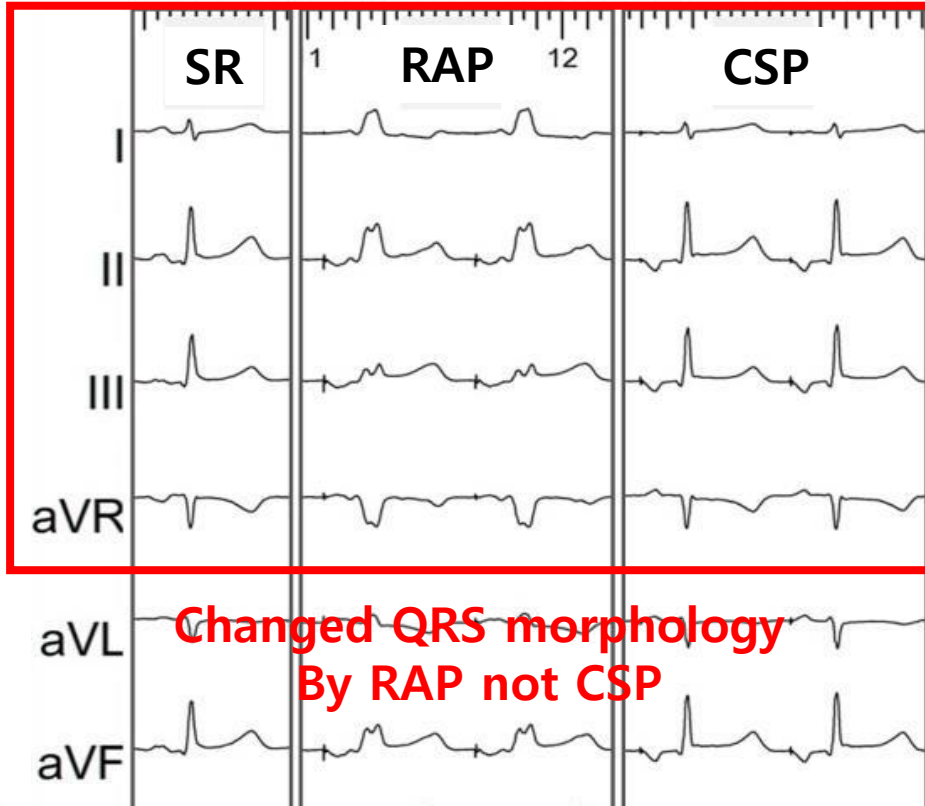
Fully pre-excitation



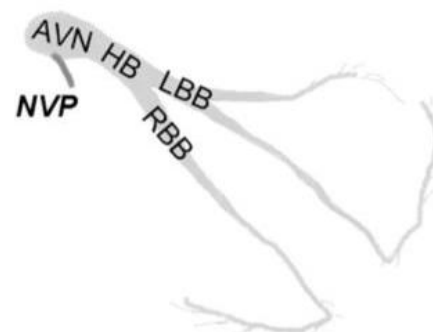
C



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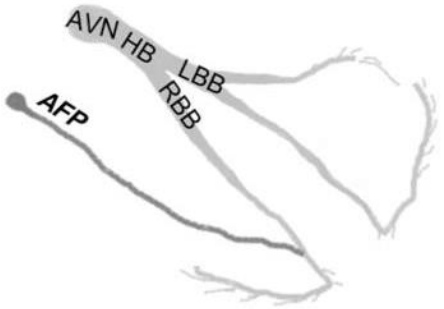
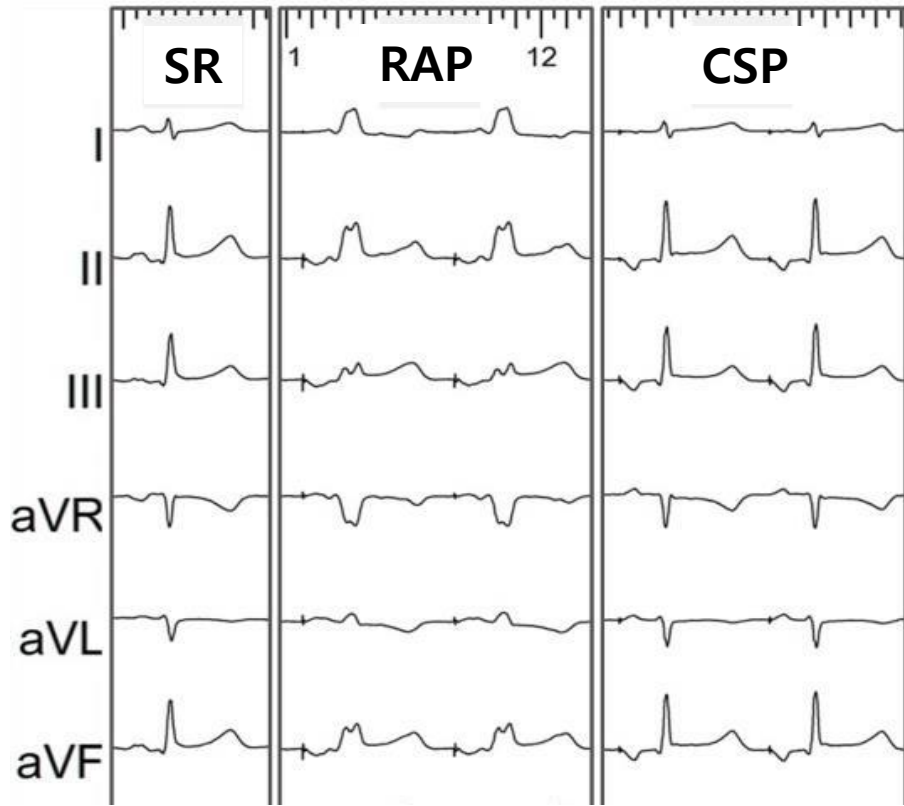


Atrio-fascicular BT
Atrio-ventricular BT

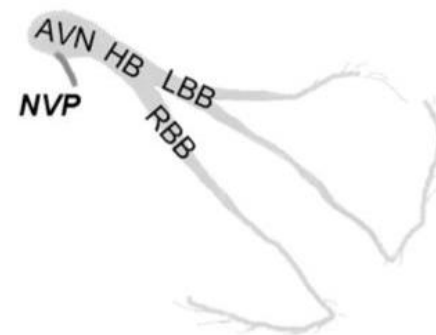
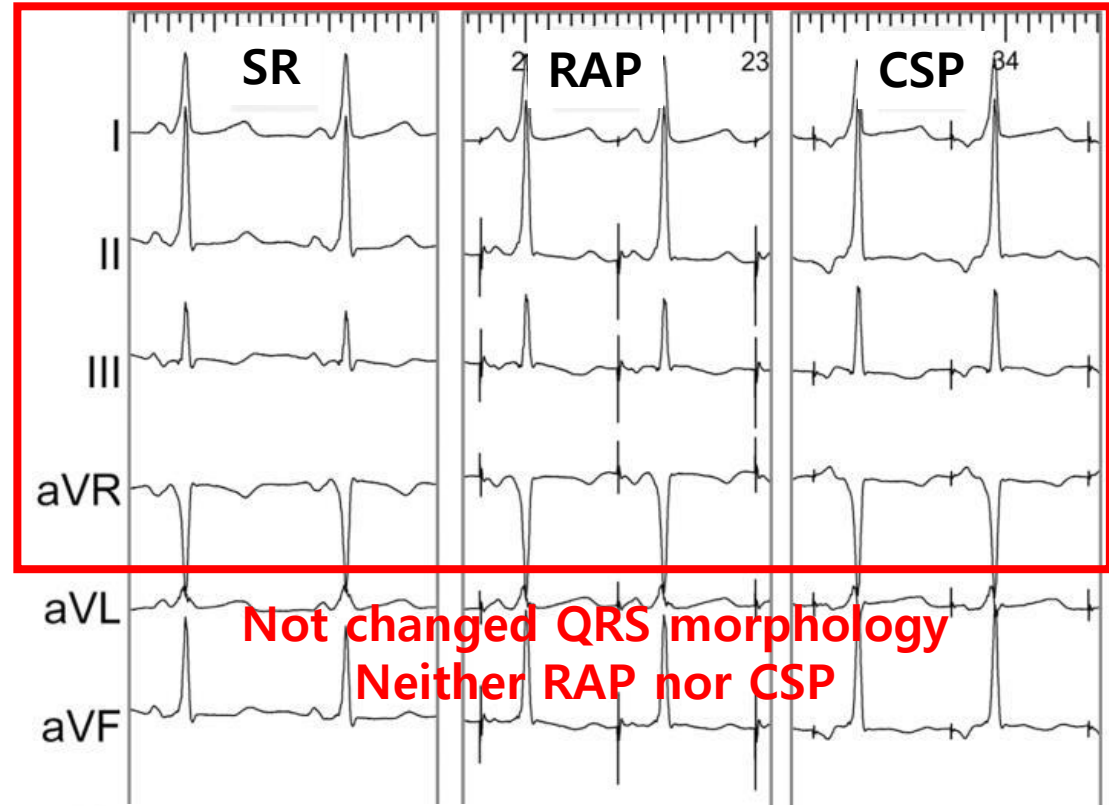


Nodo-fascicular BT
Nodo-ventricular BT
Fasciculo-ventricular BT

1. Atypical bypass tracts



Atrio-fascicular BT
Atrio-ventricular BT



Nodofascicular BT
Nodo-ventricular BT
Fasciculo-ventricular BT

1. Atypical bypass tracts

	Atrio-Fascicular BT	Long Atrio-Ventricular BT	Nodo-Fascicular BT	Nodo-Ventricular BT	Fasciculo-Ventricular BT	Short Atrio-Ventricular BT
Pre-excited QRS	Relative narrow QRS	Wider than AF	Relative narrow QRS	Wide QRS	Wide QRS	Wide QRS
Multi site atrial pacing	Wide QRS	Wide QRS	Fixed QRS	Fixed QRS	Fixed QRS	Wide QRS
Aberrancy pattern	Typical	-	Typical	-	Typical	-
Incremental Atrial pacing	Decremental conduction	Decremental conduction	Decremental conduction	Decremental conduction	Fixed QRS	Fixed QRS



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The earliest V site is near RV apex



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The earliest V site is TV annulus



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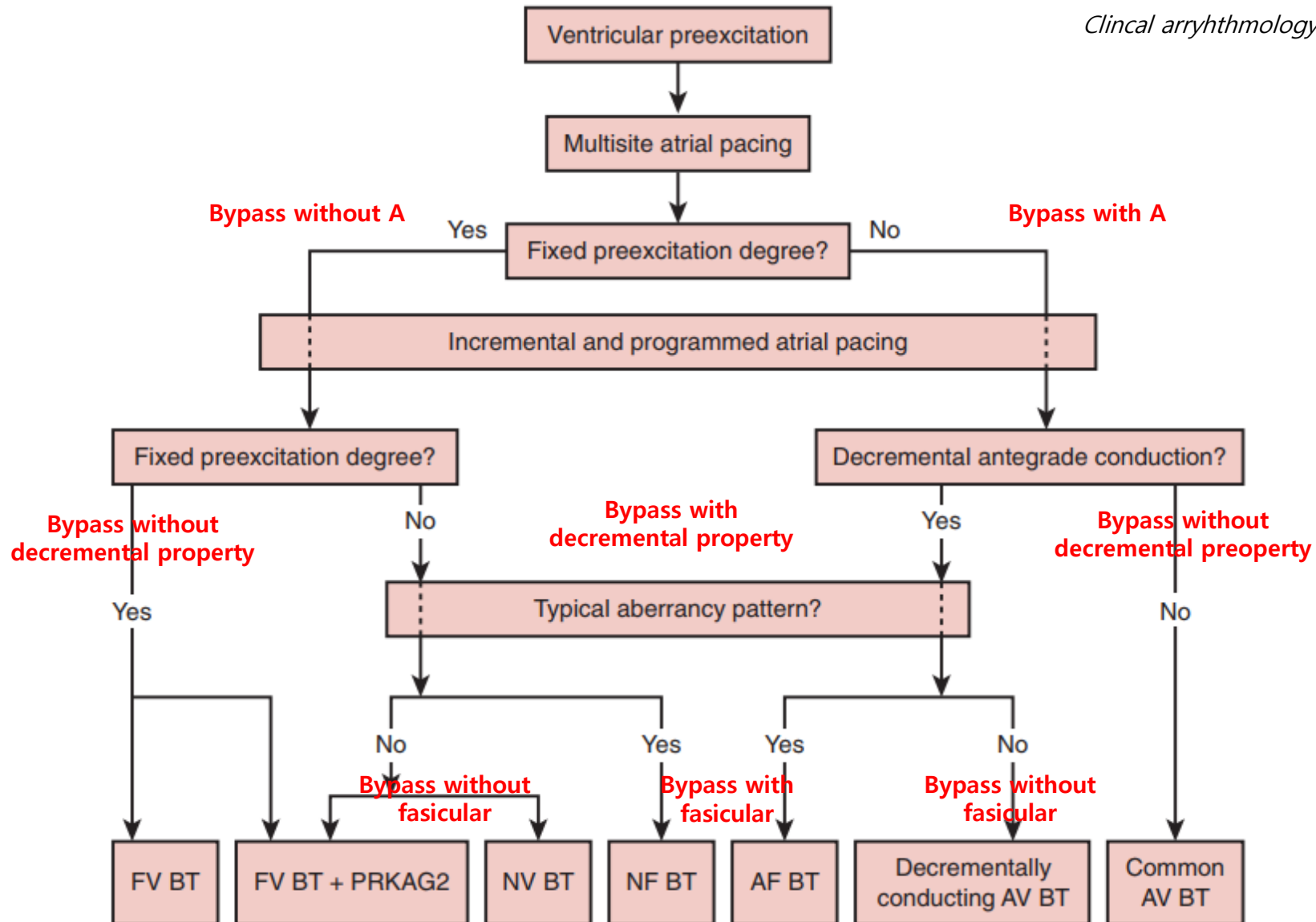
1. Atypical bypass tracts

