PVC ablation tips and tricks!

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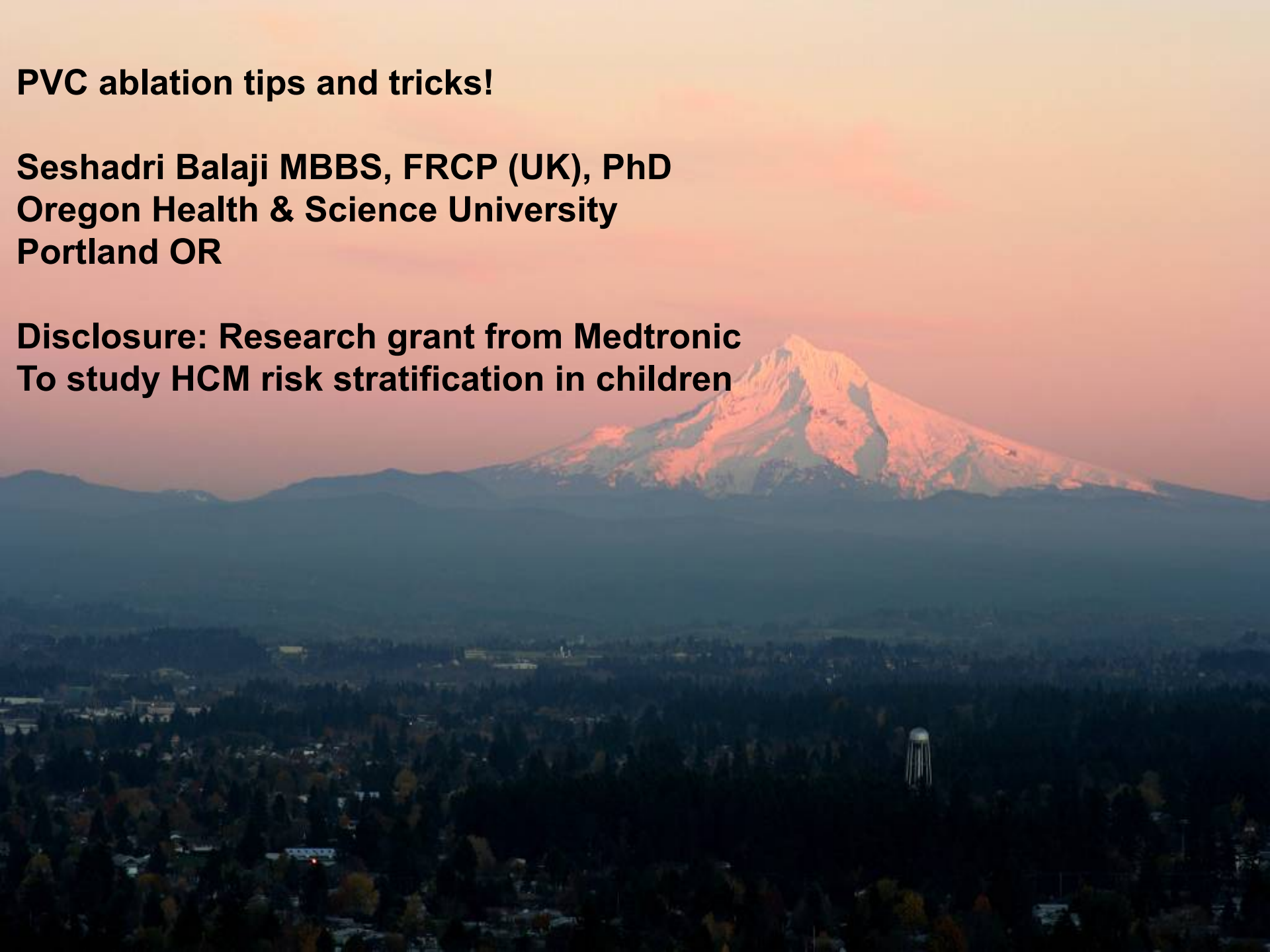
To study HCM risk stratification in children



