Diagnostic Maneuvers in Differentiation of SVT

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Objectives

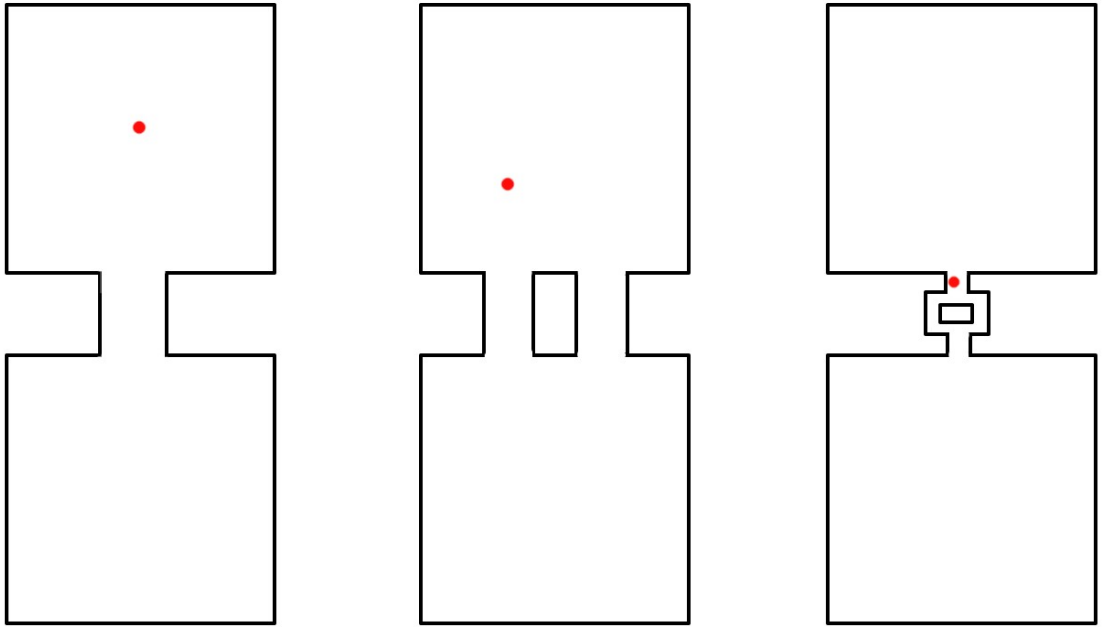
- Learn about the types of SVT seen in the EP lab
- Learn about EP findings that can help differentiate the types of SVT
- Learn about the different pacing maneuvers and how to perform them
- Understand the responses to the pacing maneuvers and how these help identify the tachycardia mechanism

When to perform pacing maneuvers ?

- May not be needed in 85% of SVTs
- Still worth doing each time
- Especially early in career
- Understanding of principles has wider applicability

Supraventricular tachycardia

- Narrow QRS, can be wide
- “Normal” HV interval
- Three common DD
  - AVNRT - Typical or atypical
  - Orthodromic AVRT
  - Atrial tachycardia



A / V relationship patterns

- More A than V
- More V than A
- A = V
  - Atrial activation sequence
  - VA interval

A > V

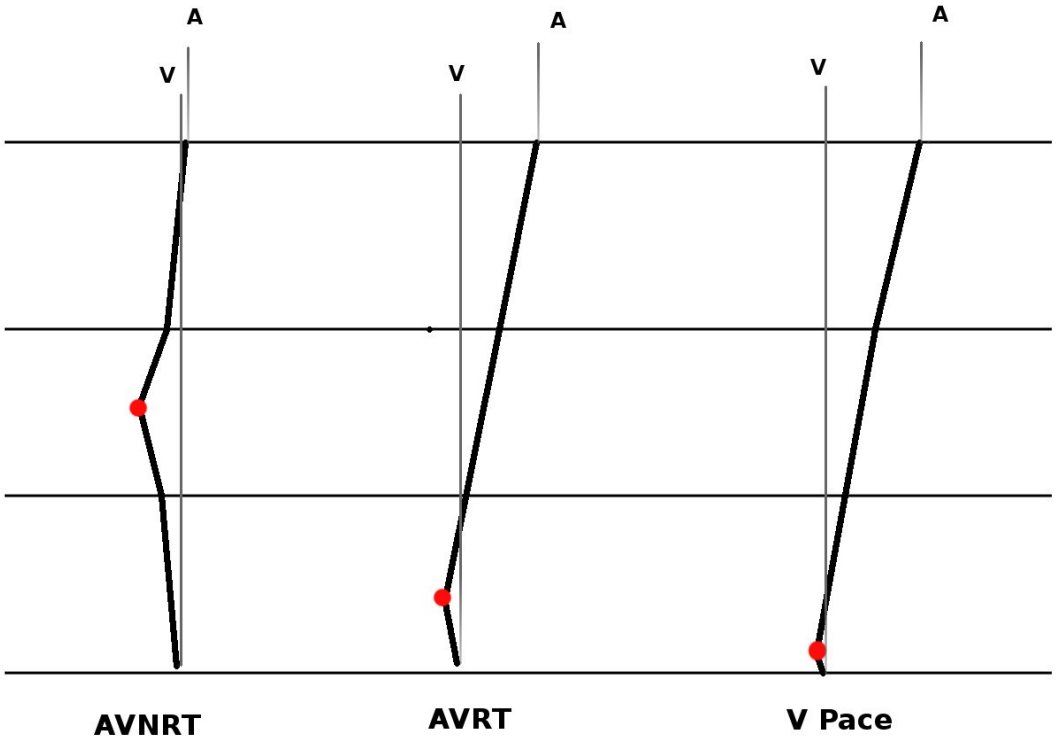

57.50
58
58.50
59
59.50
00
00.50
II
aVF
V2
HRA1,2
HIS d
HIS m
HIS p
CS9,10
CS7,8
CS5,6
CS3,4
CS1,2
RV1,2

Narrow QRS tachycardia with V = A

- Central atrial activation, short VA
- Eccentric atrial activation
- Central atrial activation, longer VA

Pattern 1 - Central VA with very short VA

Why ? is VA short in AVNRT



Pattern 2 - Eccentric atrial activation

Pattern 3 - Central atrial activation, longer VA

Clues before pacing

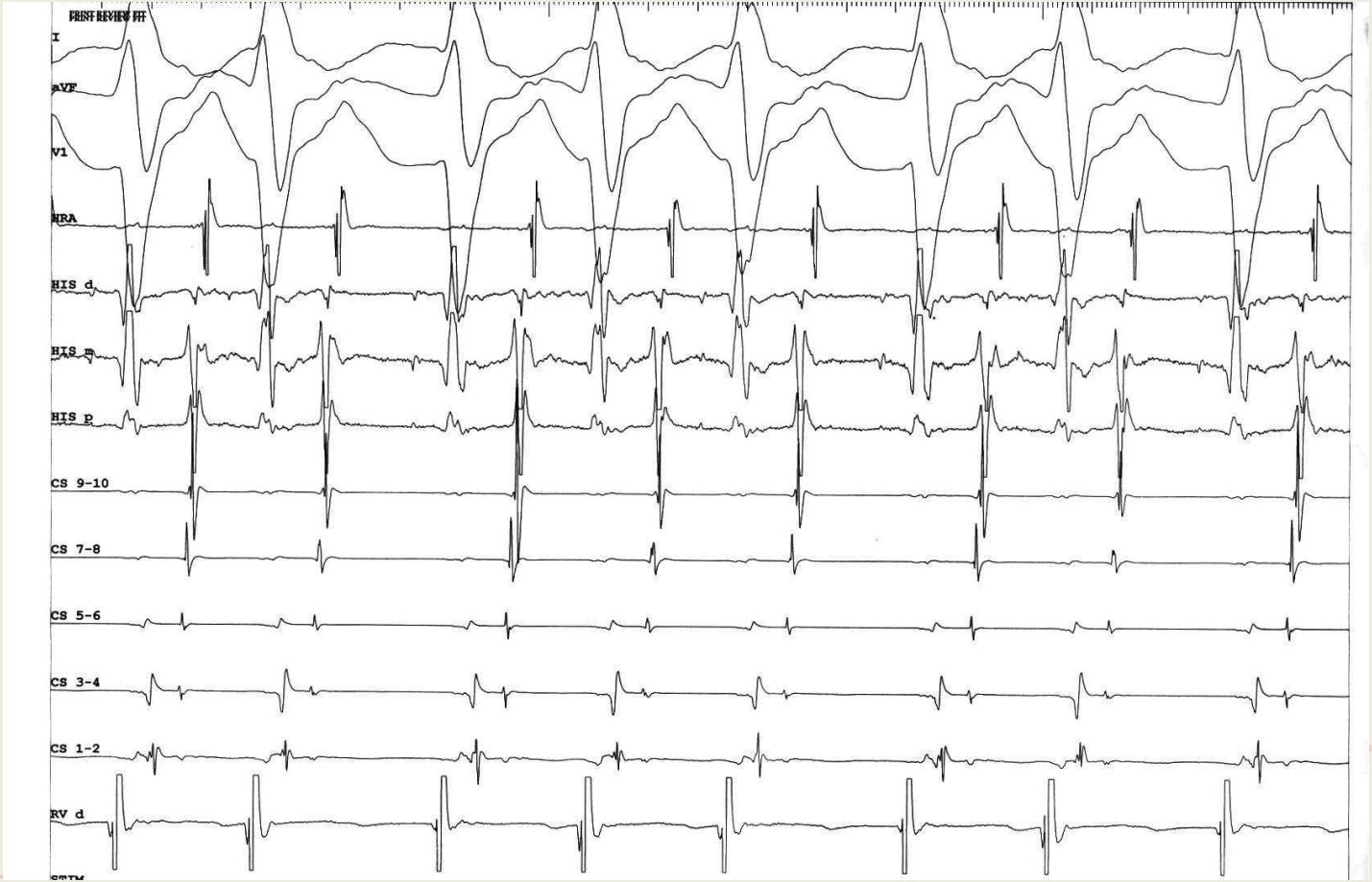
Spontaneous termination

Spontaneous termination - Rules

- Tachycardia originating in one chamber (Atrium / Ventricle) will terminate in other chamber
- Reentrant tachycardia will terminate with block in any critical limb