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1. Atypical bypass tracts

Clinical arrhythmology and EP, 19. Atypical bypass tracts



2. Pre-excited SVTs



2. Pre-excited SVTs

- AT/AFL with bystander bypass tract
- AVNRT with bystander bypass tract
- antidromic AVRT
- AVRT using 2 or more bypass tracts



2. Pre-excited SVTs

AT/AFL with bystander bypass tract

- 1:1 or greater than 1:1 AV ratio
- AV ratio is greater than 1:1, it is easy to distinguish

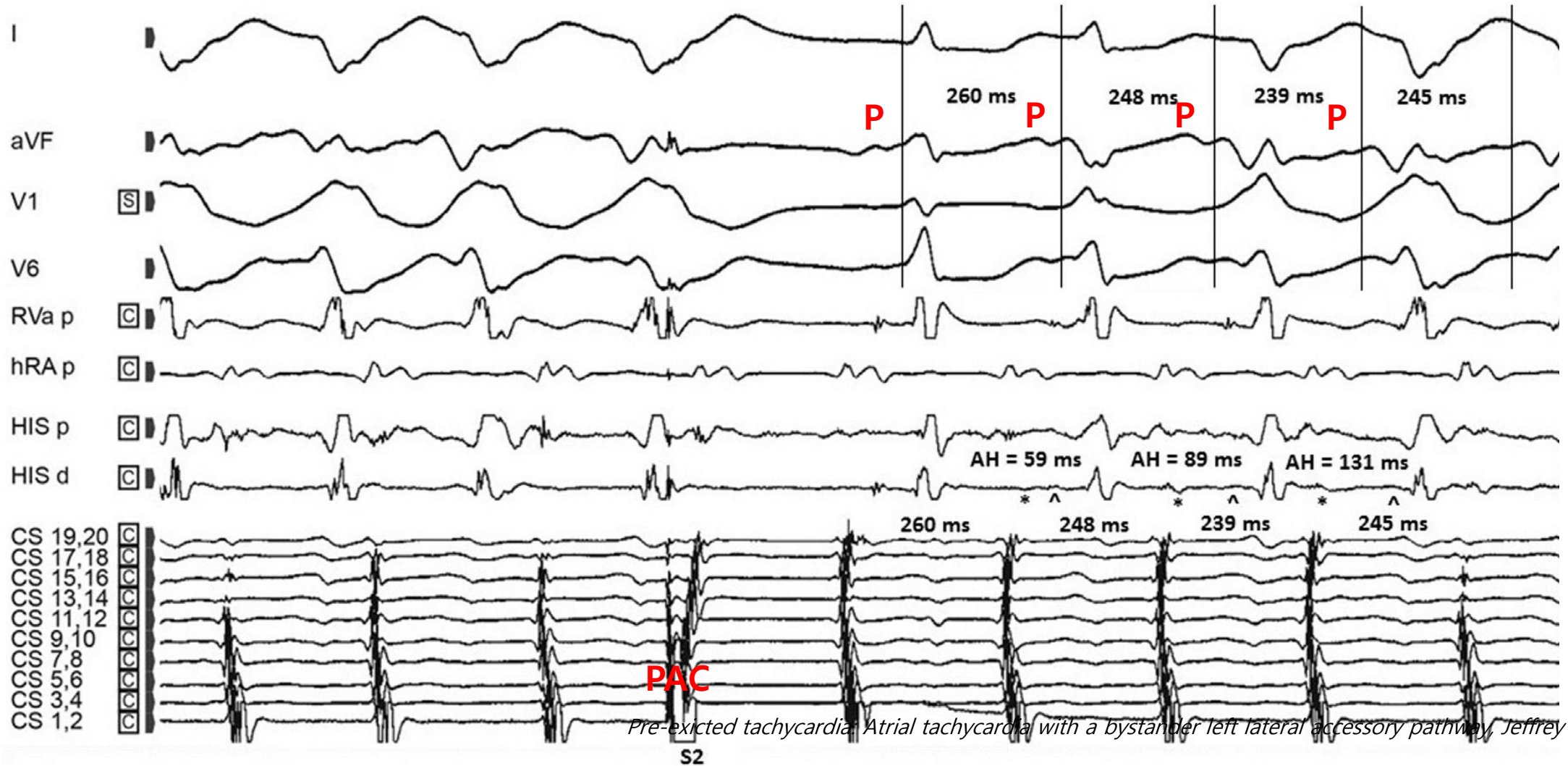
Distinct P wave of AT or

Typical sawtooth flutter wave of AFL

- If it is maintain to 1:1 AV ratio, the first is bypass tract ablation



2. Pre-excited SVTs

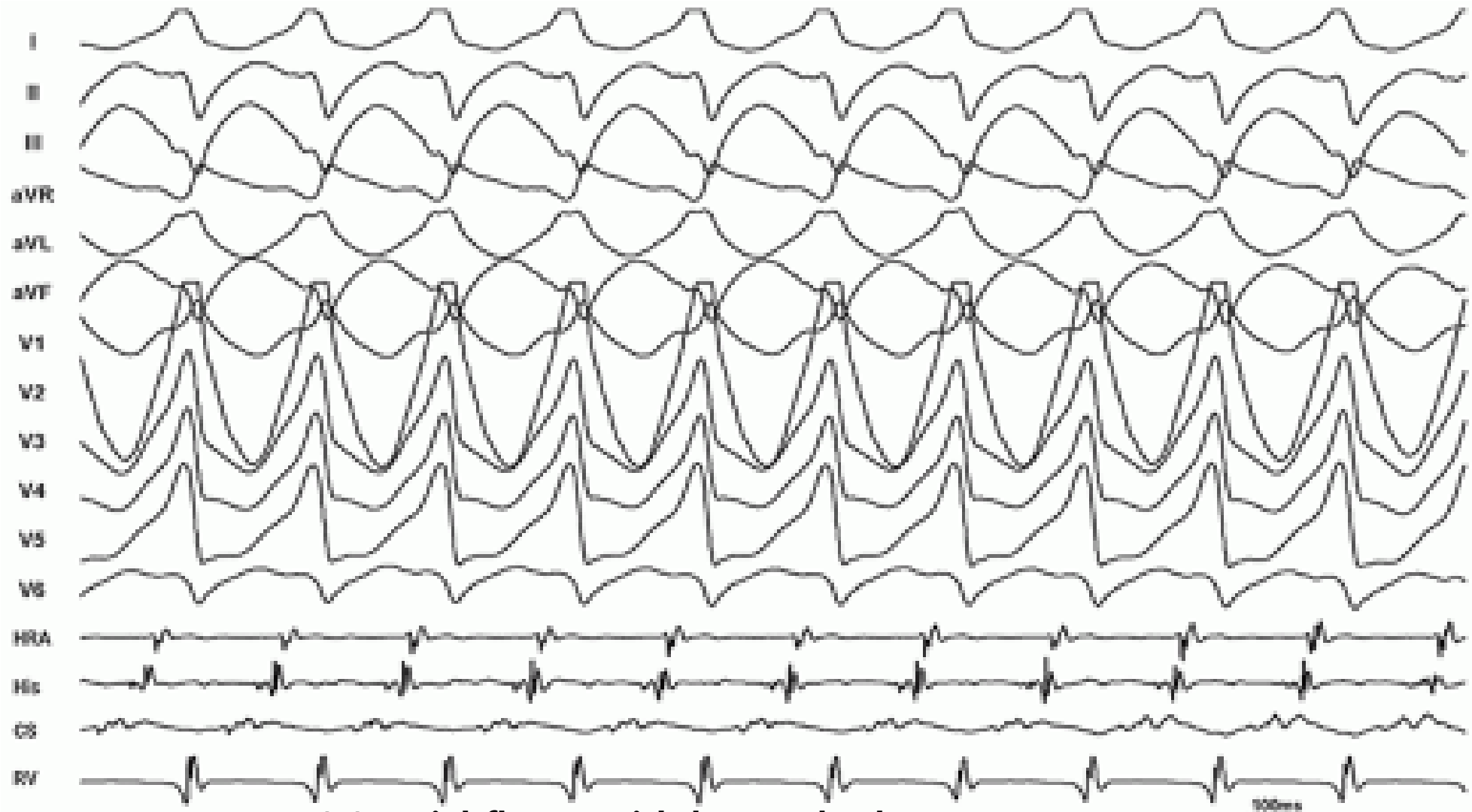


Pre-excited tachycardia: Atrial tachycardia with a bystander left lateral accessory pathway, Jeffrey Munro.

Atrial tachycardia with bystander bypass tract



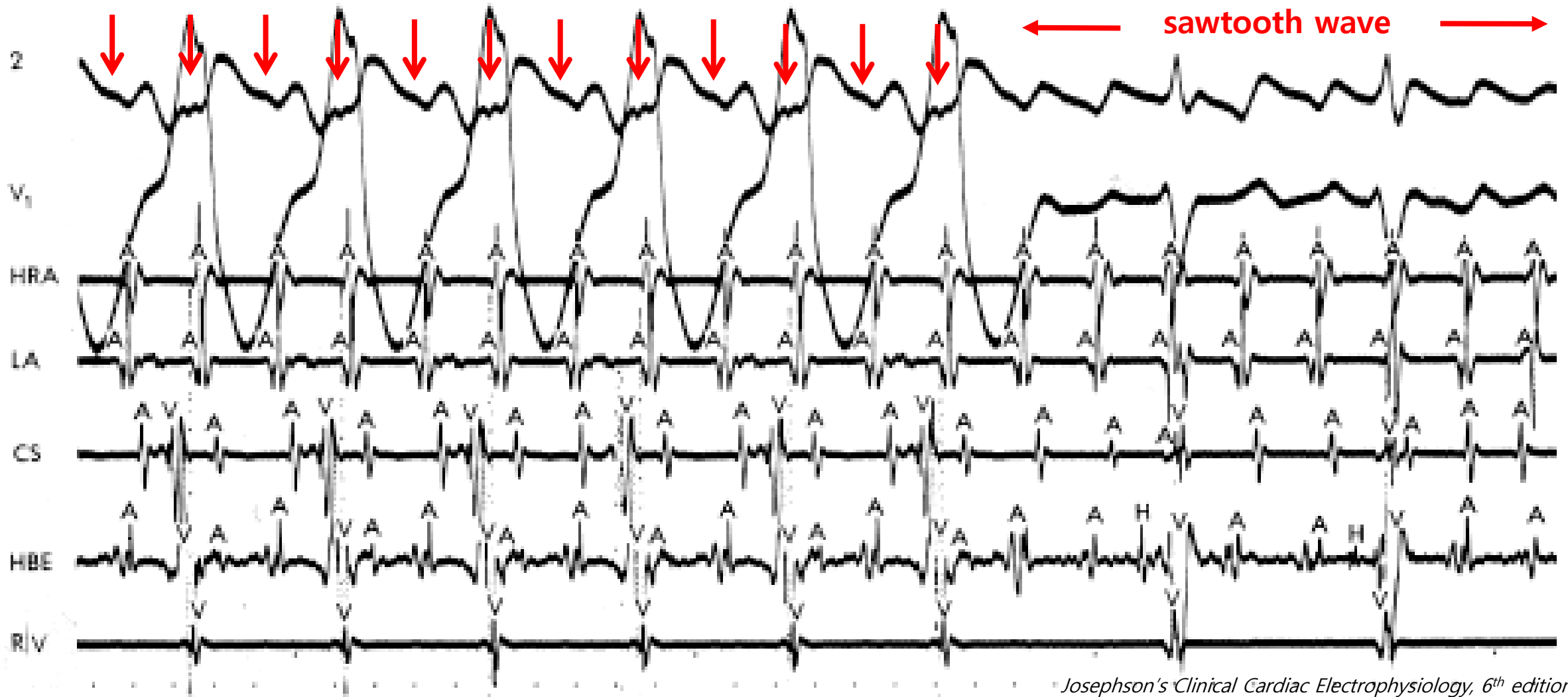
2. Pre-excited SVTs



1:1 Atrial flutter with bystander bypass tract



2. Pre-excited SVTs



Josephson's *Clinical Cardiac Electrophysiology*, 6th edition, Ch.9

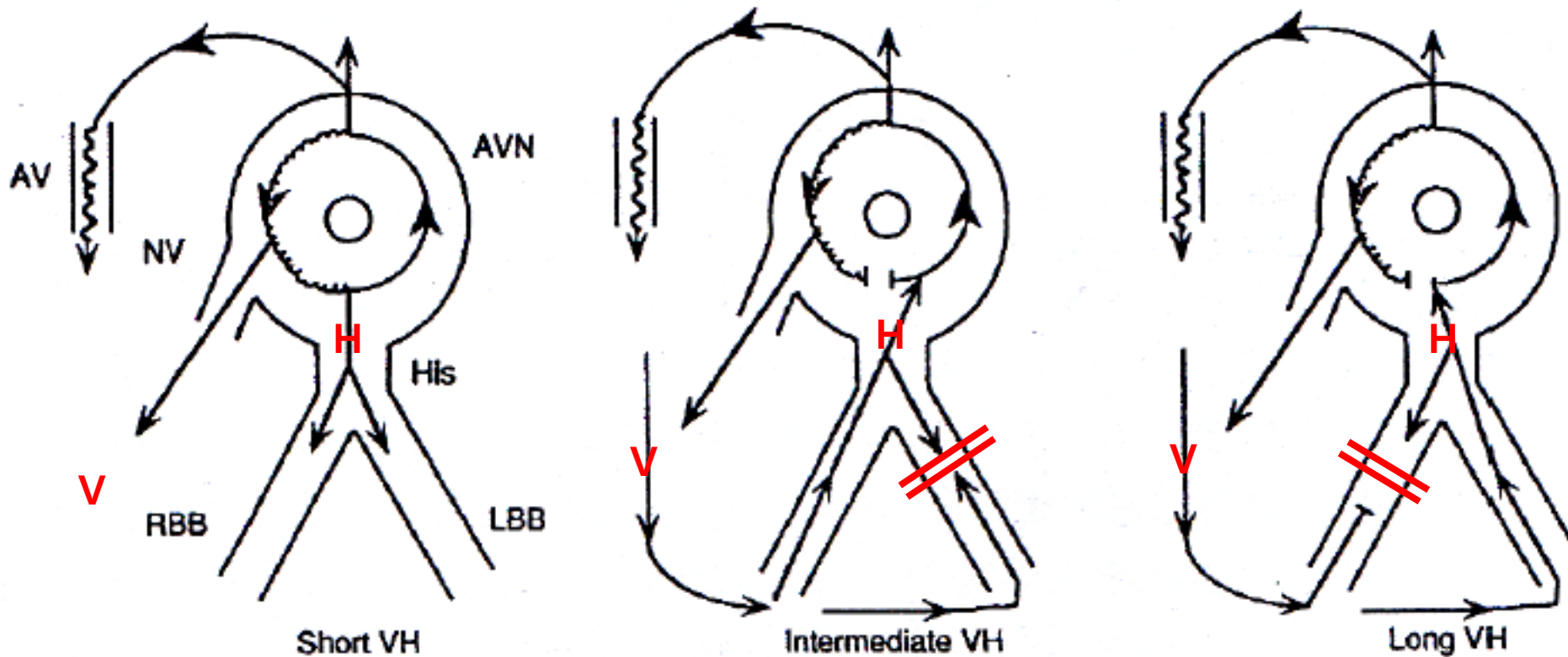
2:1 Atrial flutter with bystander bypass tract converted to 3:1 atrial flutter