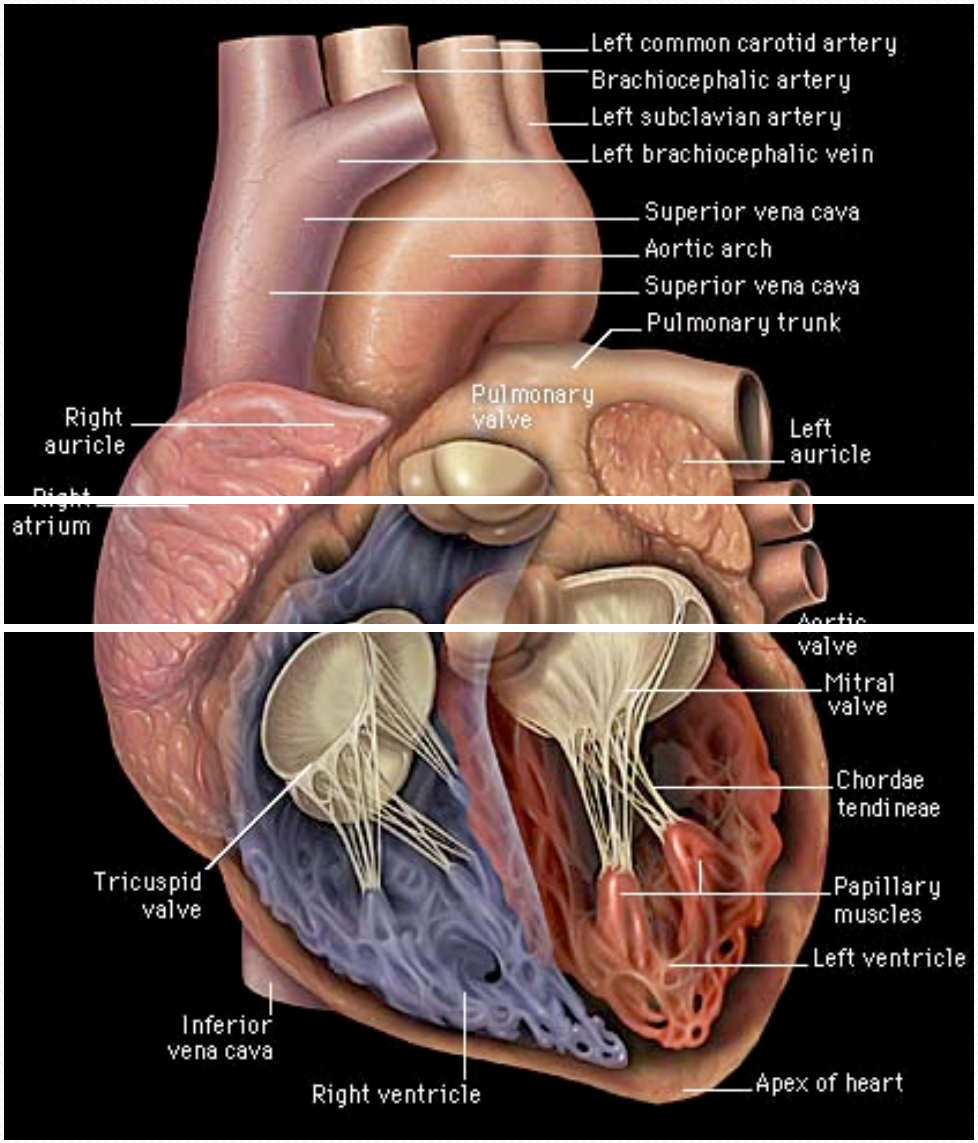
PVC ablation

- Murphy's law (Dr Ed Murphy, long-time chief of cardiology at Portland VA): things invariably go wrong during unnecessary procedures!
- Be sure that ablation is really necessary.
- Common to have mild LV enlargement with frequent PVCs. Does this equal "LV dysfunction"?
- Common to have "symptoms" especially if you ask leading questions. Do the "symptoms" correlate with the PVCs?
- Be clear about the indication for ablation.