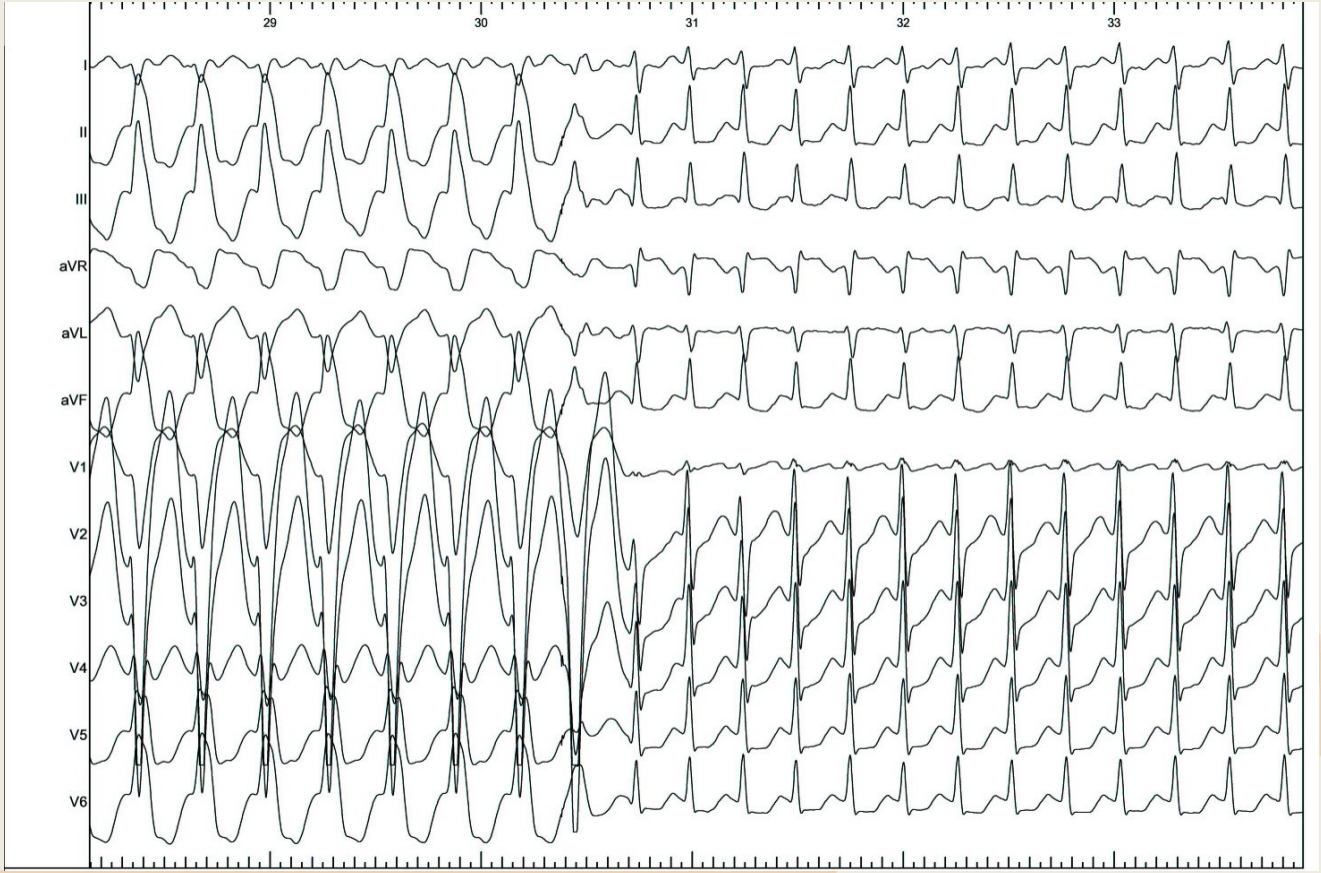
Spontaneous termination with V

Wobble

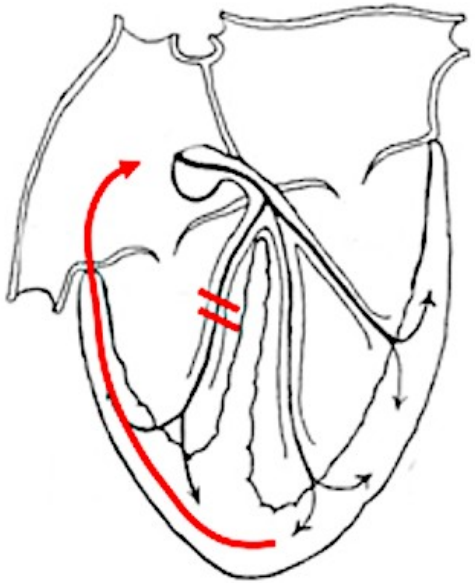


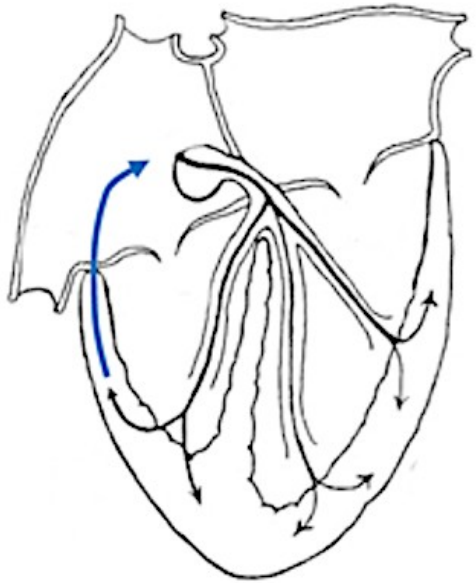
Wobble

Bundle branch block - Coumel sign

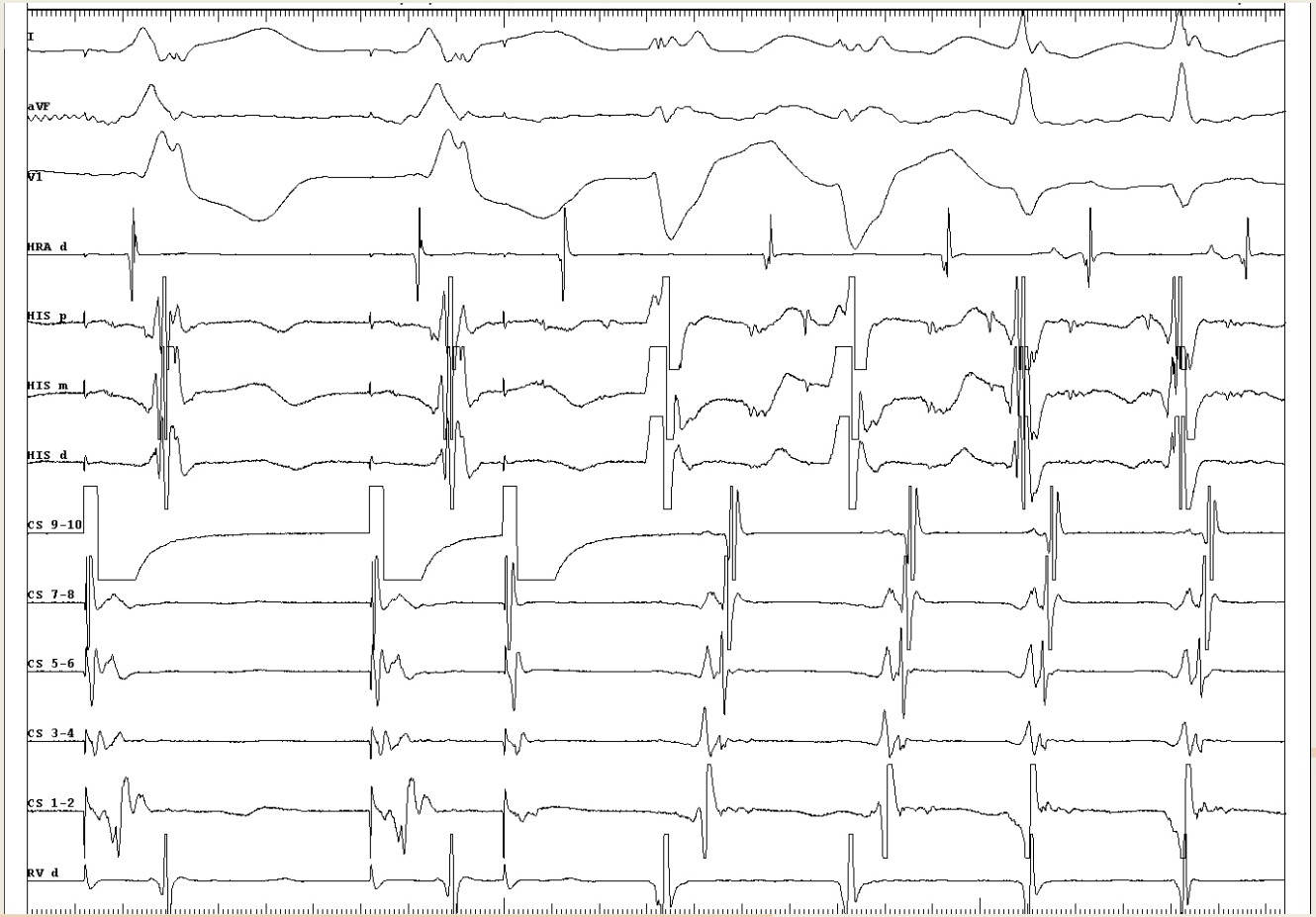


Coumel sign

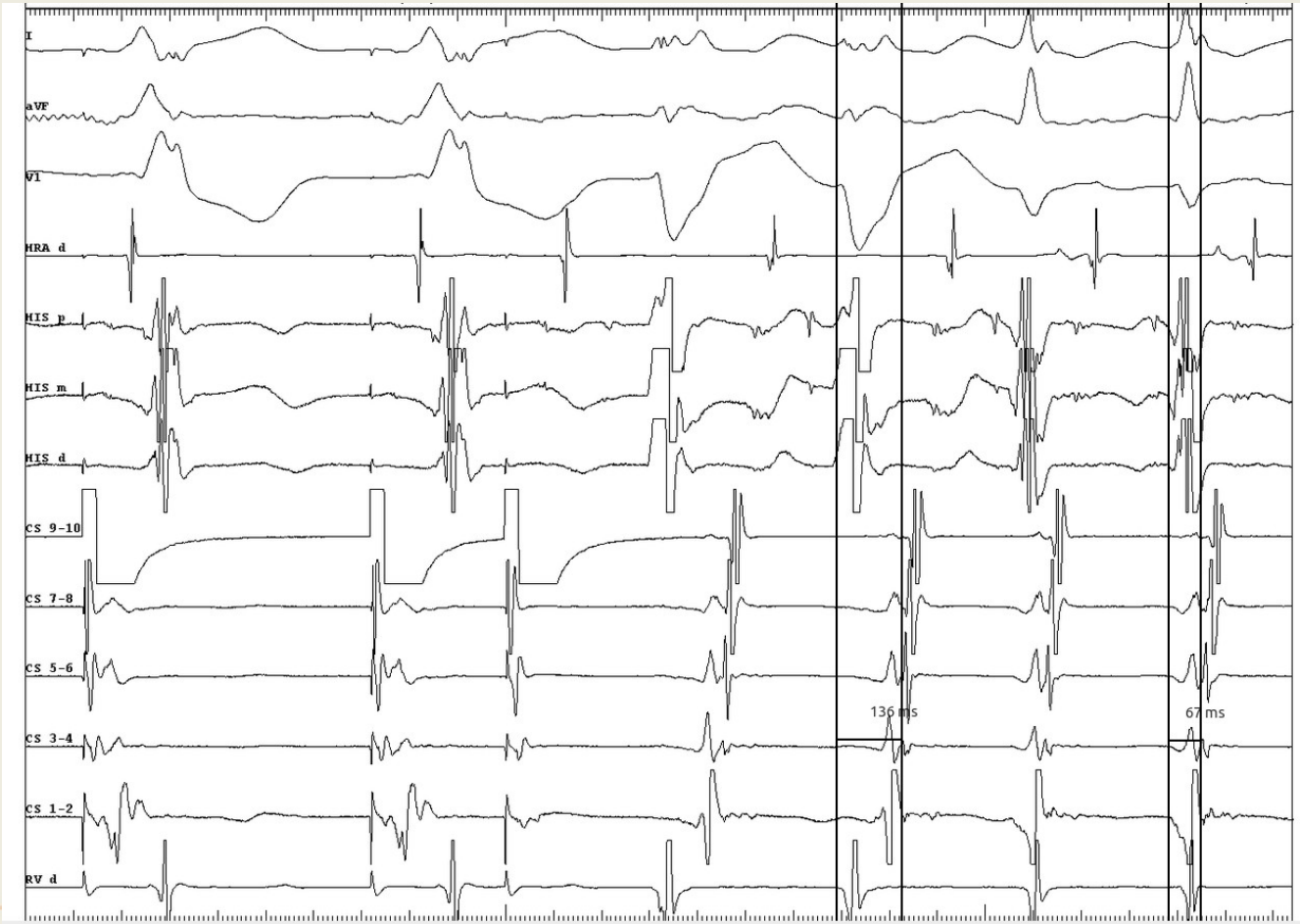