KHRS 2023



2. Pre-excited SVTs

Slowly conducting AV and/or NV bypass tract



AVNRT with bystander

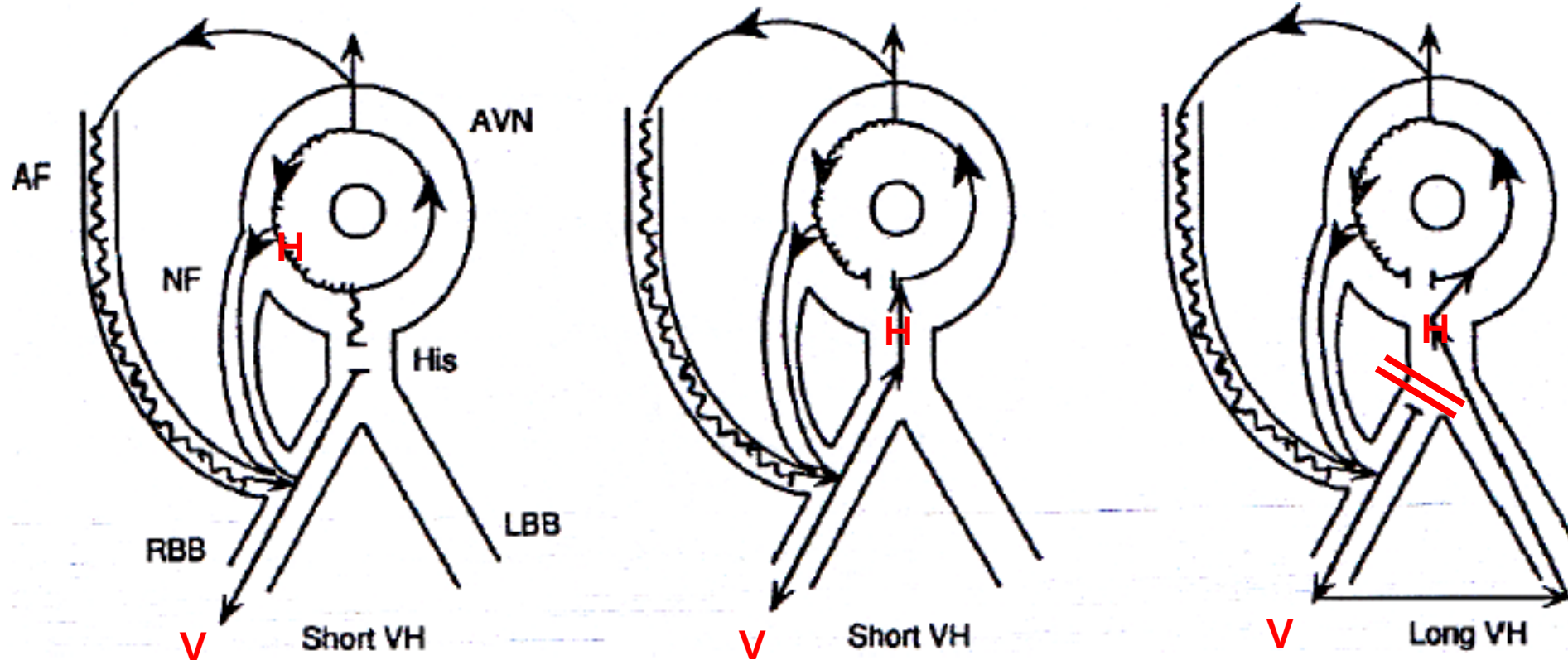
Antidromic AV/NVRT

Antidromic AV/NVRT with RBBB



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Slowly conducting AF and/or NF bypass tract



AVNRT with bystander

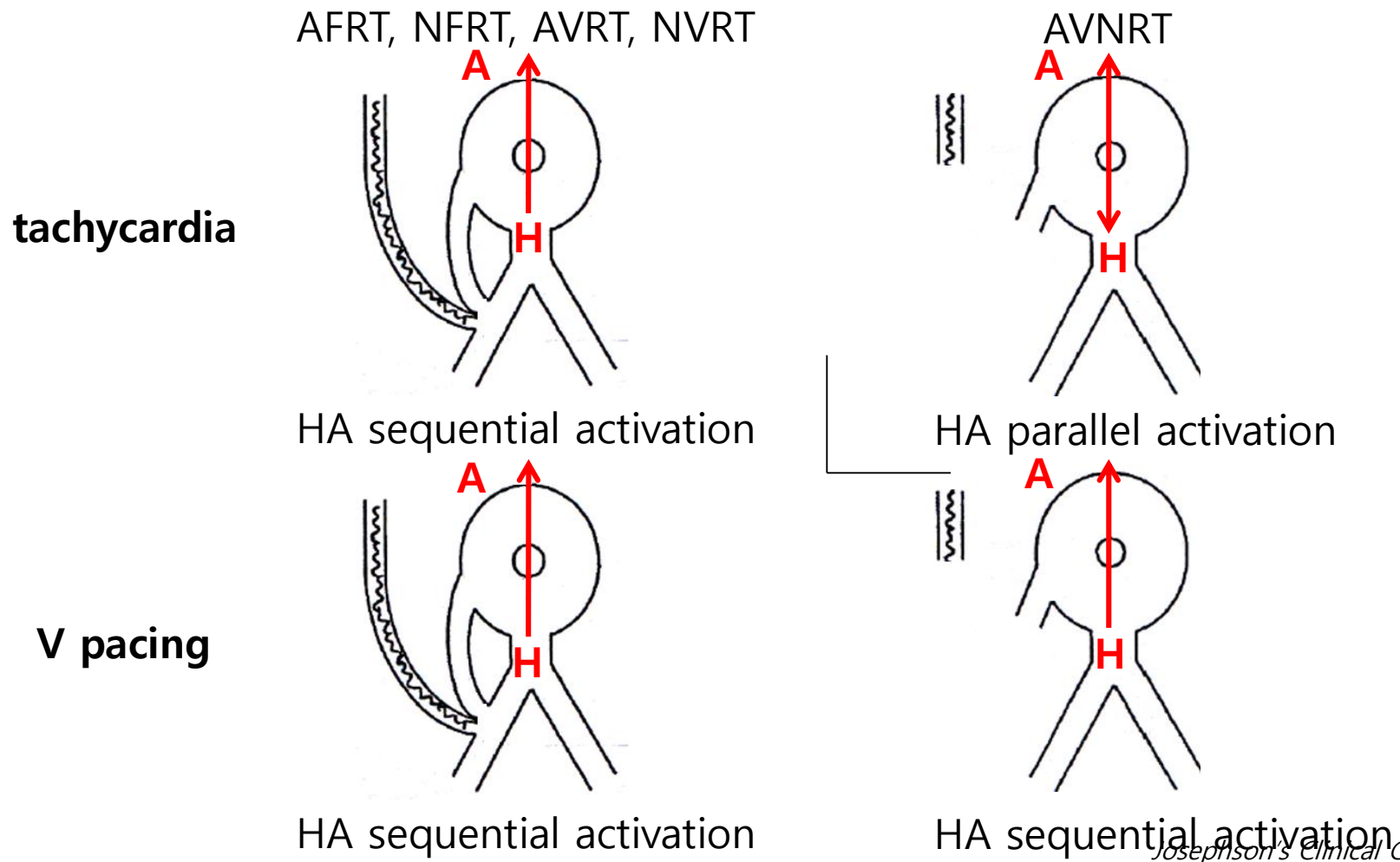
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Antidromic AF/NFRT with RBBB