PVC ablation

- Determine site of origin from ECG.
- The most common sites are RVOT and LVOT
- Left posterior fascicle less common for PVCs, more VT.
- Multiple sites indicates a diffuse problem (?ARVD) and lowers success rate.
- Discuss with a colleague (? Adult EP) who does VT ablation frequently.
- Collaborate with a colleague.
- Assume that anesthesia will suppress the PVCs.
- Talk with anesthesia person and formulate a strategy, use light sedation or even use ketamine if needed.

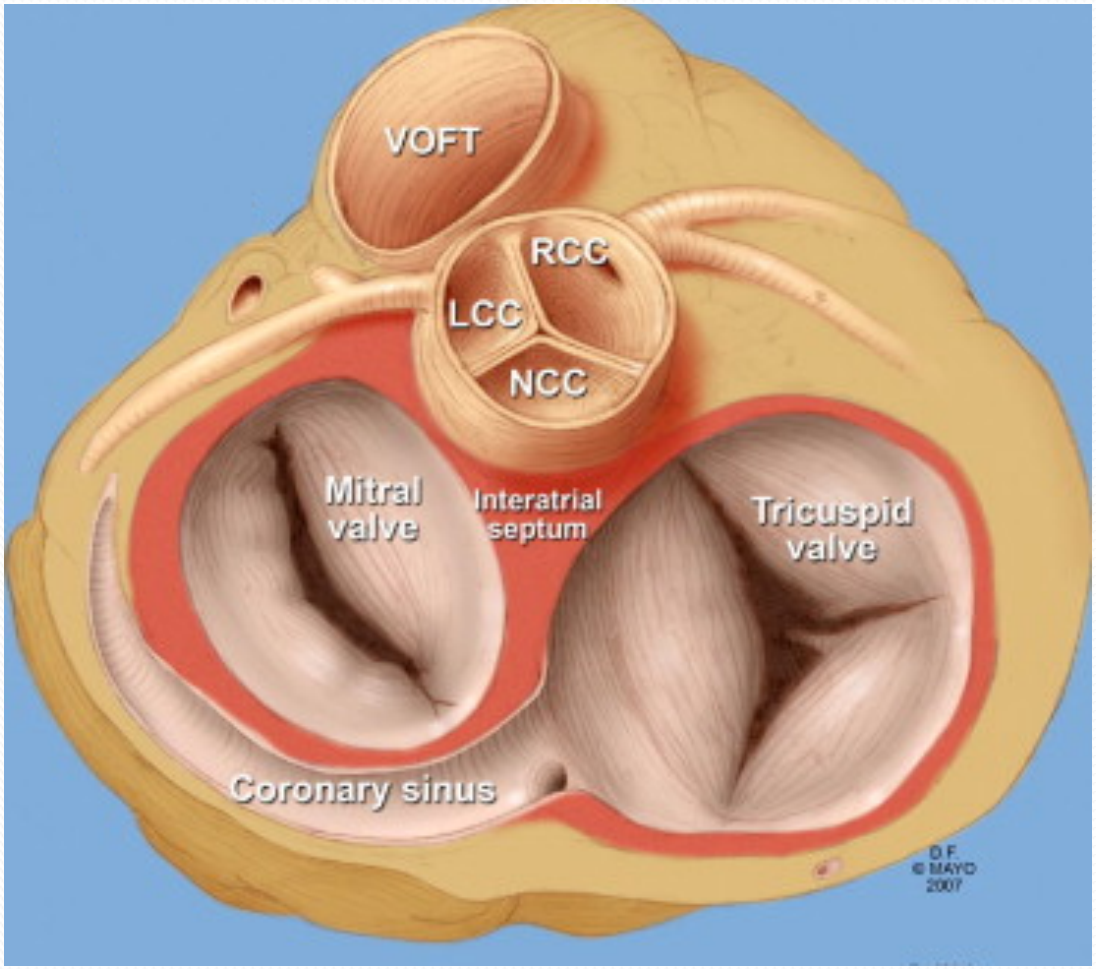
RVOT



- Superior border: PV
- Inferior border: superior margin of RV inflow tract (top of TV)
- The bulk of the RVOT has no true septum, but rather arches anteriorly over the Ao root, which replaces the IV septum as the structure posterior to the RVOT.
- Beware the thin RVOT