Coumel sign as a transient finding



Coumel sign as a transient finding



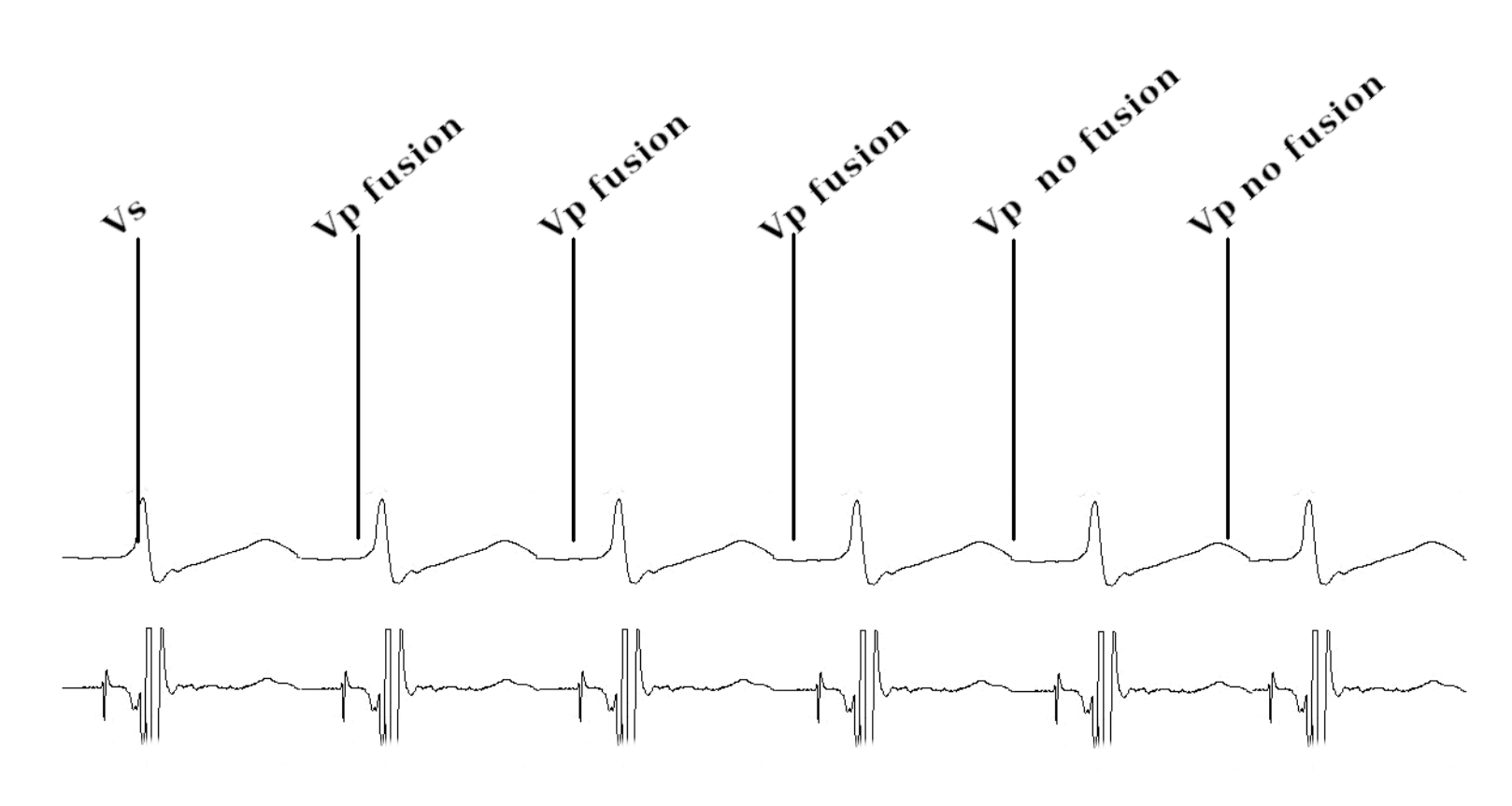
Pacing Maneuvers

VOP - Single pacing maneuver

- Central, short VA - AVNRT or AT
- Eccentric VA - AVRT or AT
- Central, longer VA - AVNRT, AVRT or AT