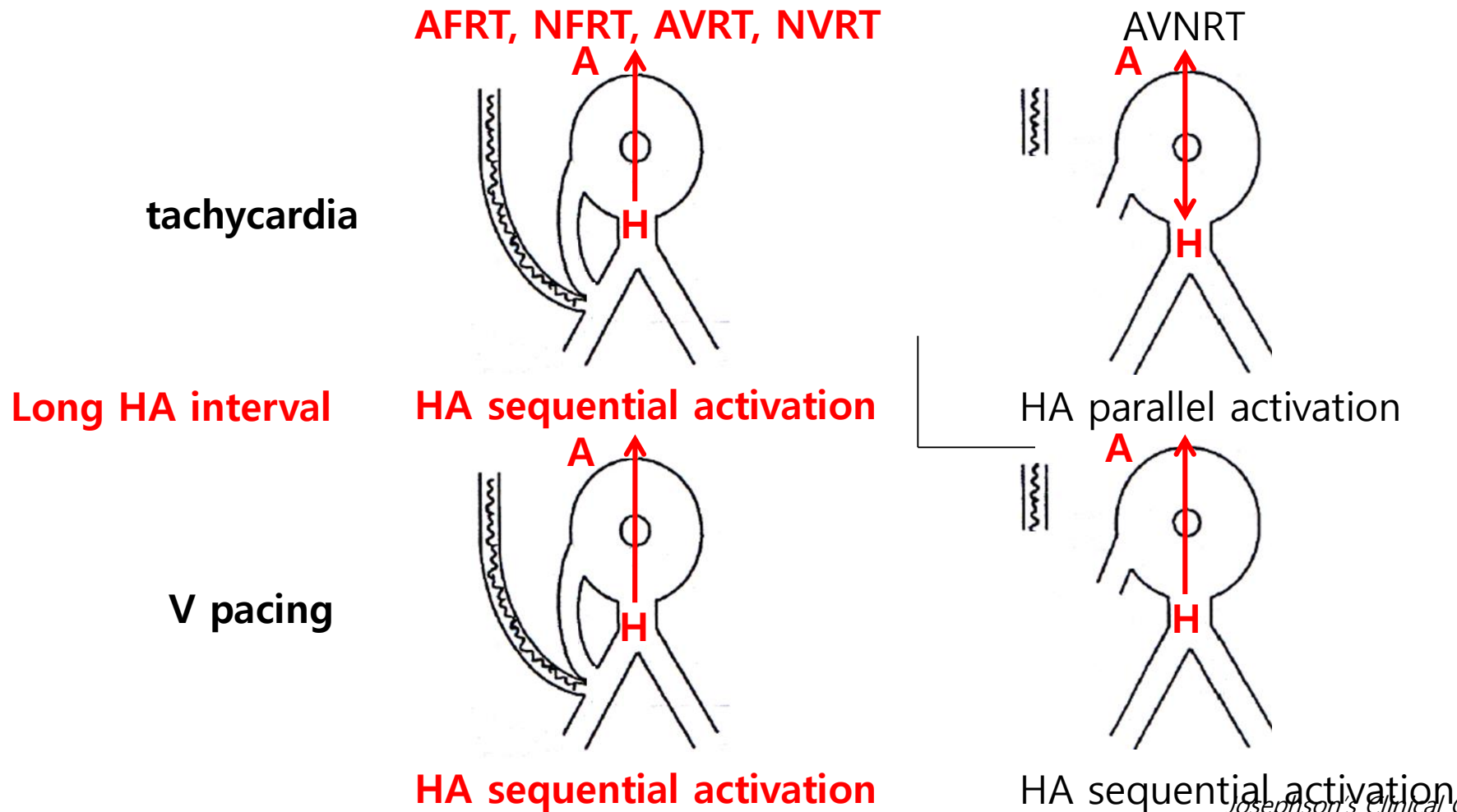
2. Pre-excited SVTs

- Comparison of HA interval during tachycardia and V pacing



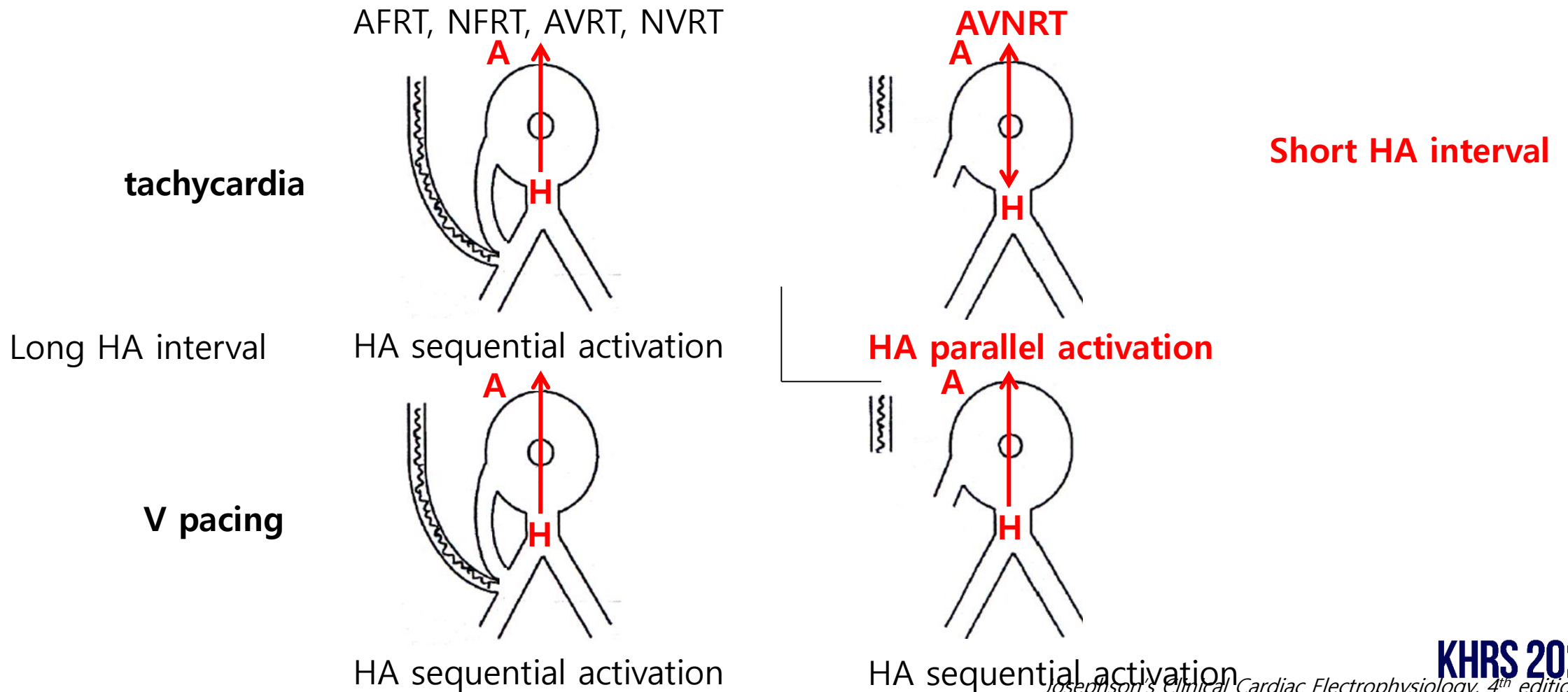
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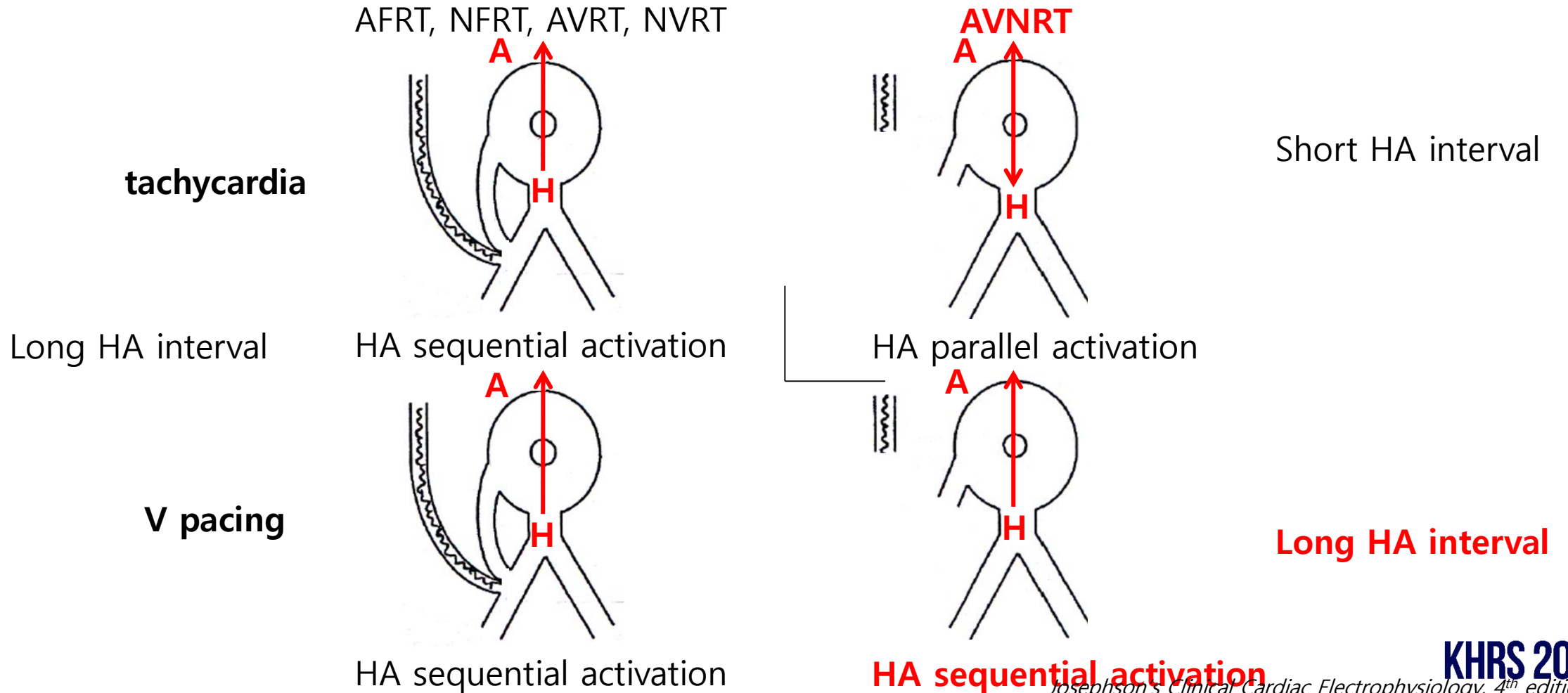
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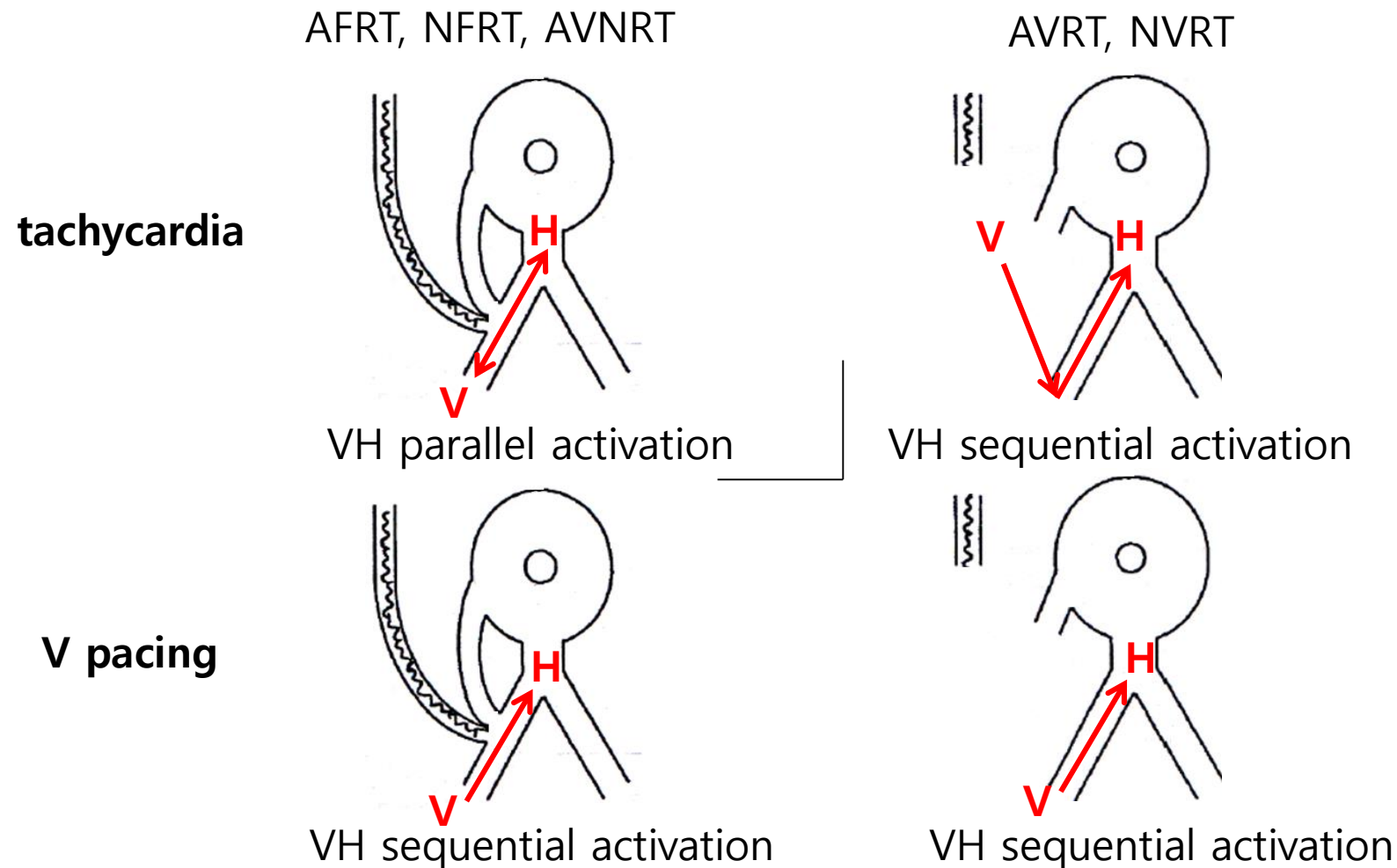
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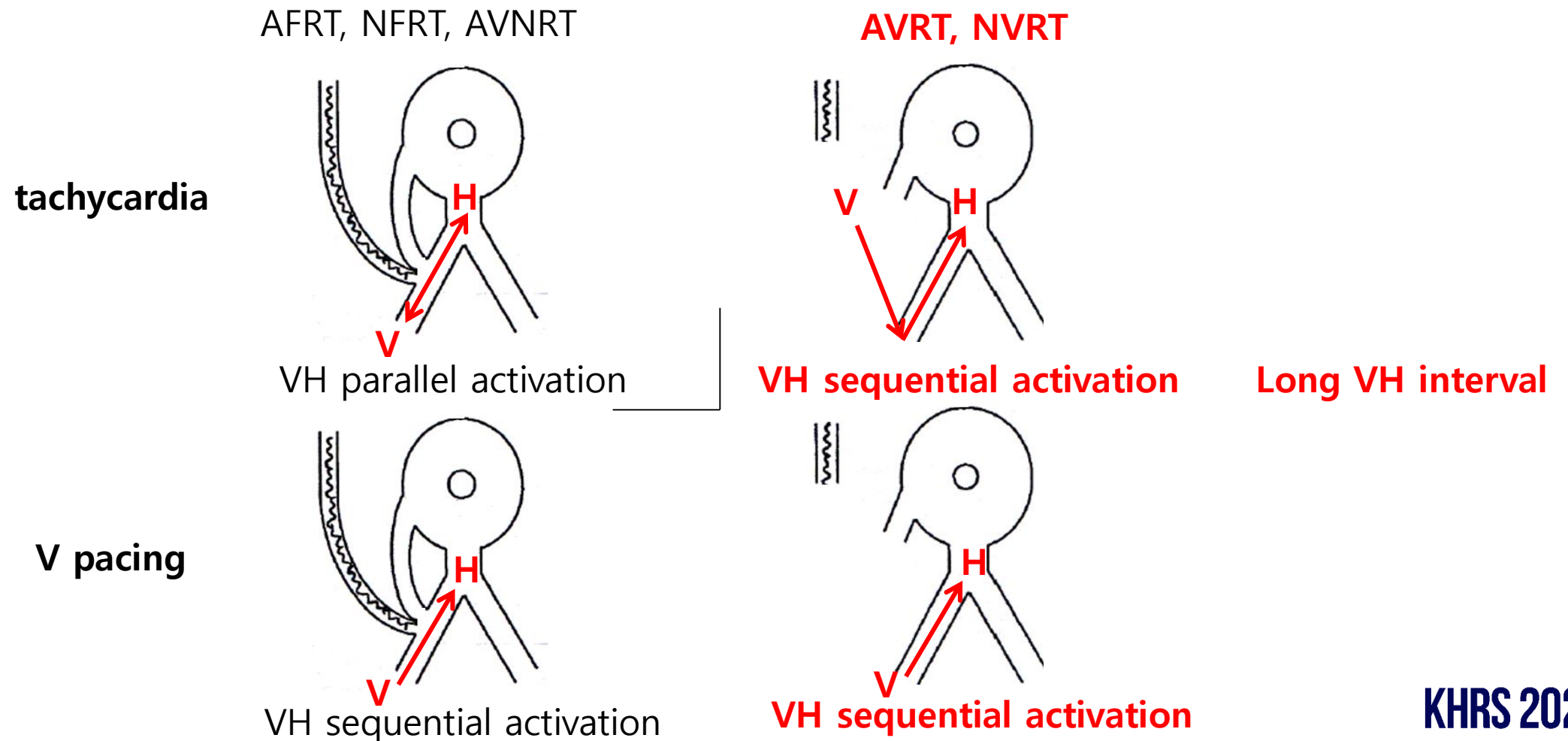
2. Pre-excited SVTs

- Comparison of VH interval during tachycardia and V pacing



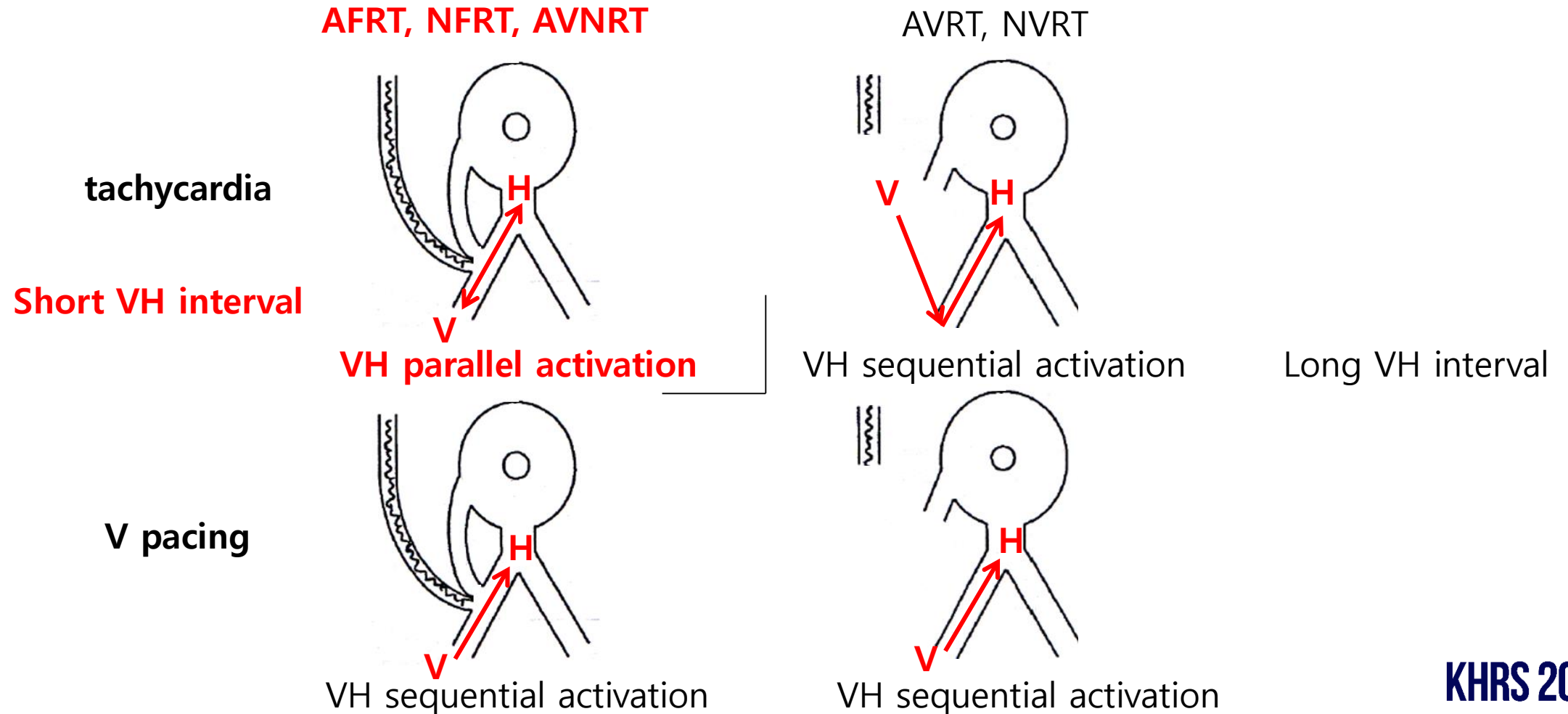
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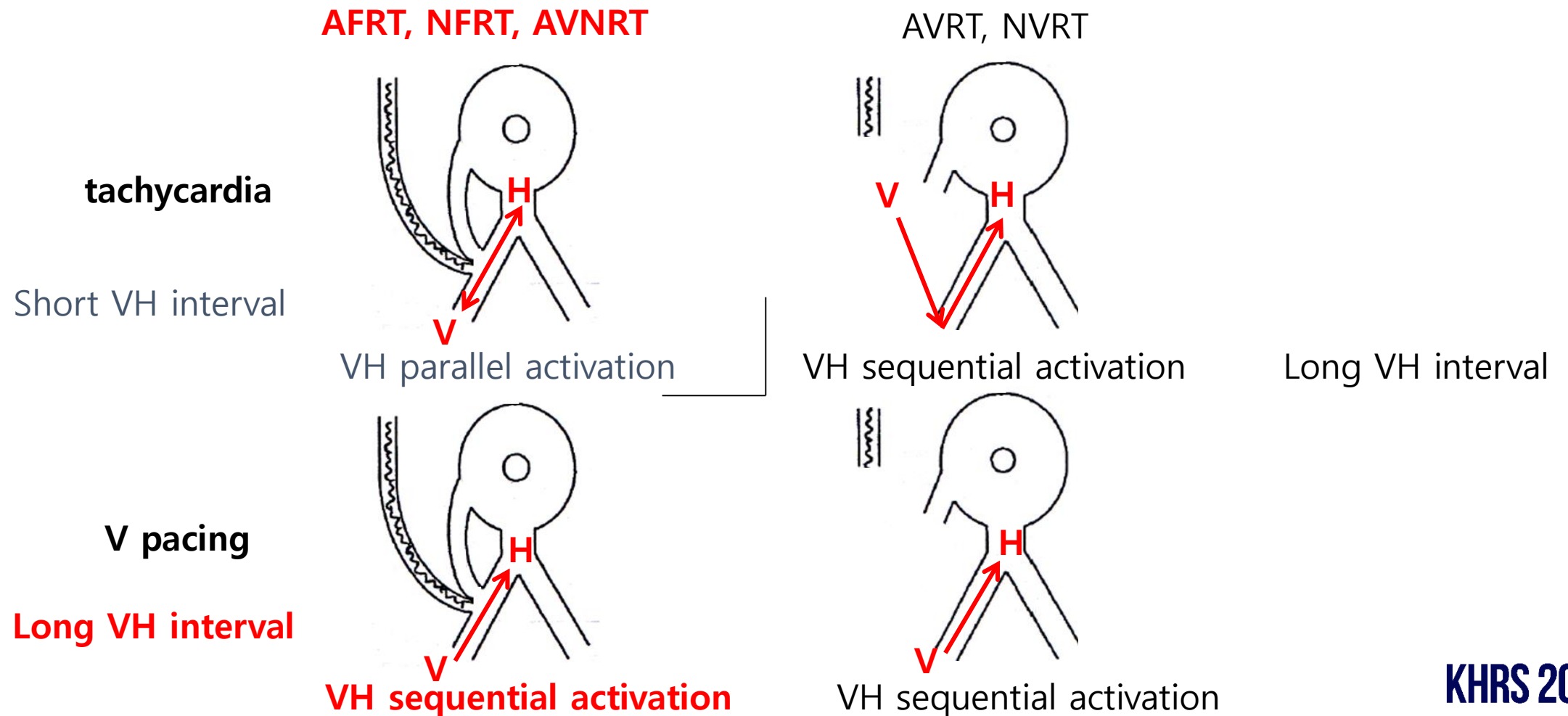
2. Pre-excited SVTs

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2. Pre-excited SVTs

- Comparison of VH interval during tachycardia and V pacing



2. Pre-excited SVTs

AVNRT with bystander BT

- $HA_{SVT} < HA_{RVP}$, $VH_{SVT} < VH_{RVP}$
- H before RB
- Unchanged TCL with BT or BBB

Antidromic AFRT, NFRT

- Short VH : $HA_{SVT} = HA_{RVP}$, $VH_{SVT} < VH_{RVP}$, RB before RB
- Long VH : $HA_{SVT} = HA_{RVP}$, $VH_{SVT} > VH_{RVP}$, H before RB

Antidromic AVRT, NVRT

- Intermediate VH : $HA_{SVT} = HA_{RVP}$, $VH_{SVT} \geq VH_{RVP}$, RB before H
- Long VH : $HA_{SVT} = HA_{RVP}$, $VH_{SVT} > VH_{RVP}$, H before RB