VOP - Setting up

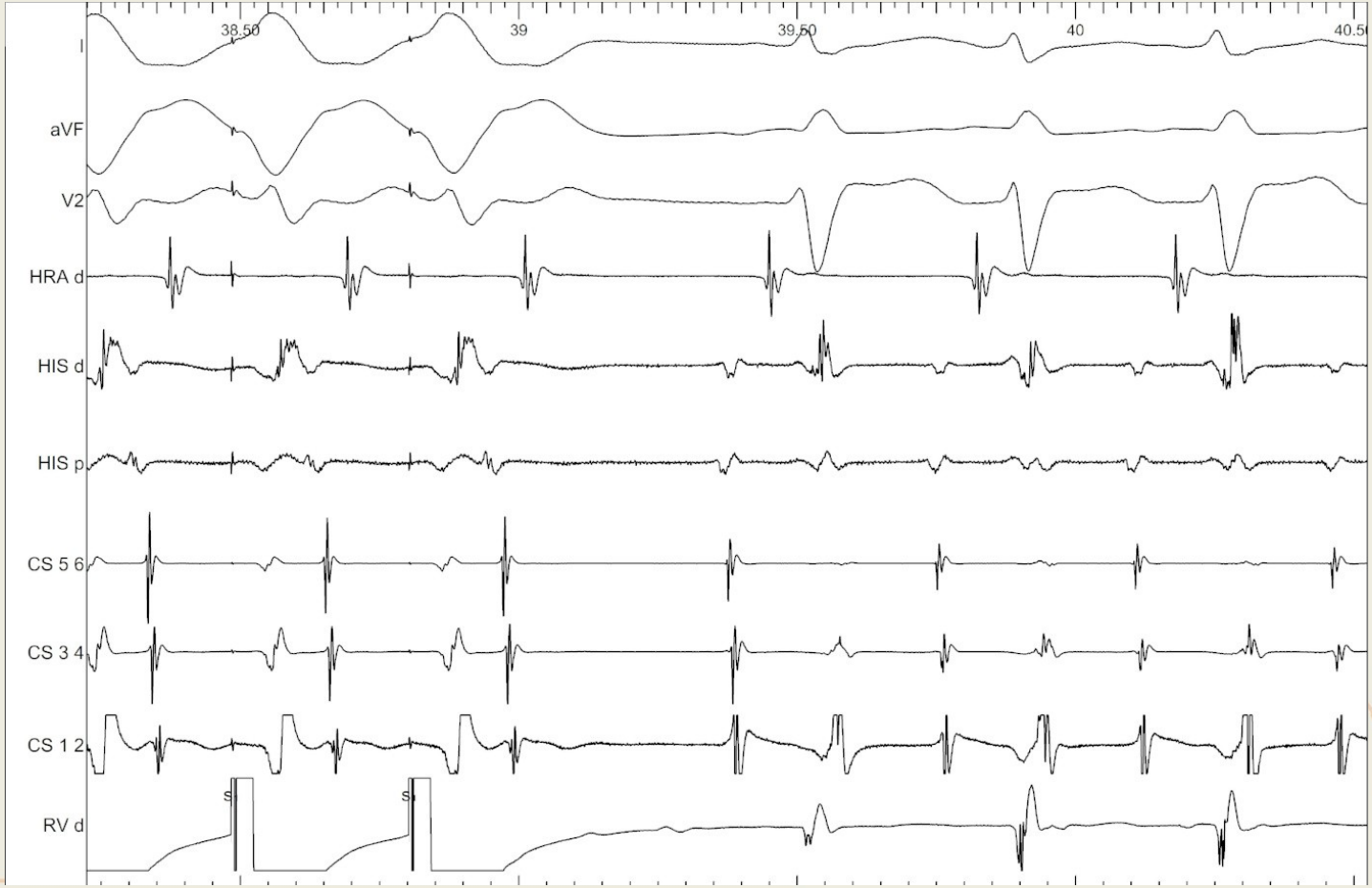
- Pacing CL - 20 to 30 ms shorter than tachycardia CL
- Sync on and working


Vs
Vp fusion
Vp fusion
Vp fusion
Vp no fusion
Vp no fusion

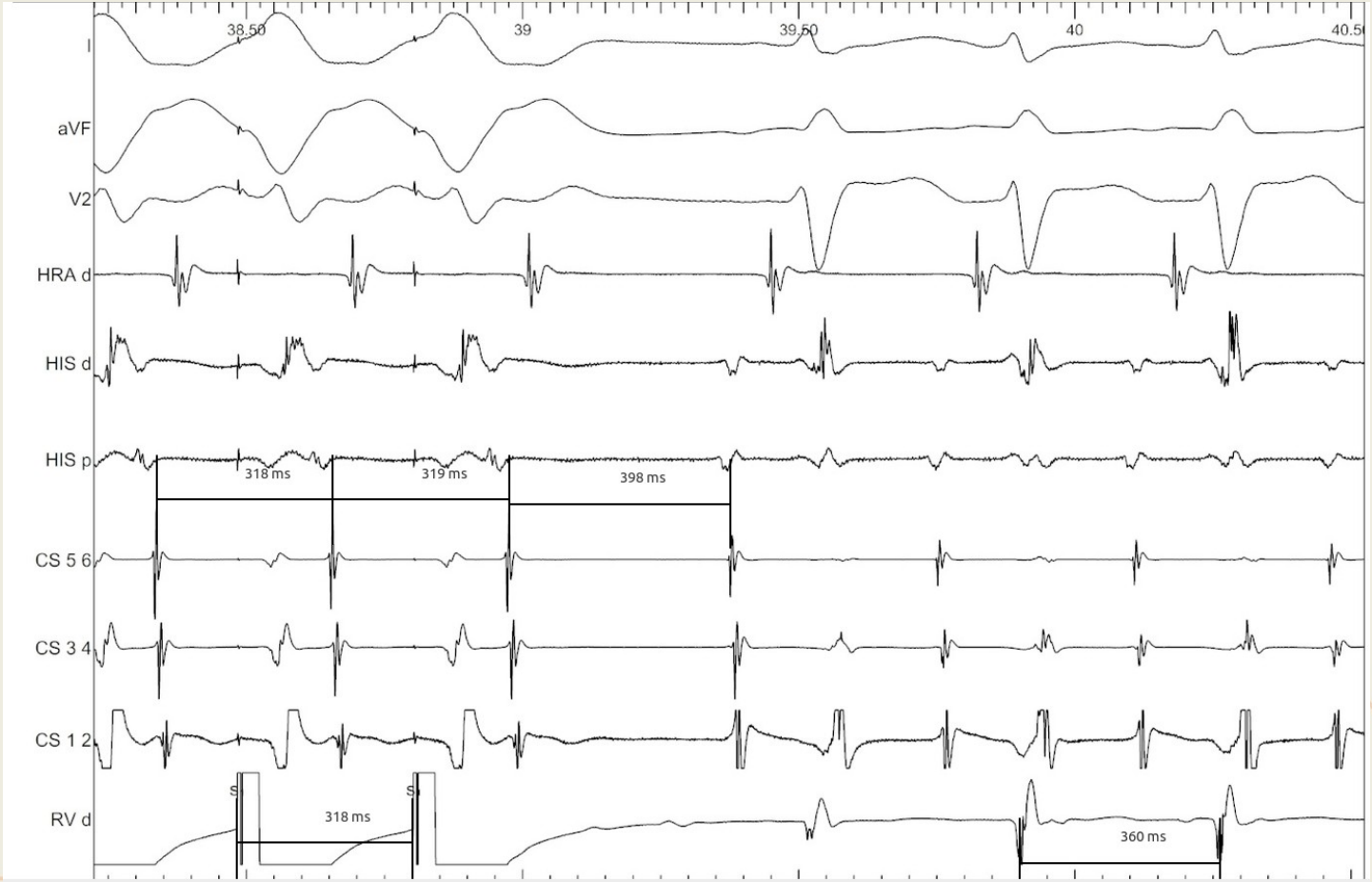
Stepwise approach

- Does tachycardia continue ?
- Was the atrium entrained ?
- Which is the last entrained A ?
- What is the return response - VAV or VAAV ?
- What is the cPPI - TCL ?
- What is the SA - VA interval ?