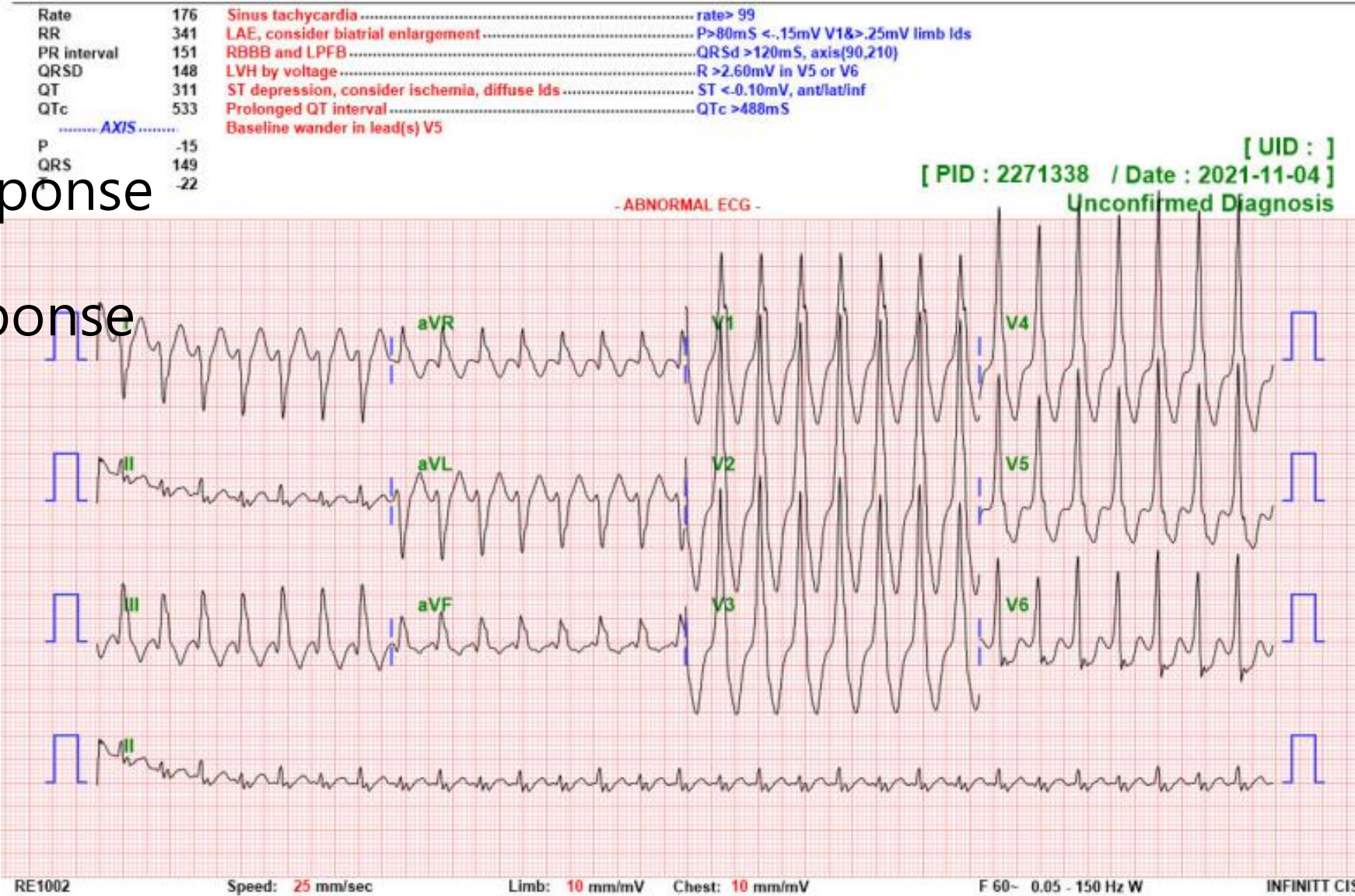
2. Pre-excited SVTs

- AVRT using 2 or more bypass tracts



ER EKG

- 20M
- Adenosine IV ; no response
- Verapamil IV ; no response



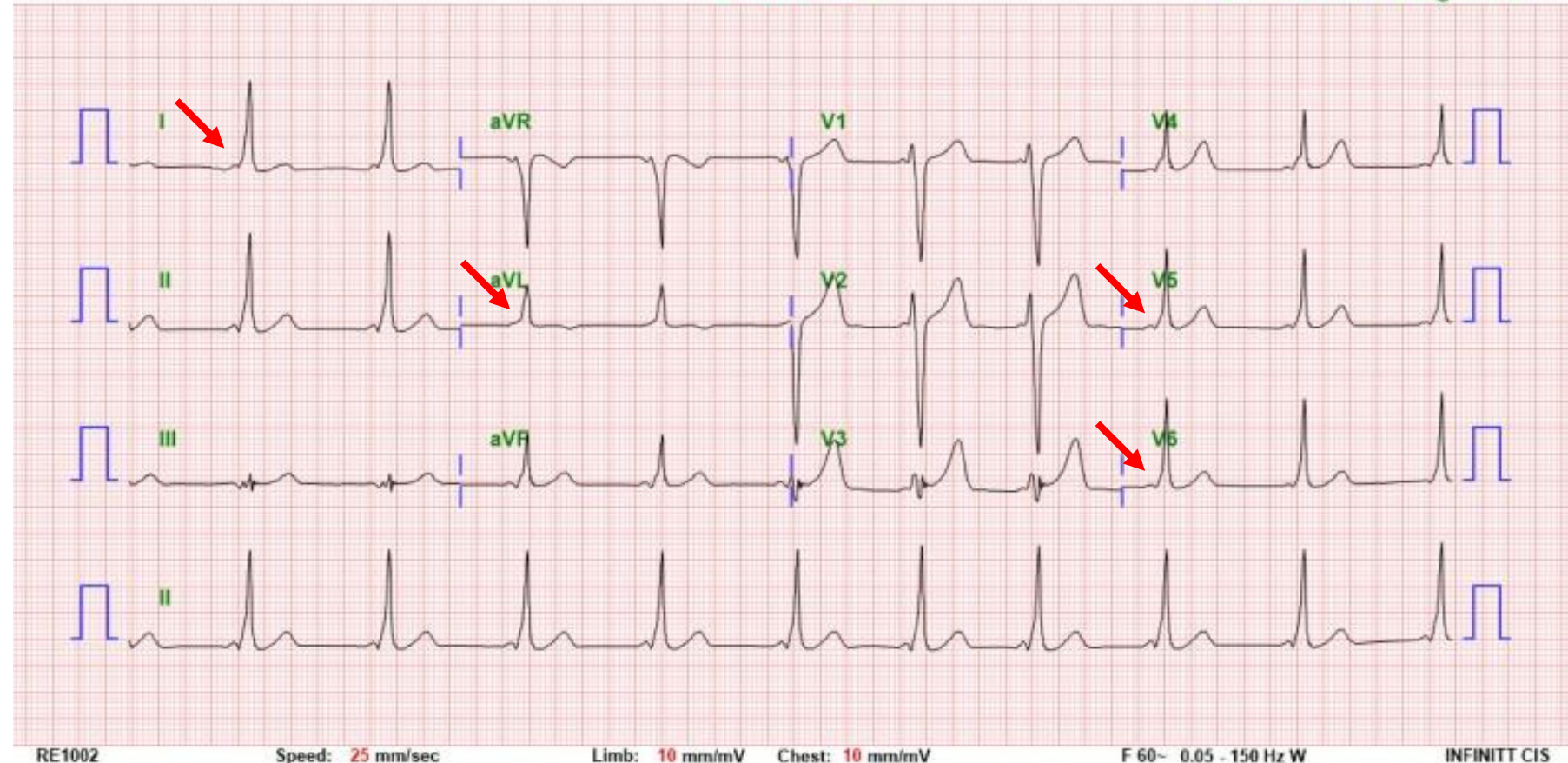
ER EKG

- right side bypass tract

Rate	61	Age not entered, assumed to be 50 years old for purpose of ECG interpretation
RR	984	Sinus rhythm normal P axis, V-rate 50-99
PR interval	76	Short PR interval PR <110mS
QRSD	145	IVCD, consider atypical LBBB QRSD>120, notch/slur R I aVL V5-6
QT	493	
QTc	497	
.....AXIS.....		
P	108	
QRS	30	
T	88	

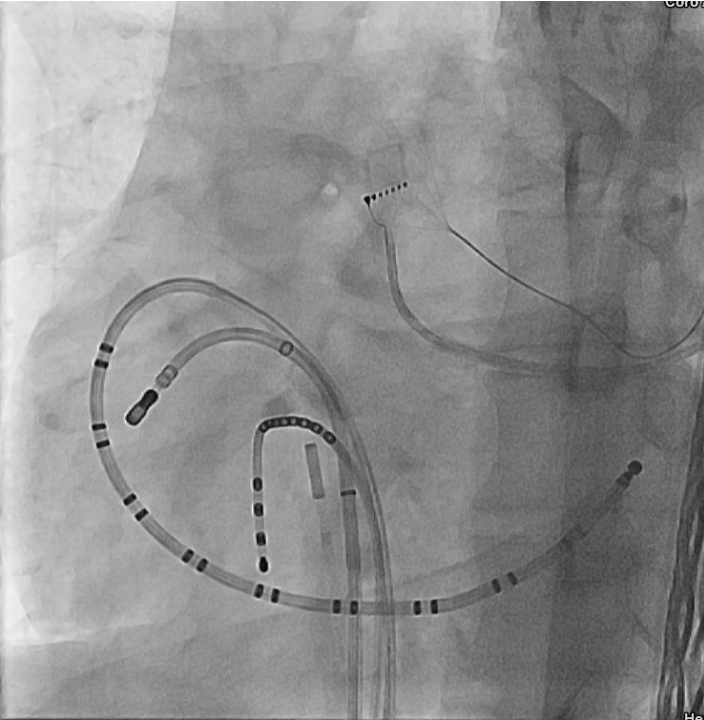
[UID :]
[PID : 2271338 / Date : 2021-11-05]
Unconfirmed Diagnosis

- ABNORMAL ECG -



EPS (Sinus Rhythm)

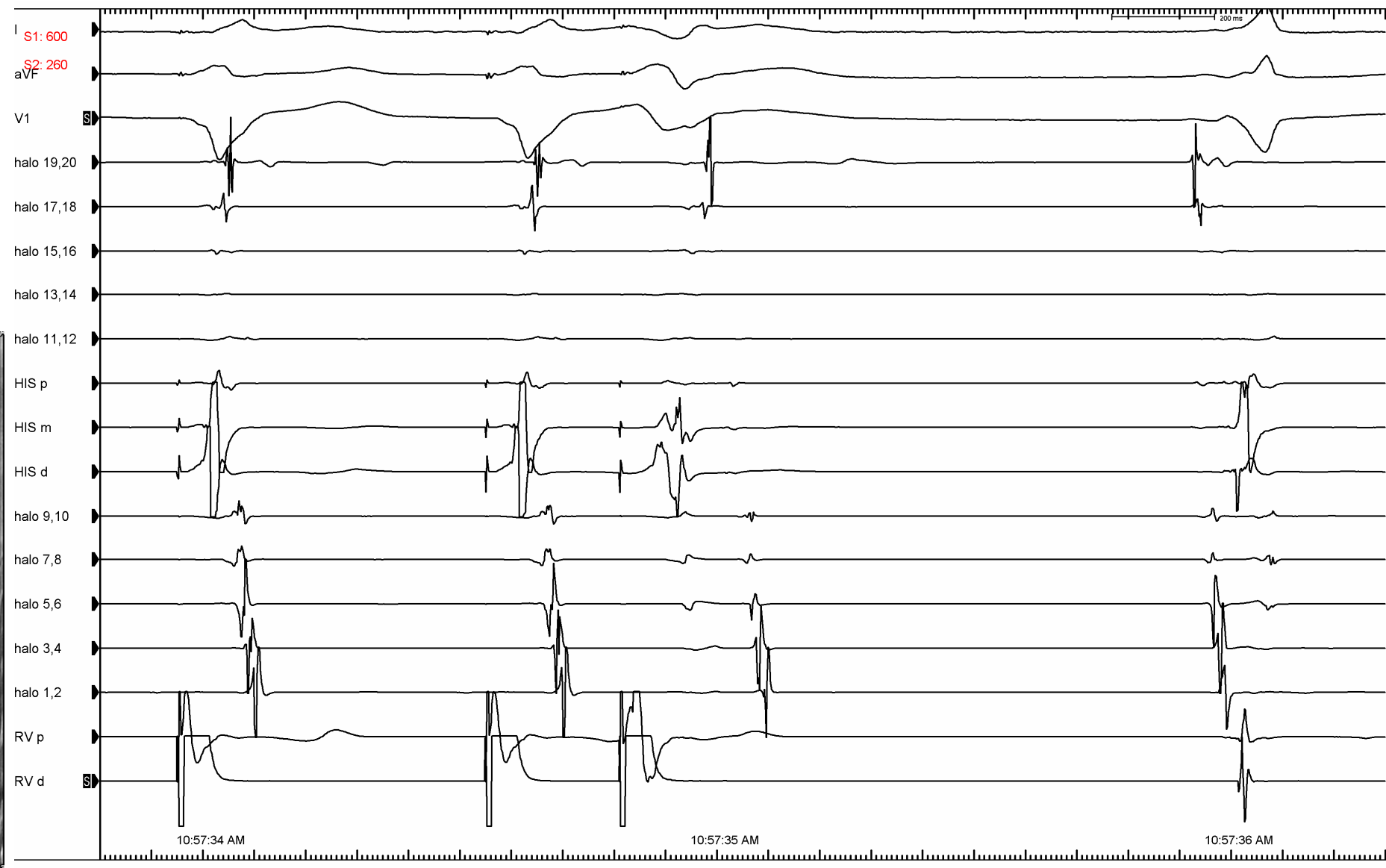
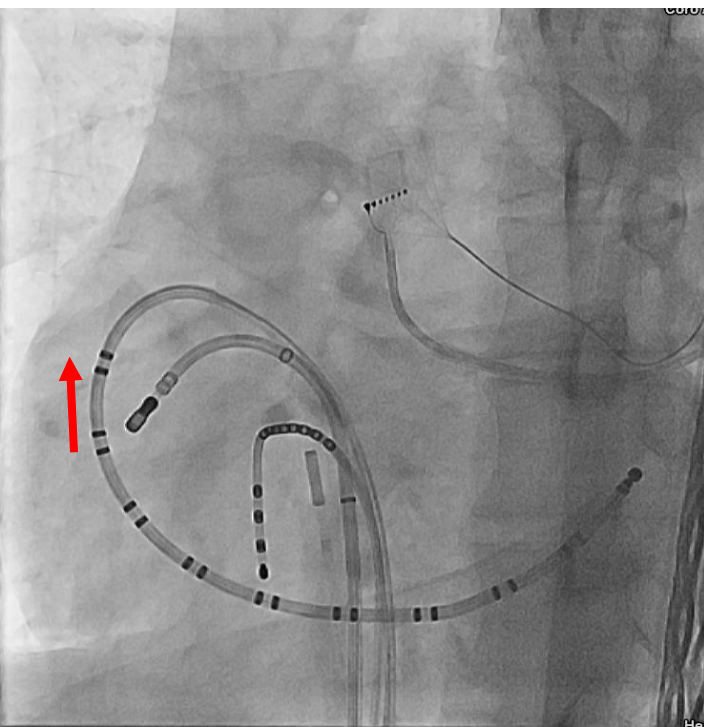
- Delta wave
- Short HV interval



EPS (RVP 600-260ms)

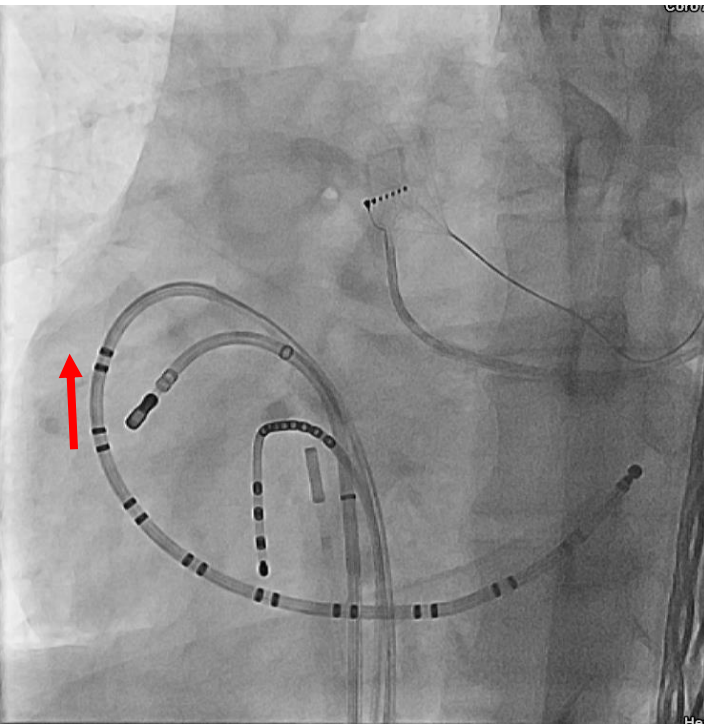
- Eccentric

- Halo 17, 18



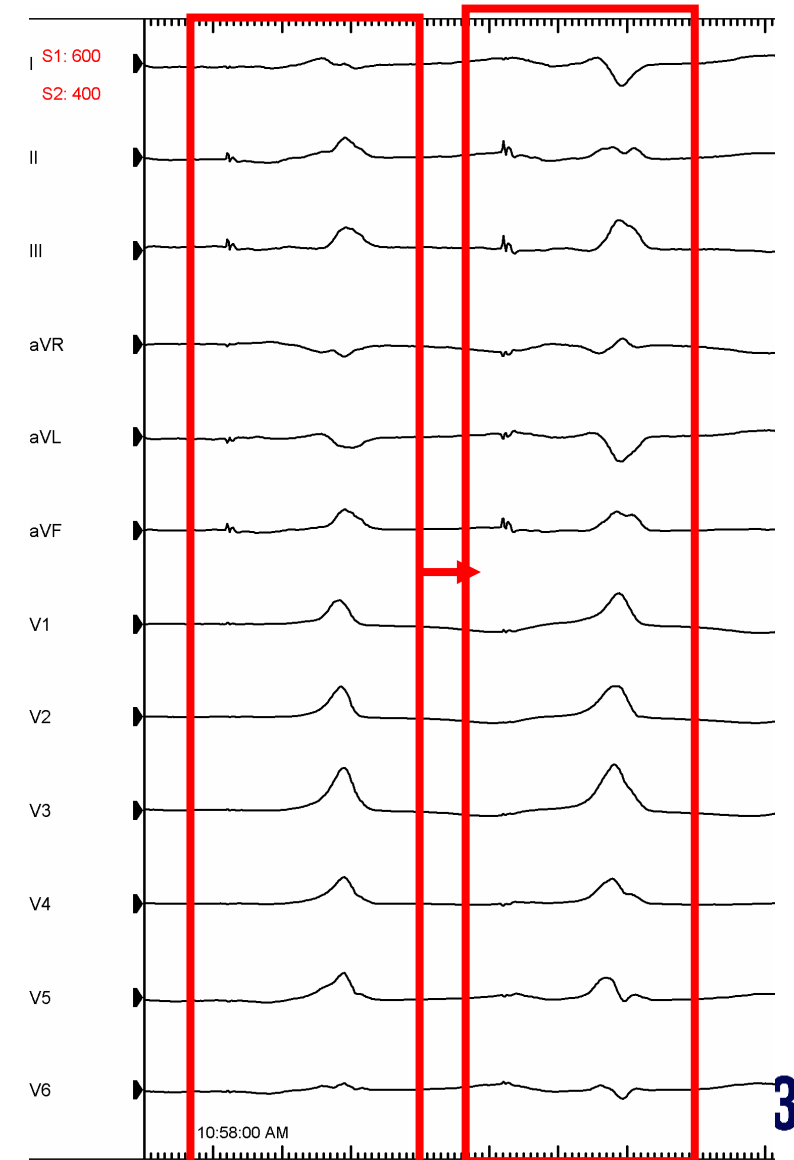
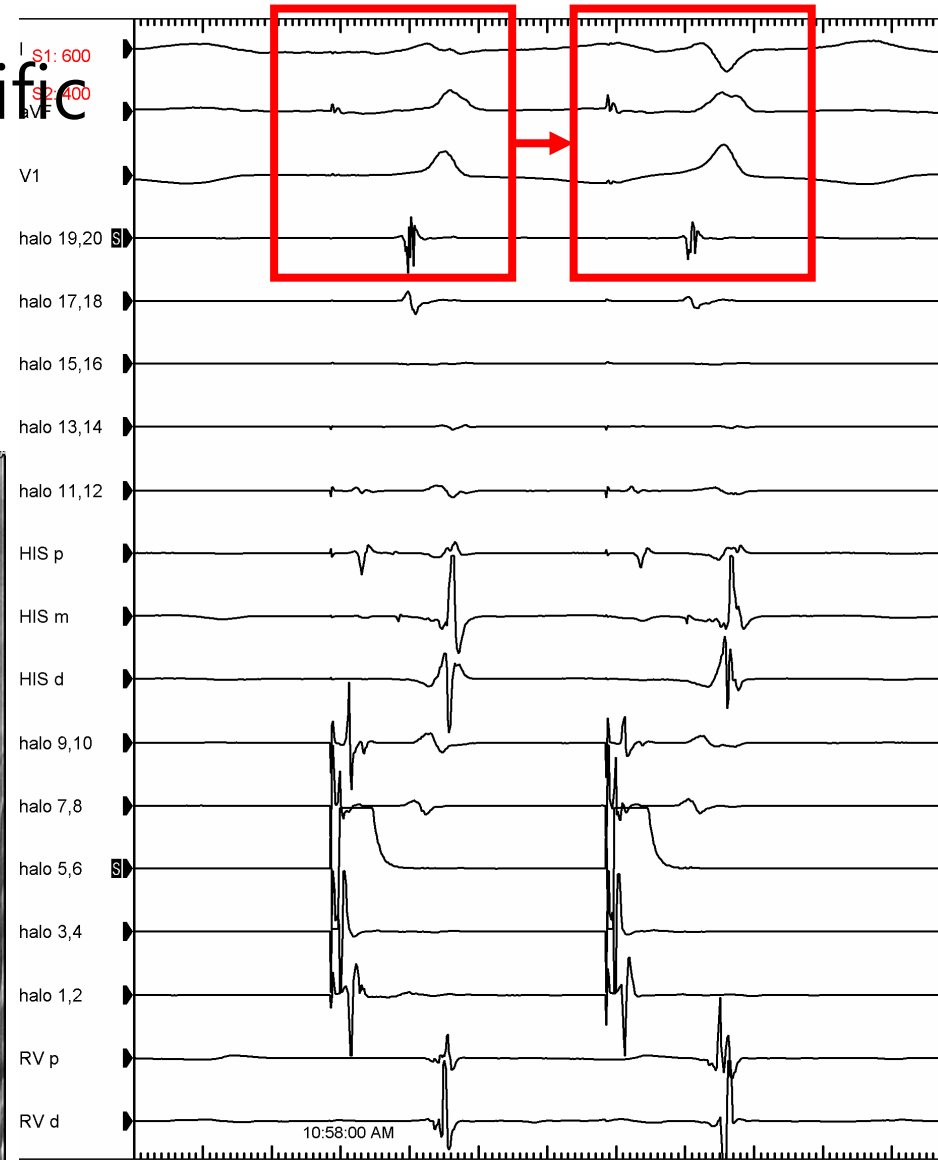
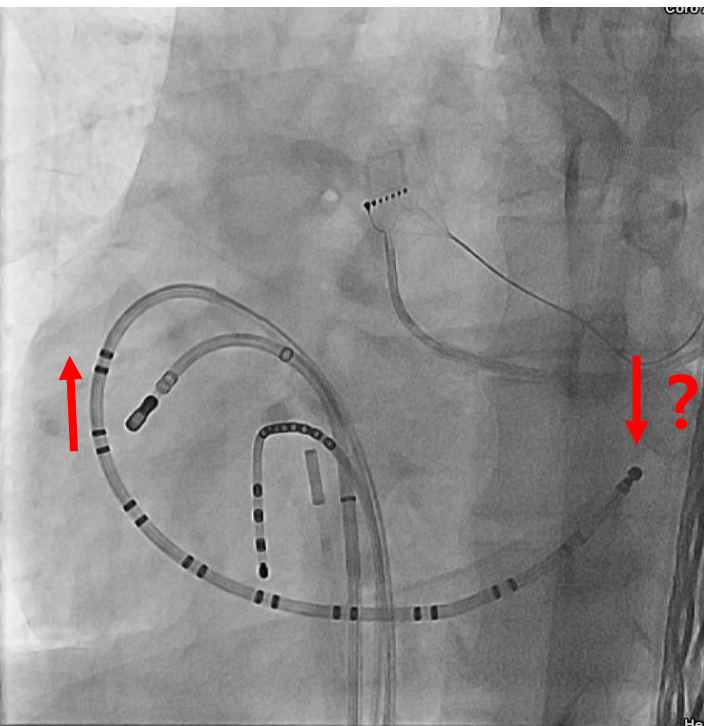
EPS (RAP 600-400ms)

- Delta wave is not changed
- Fully excitation already



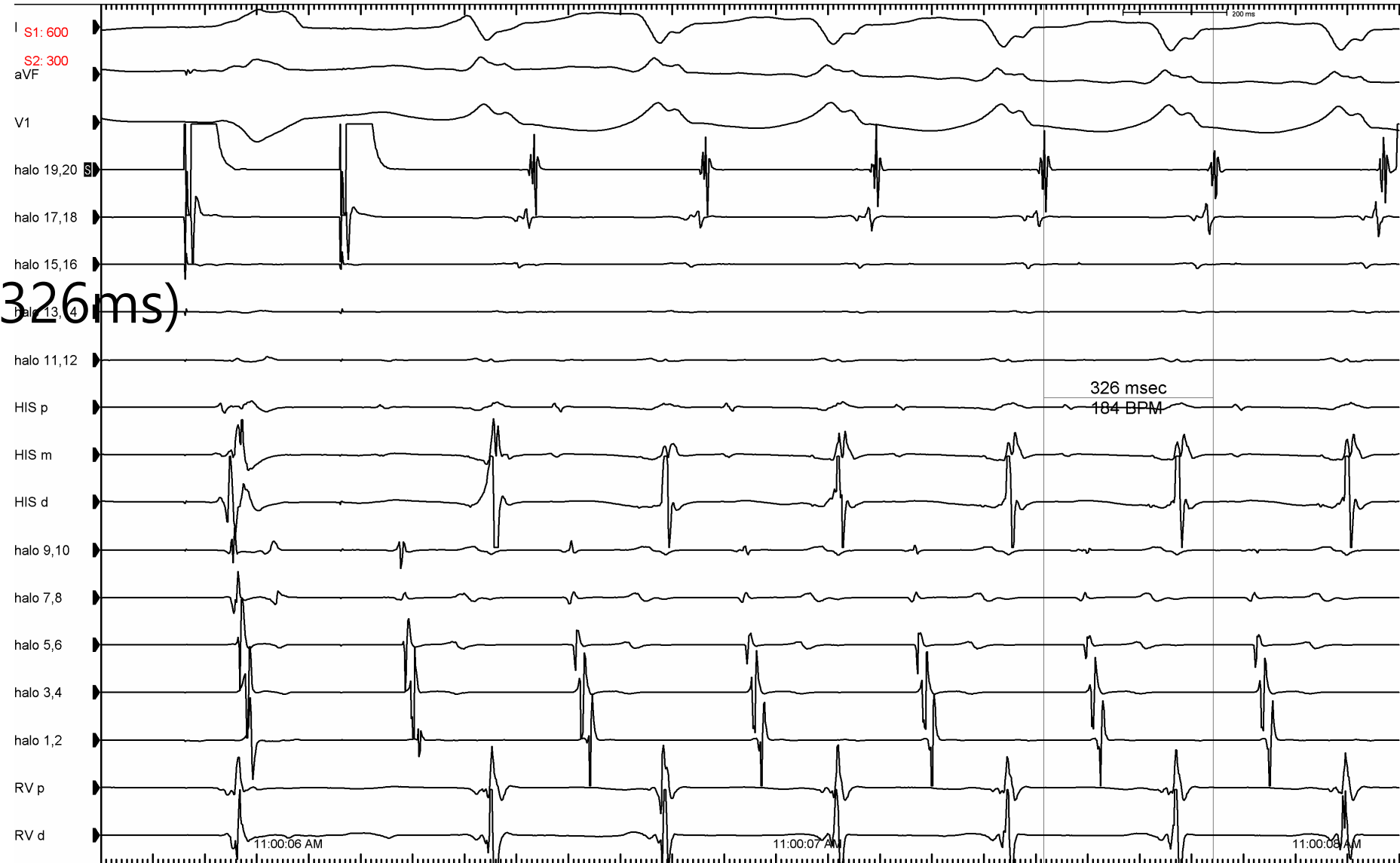
EPS (CSP 600-400ms)

- Delta wave is specific



EPS (RAP 600-300ms ; induction)

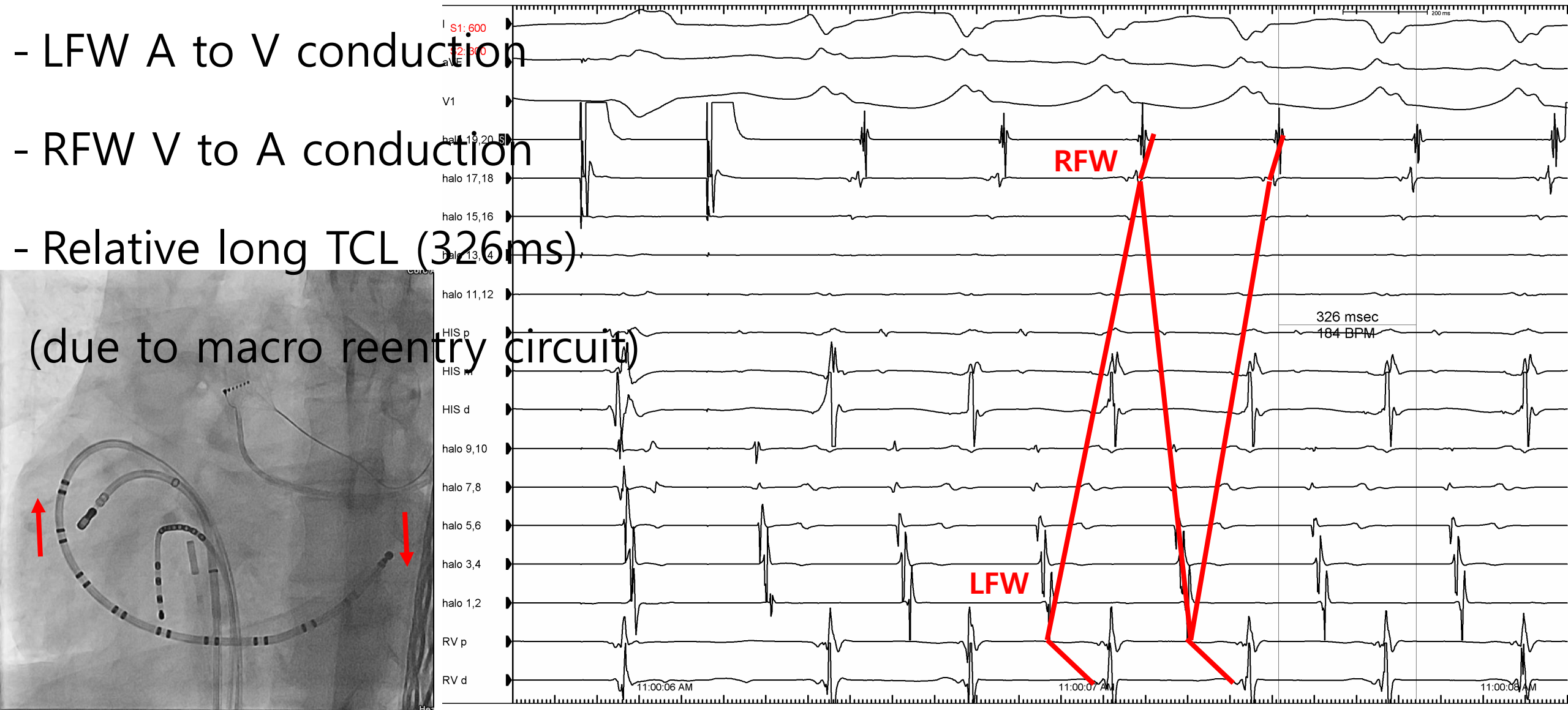
- Relative long TCL (326ms)



EPS (RAP 600-300ms ; induction)