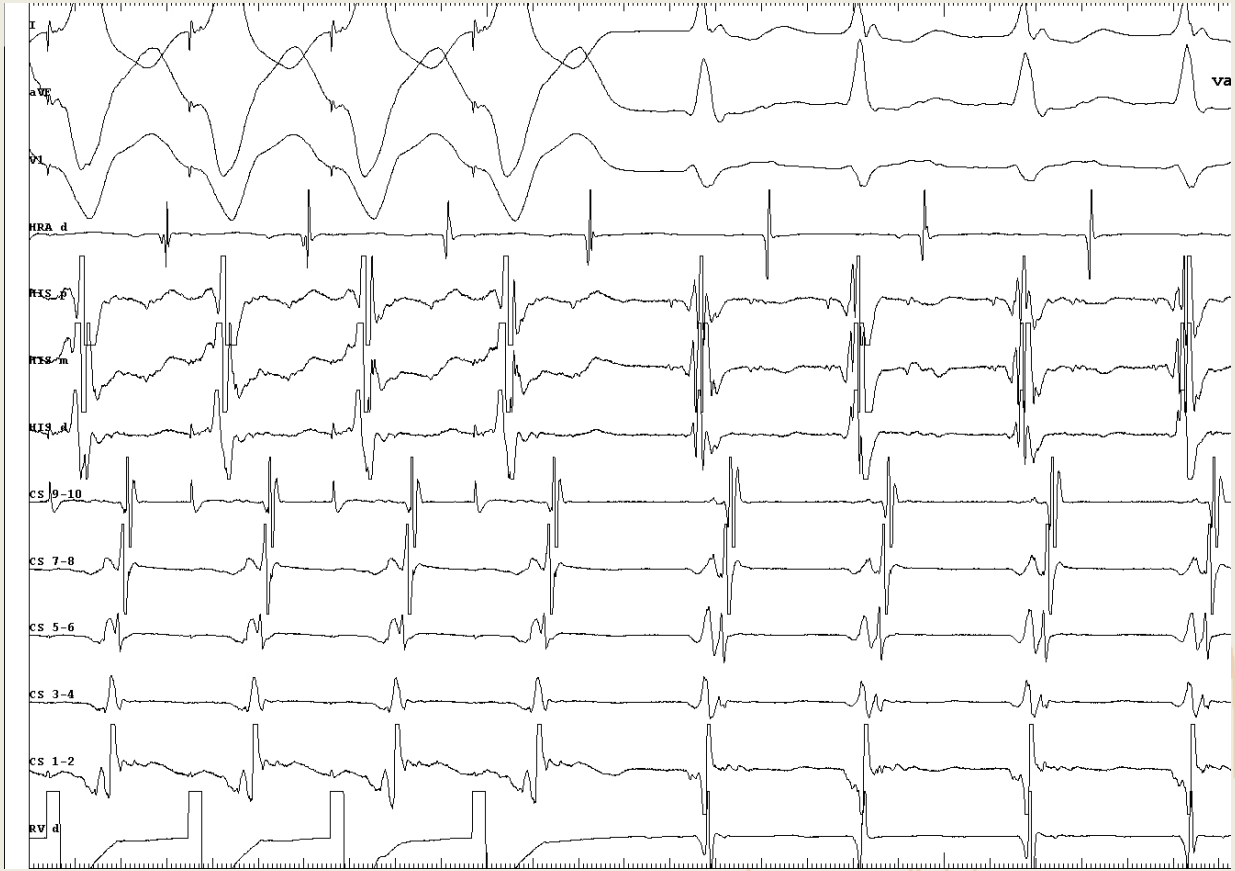
VAAV



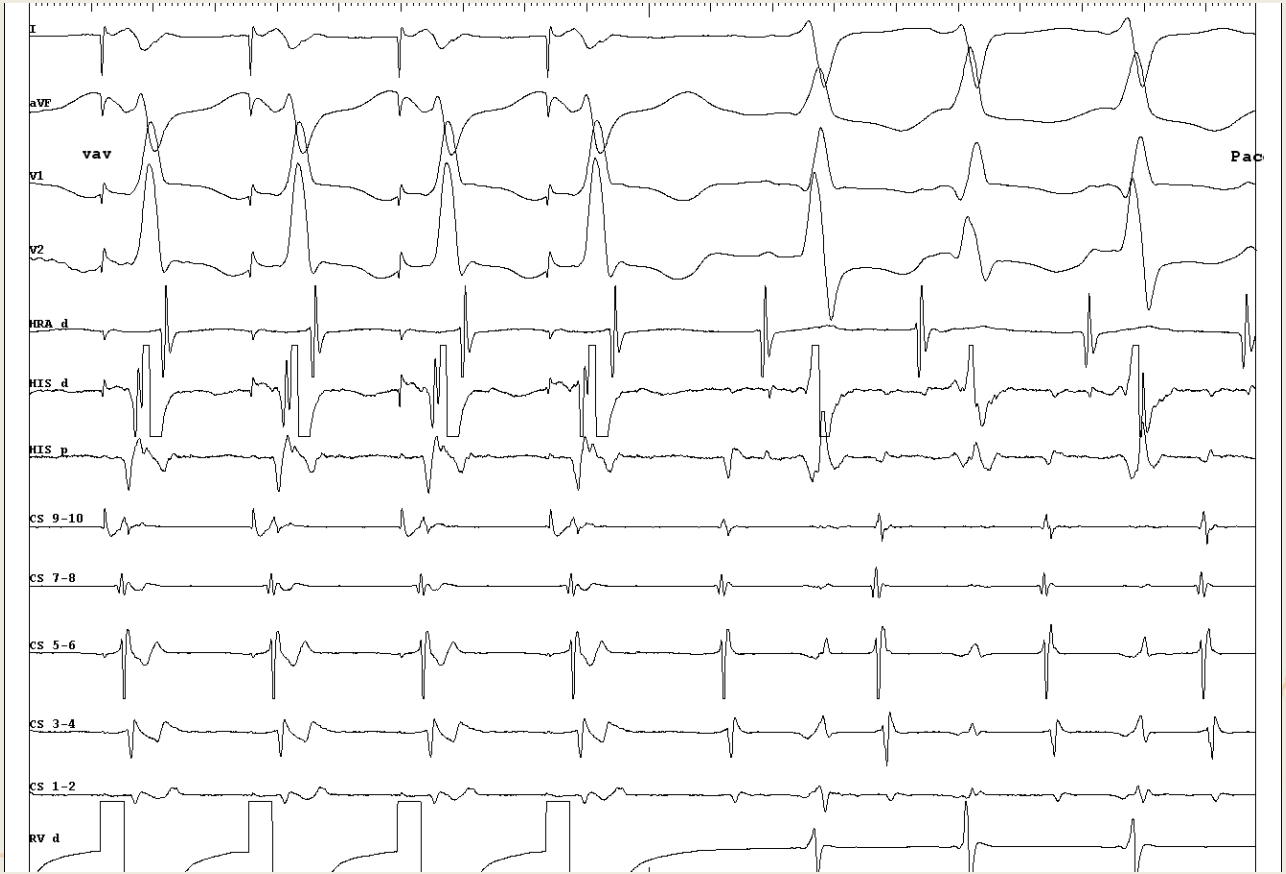
VAAV


38.50
39
39.50
40
I
aVF
V2
HRA d
HIS d
HIS p
318 ms
319 ms
398 ms
CS 5 6
CS 3 4
CS 1 2
RV d
S
S
318 ms
360 ms

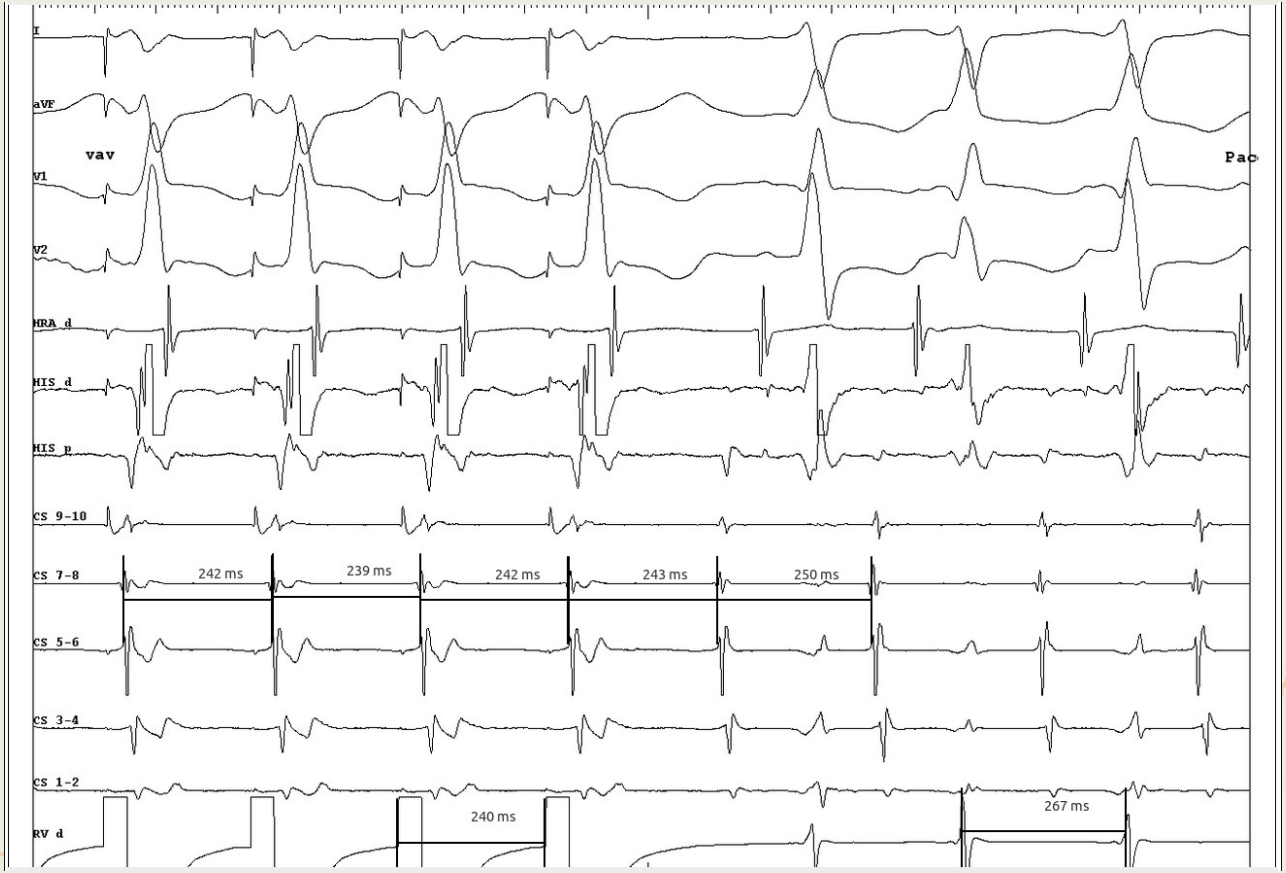
VAV



Importance of identifying last entrained A

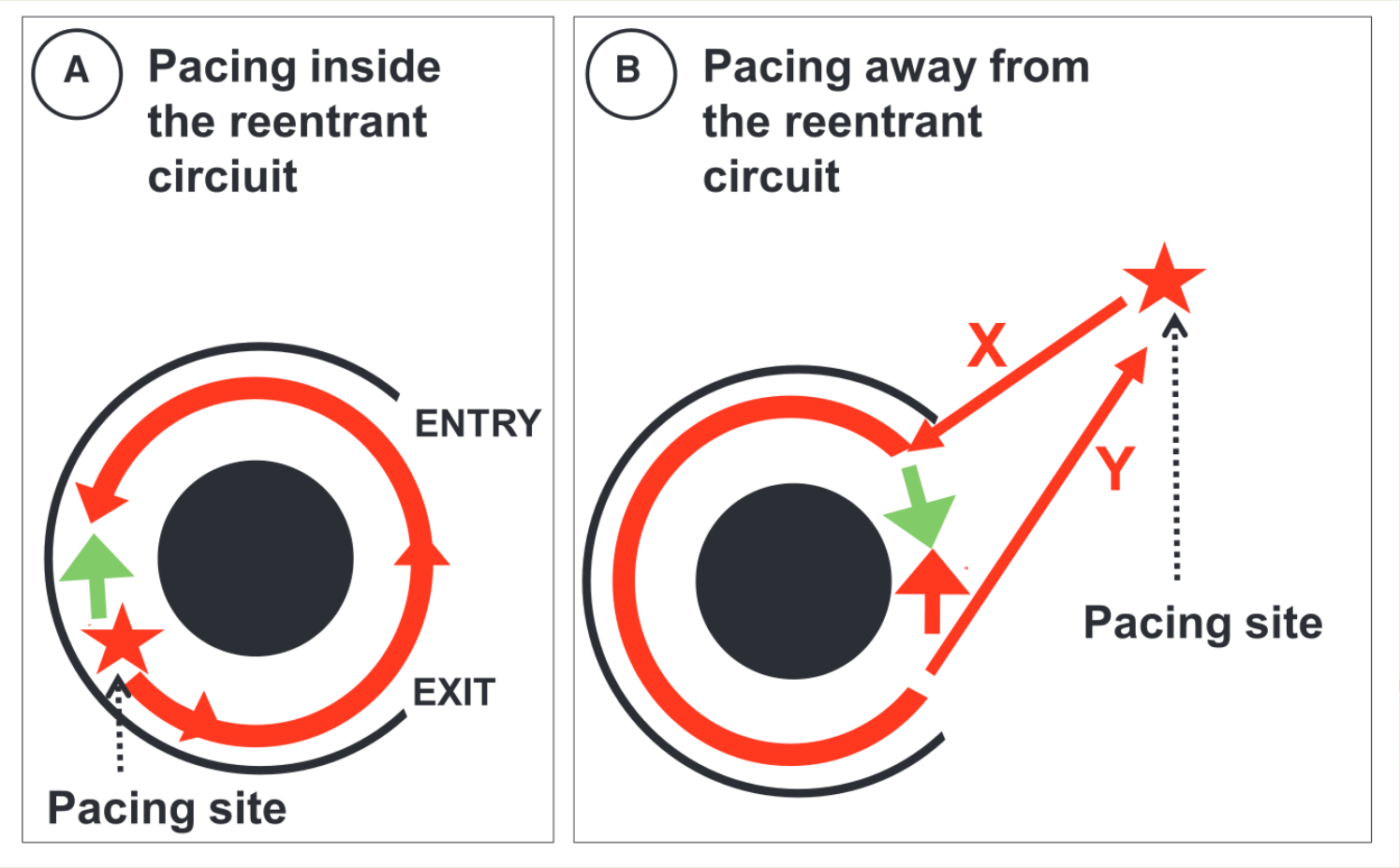


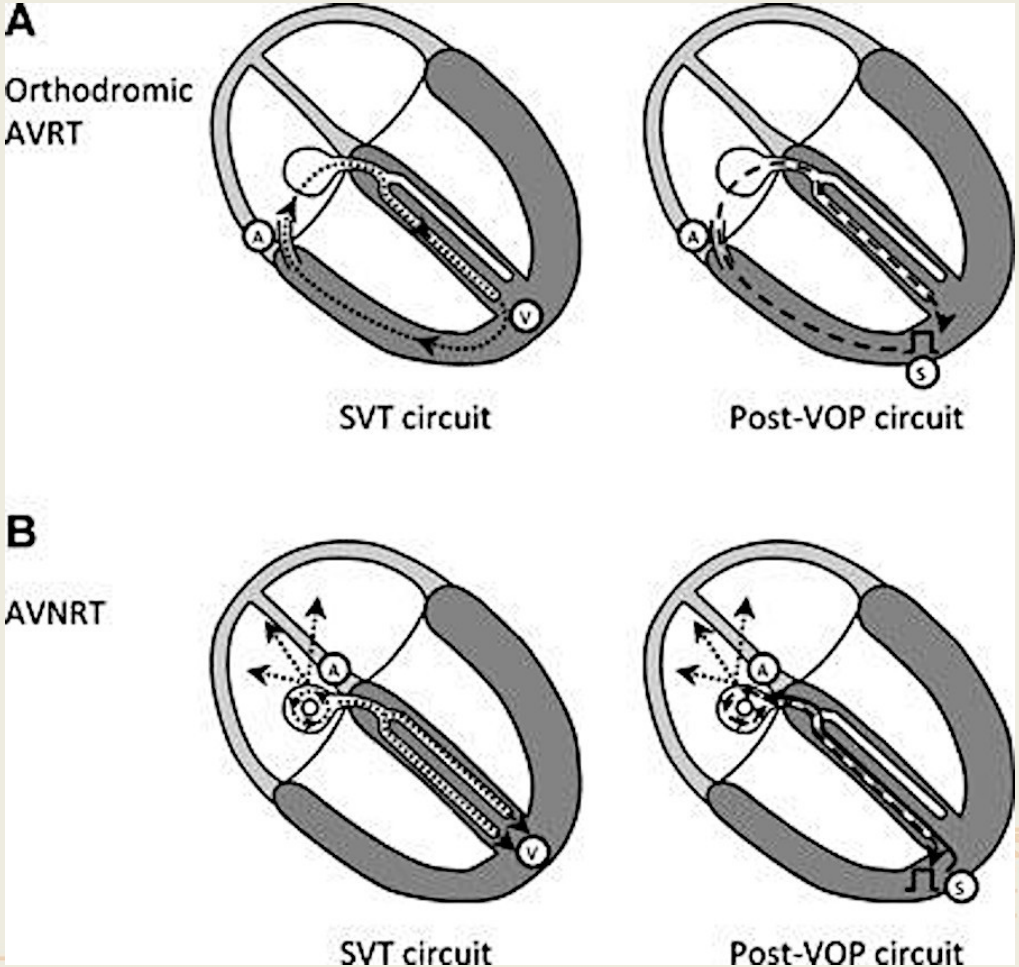
Importance of identifying last entrained A



AVNRT or AVRT ?