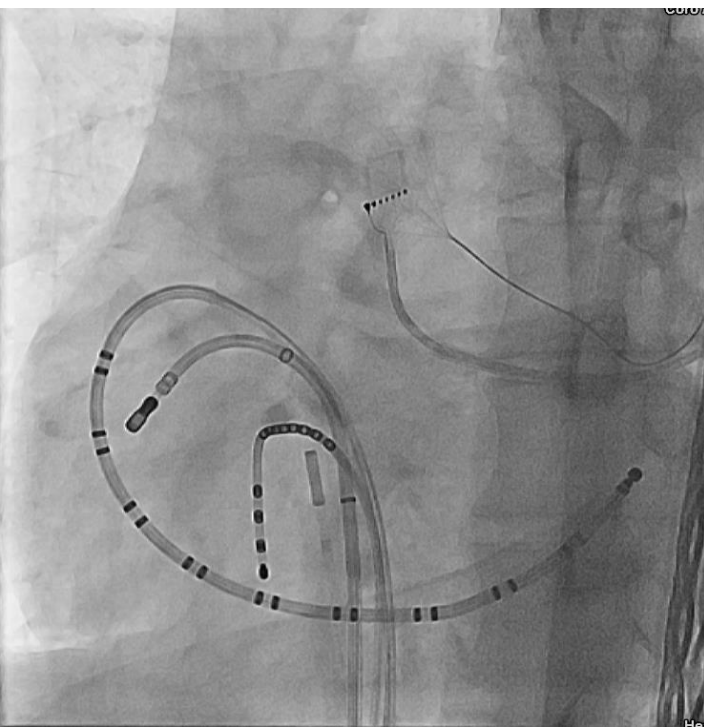
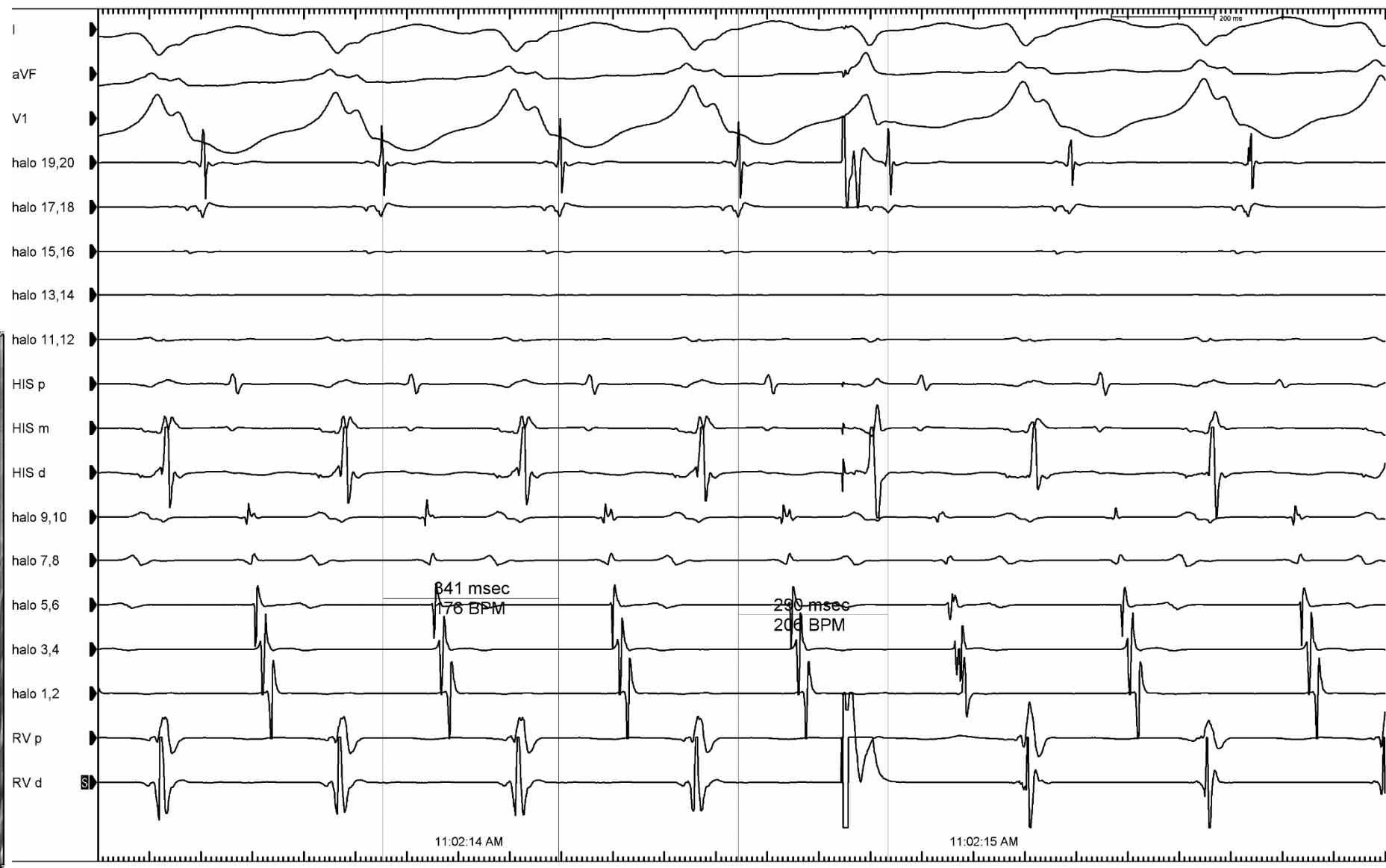
- LFW A to V conduction
- RFW V to A conduction
- Relative long TCL (326ms)

(due to macro reentry circuit)



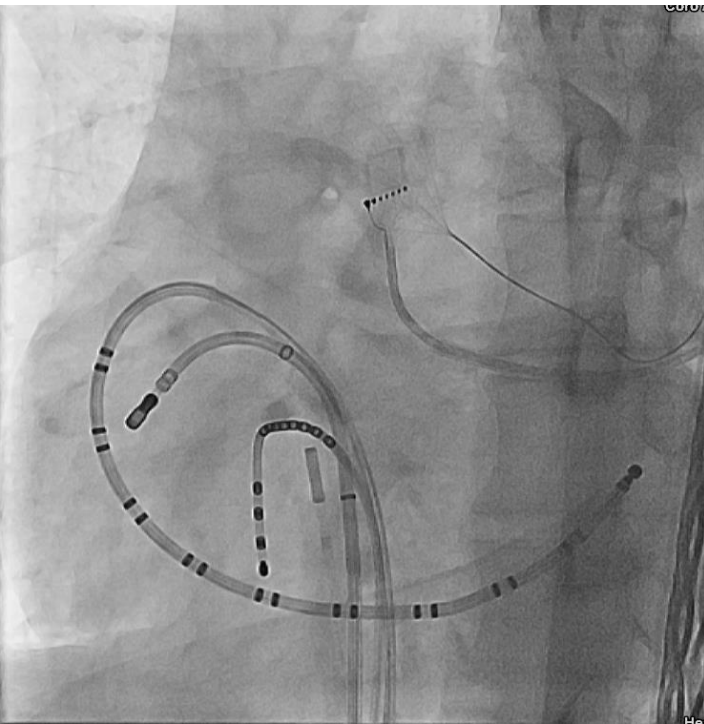
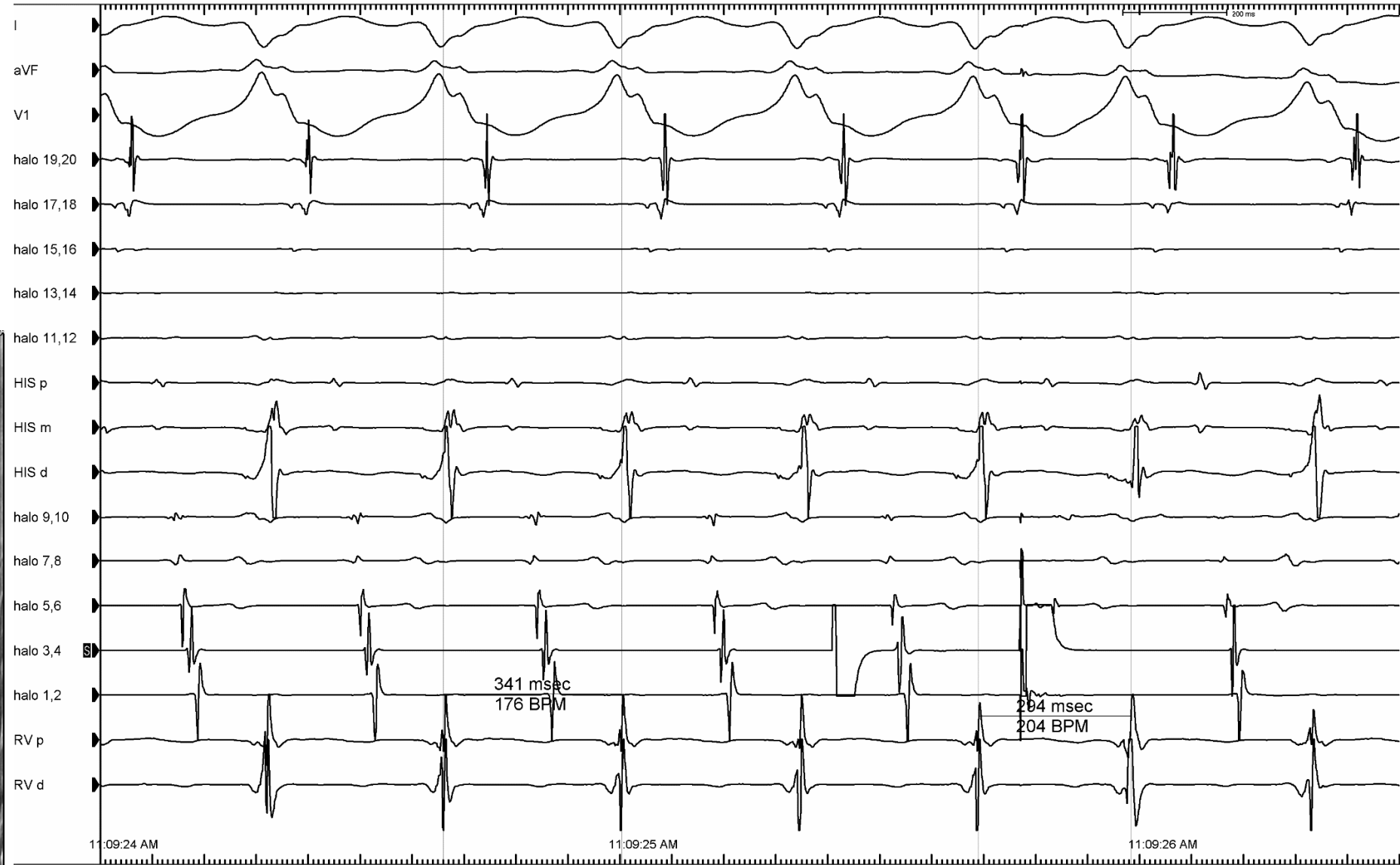
EPS (HRPVC ; atrial advancement)

- AVRT favour



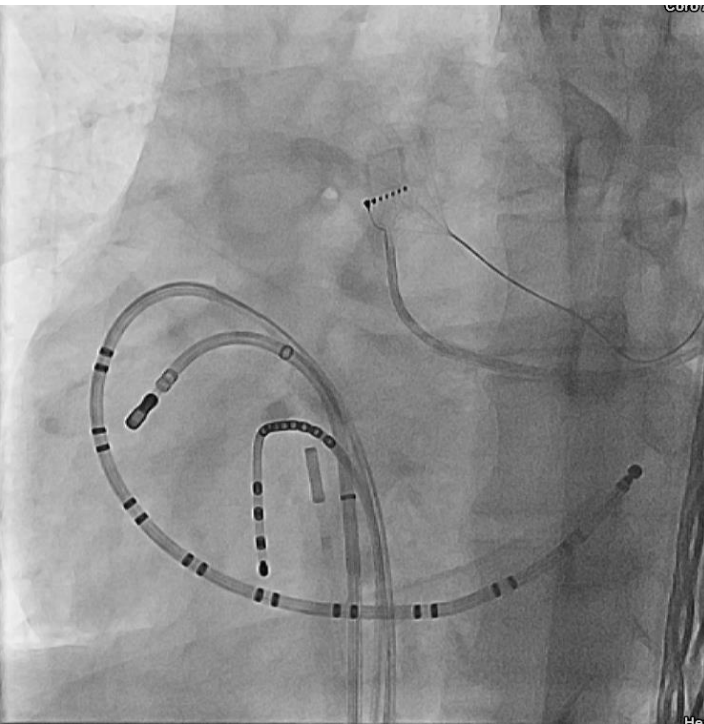
EPS (AVJPAC; ventricle advancement)

- AVRT favour



EPS (early PVC ; termination)

- AVRT favour



Take home messages

- Differential of atypical bypass tracts
- Differential of pre-excitation SVTs

- Very rare case one by one





Thanks to your attention



Jong-ho, Shin

The Catholic Univ. of Korea Eunpyeong St.Mary Hospital

2. Pre-excited SVTs

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ER EKG

- SVT with aberrancy
- Antidromic AVRT
- VT
 - Left anterior fascicular VT
 - Mitral annulus VT

Rate	176	Sinus tachycardia	rate > 99
RR	341	LAE, consider biatrial enlargement	P > 80ms < .15mV V1 & > .25mV limb lds
PR interval	151	RBBB and LPFB	QRSd > 120ms, axis(90,210)
QRSD	148	LVH by voltage	R > 2.60mV in V5 or V6
QT	311	ST depression, consider ischemia, diffuse lds	ST < -.10mV, ant/lat/inf
QTc	533	Prolonged QT interval	QTc > 488ms
-----AXIS-----		Baseline wander in lead(s) V5	
P	-15		
QRS	149		
T	-22		

[UID :]
[PID : 2271338 / Date : 2021-11-04]
Unconfirmed Diagnosis

- ABNORMAL ECG -



EPS (LFW AP confirmed)

- RVP : concentric
- PVC : eccentric