PPI as measure of distance from circuit

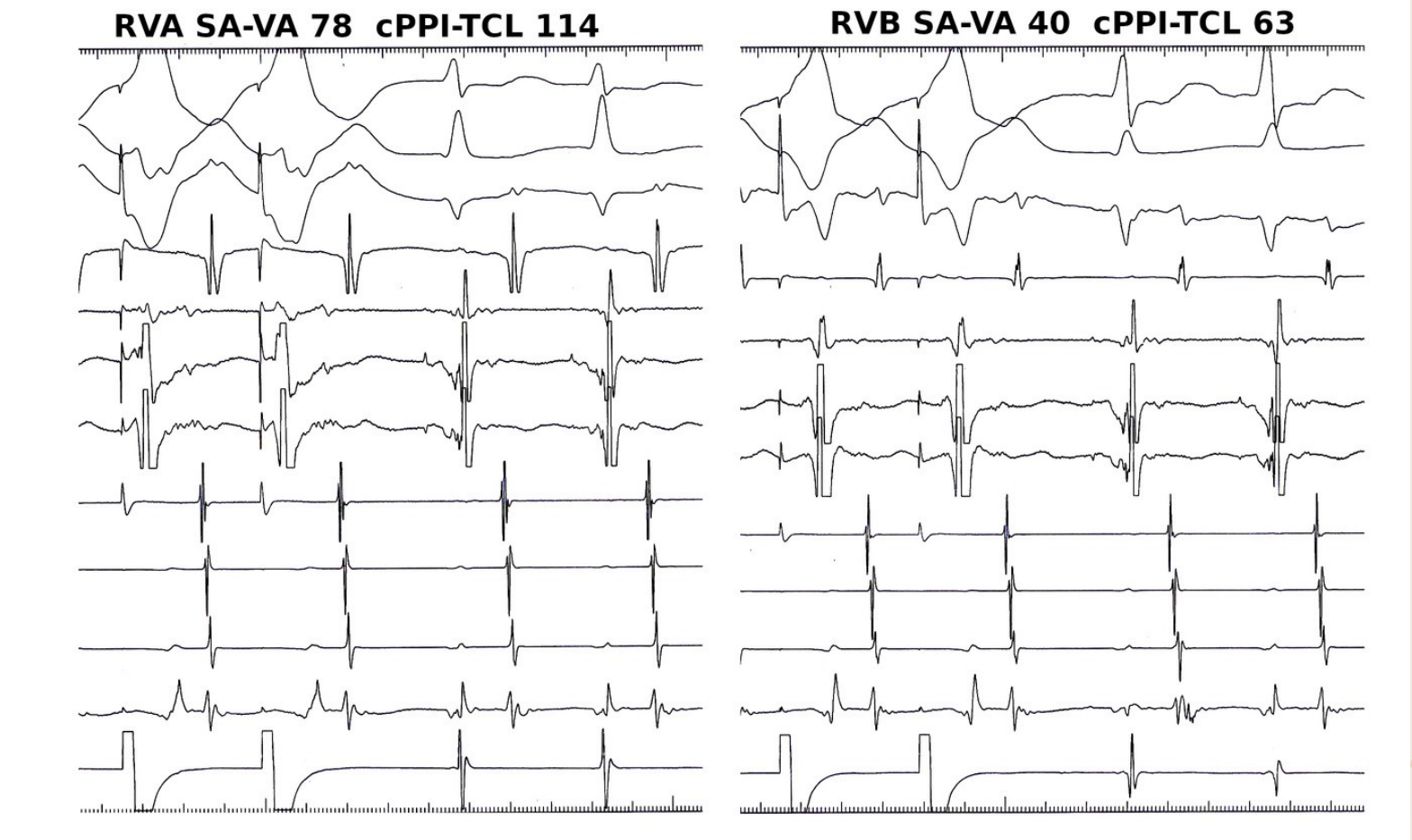



A
Orthodromic AVRT
A
V
S
SVT circuit
Post-VOP circuit
B
AVNRT
A
V
S
SVT circuit
Post-VOP circuit

AVNRT or AVRT ? - cPPI - TCL

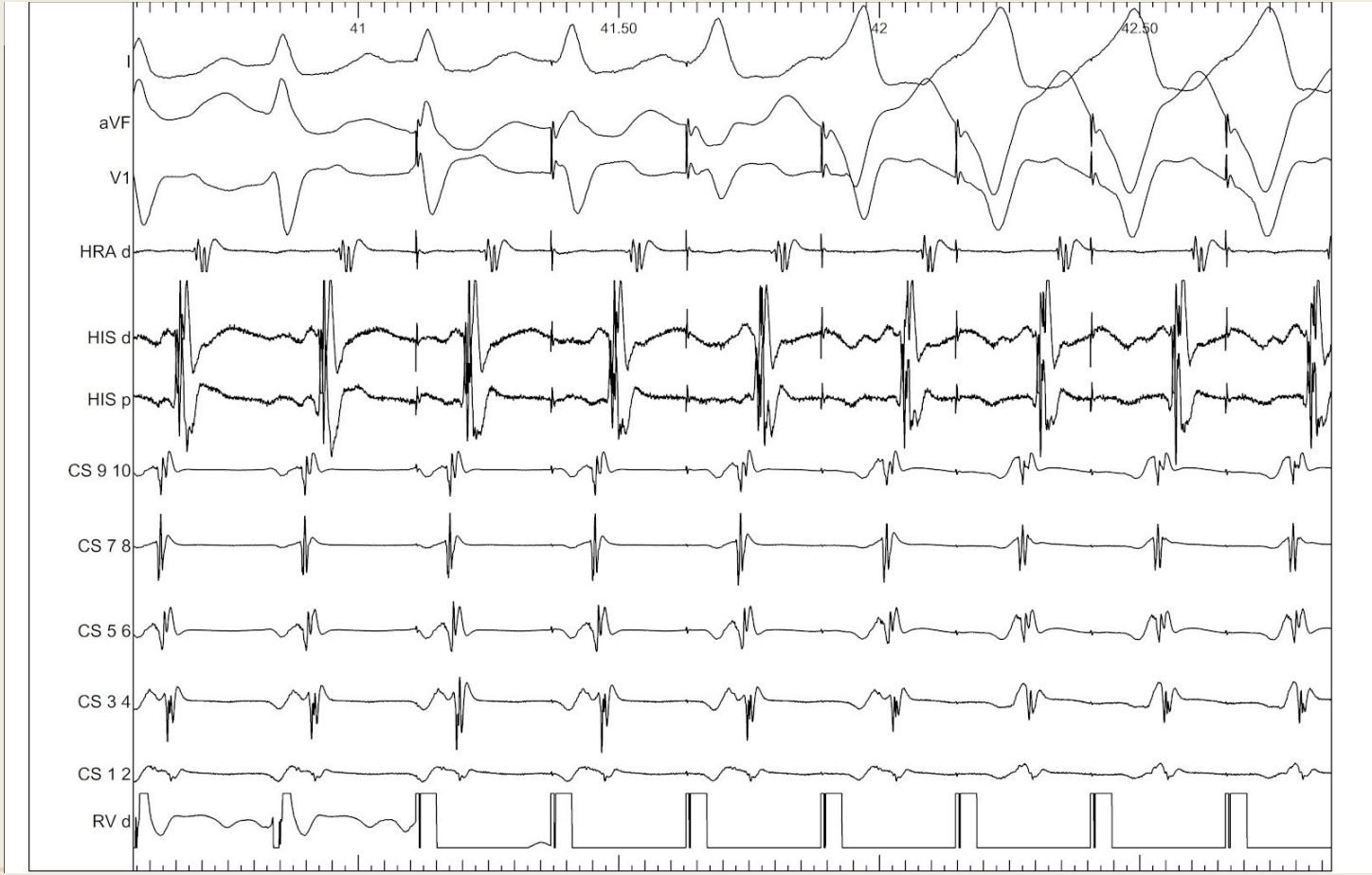
AVNRT or AVRT ? - SA - VA

Basal position of RV catheter



Termination during VOP - What now ?

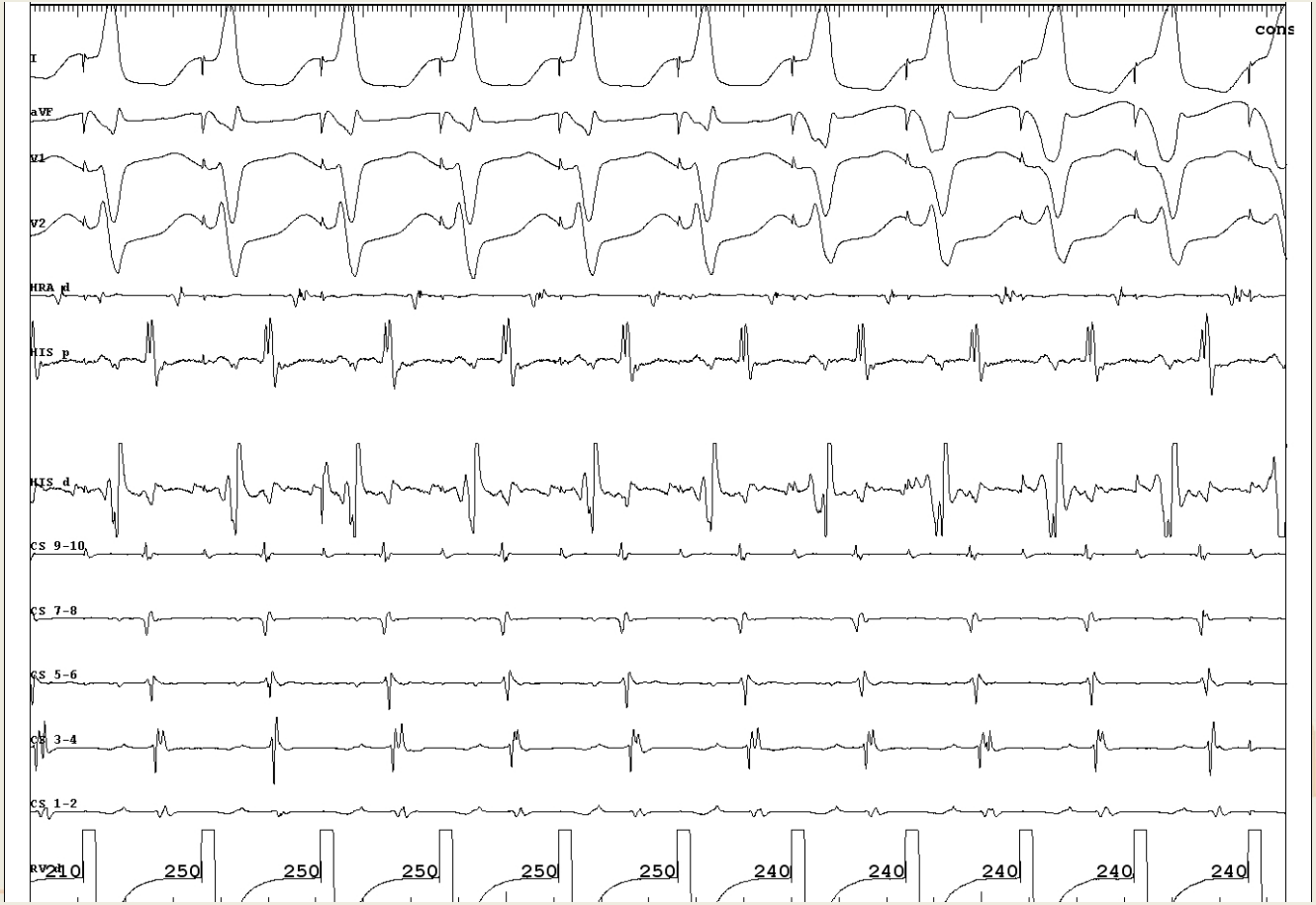
Onset of VOP


41
41.50
42
42.50
I
aVF
V1
HRA d
HIS d
HIS p
CS 9 10
CS 7 8
CS 5 6
CS 3 4
CS 1 2
RV d

Onset of VOP

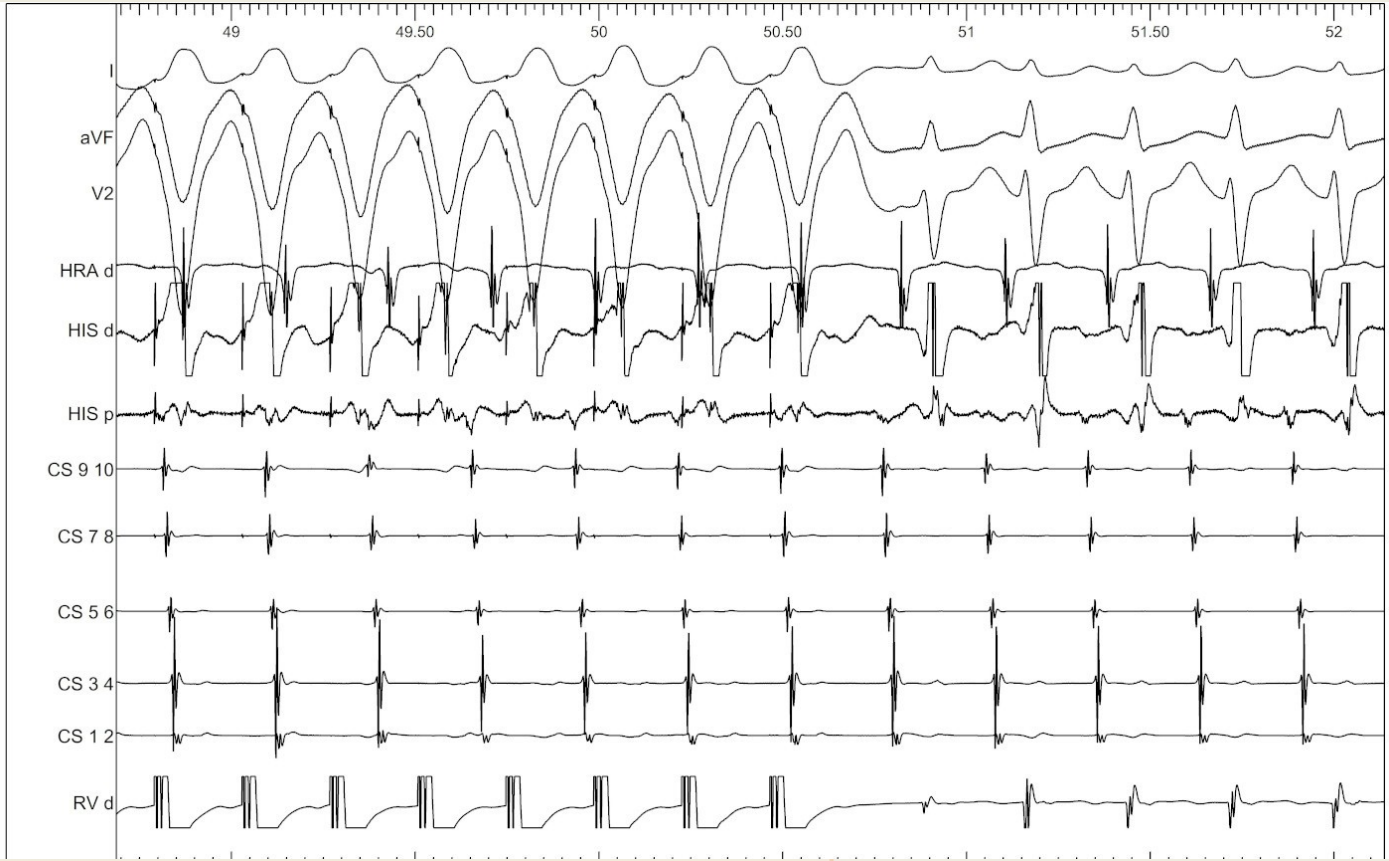

41
41.50
42
42.50
I
aVF
V1
HRA d
HIS d
HIS p
CS 9 10
278 ms
273 ms
276 ms
273 ms
280 ms
260 ms
CS 7 8
CS 5 6
CS 3 4
CS 1 2
260 ms
RV d

Middle of VOP



Termination during VOP

Unable to entrain - What now ?



Narrow QRS tachycardia - Unable to entrain

- AVRT ruled out (VA dissociation)
- Retry with isoprenaline
- Atrial pacing
  - VA unlinking
  - Differential atrial pacing
  - AH during pacing and tachycardia

PVC during tachycardia - How to do ?

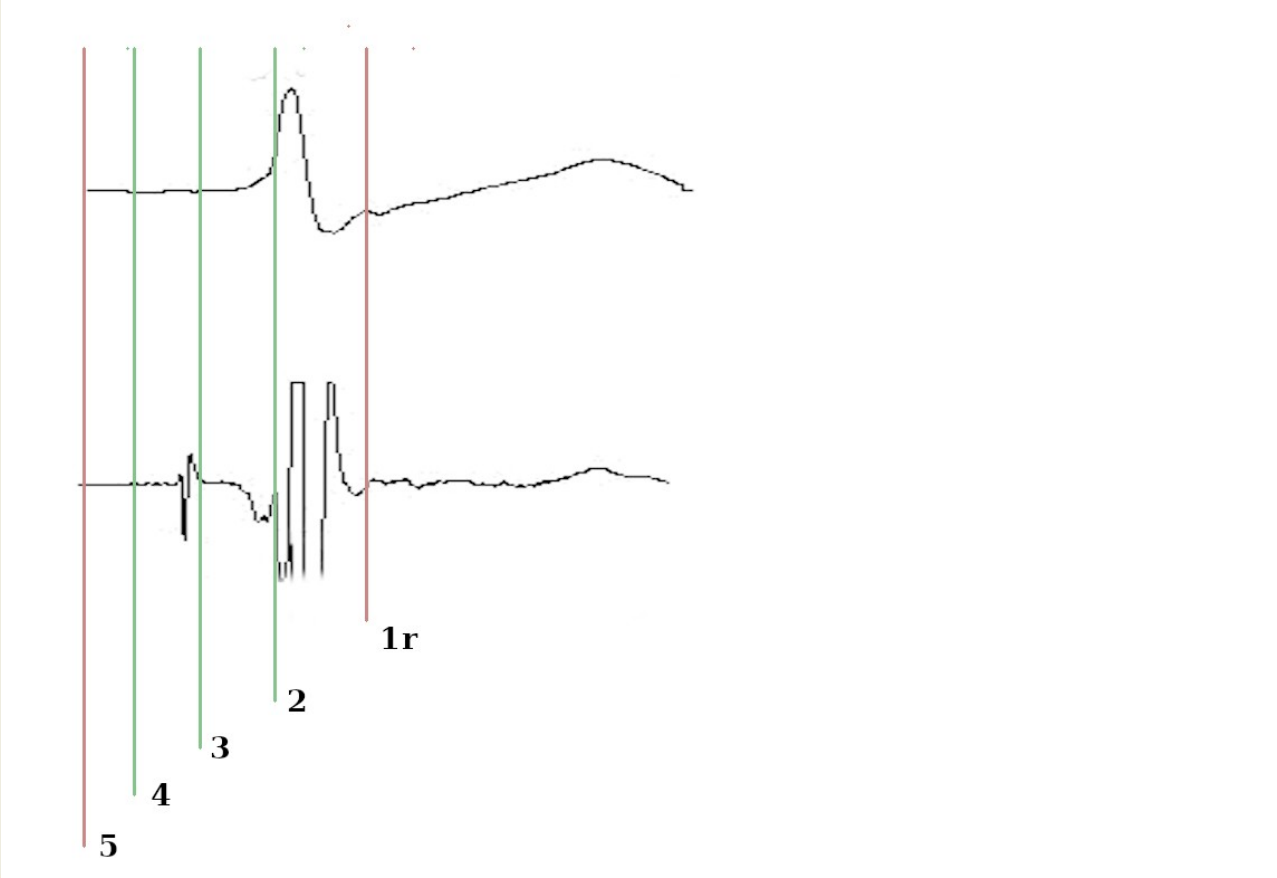
- Sync on
- PVCs with sense train
- Start with coupling interval equal to CL
- Decrement by 5 or 10 ms

- Change in timing of next A ?
- Is the PVC His refractory ?

When is a PVC His refractory ?

- Occurs after the His signal
- Before the His signal, but interval not sufficient to travel to His
- Does not alter timing of His signal
- Does not change the sequence of His activation
- Manifest fusion on surface ECG

When is a PVC His refractory ?




19
20
I
aVF
V1
V2
HRA d
368 ms
339 ms
HISm
HIS d
368 ms
364 ms
RV d


II
aVF
V1
HRA d
HIS d
HISm
CS 9 10
CS 7 8
CS 5 6
CS 3 4
CS 1 2
RV d
40
41

Rarely used maneuvers

- PAC during short VA tachycardia
- Delta AH during tachycardia
- VA linking
- Simultaneous AV pacing

Summary and recap

- Understand the principles
- Practice performing maneuvers and measuring
- Ventricular overdrive pacing is single most useful maneuver
- PVCs during tachycardia next most important
- Evaluation before tachycardia induction and before pacing maneuvers also very important