Yale cardiac imaging website

Proximity of coronary arteries (esp. L main) to posterior RVOT

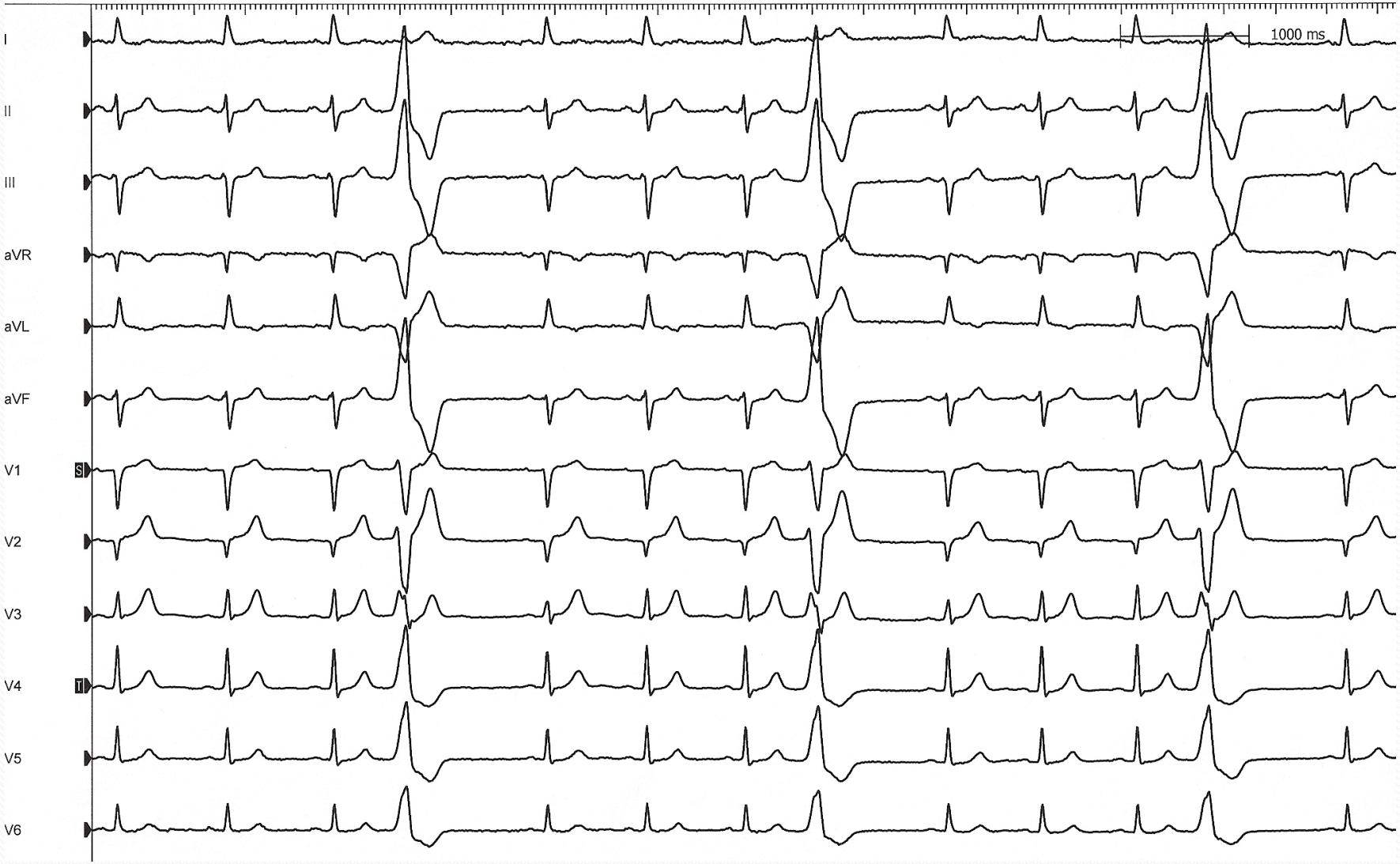


Suleiman M, Asirvatham S. Heart Rhythm 2008.

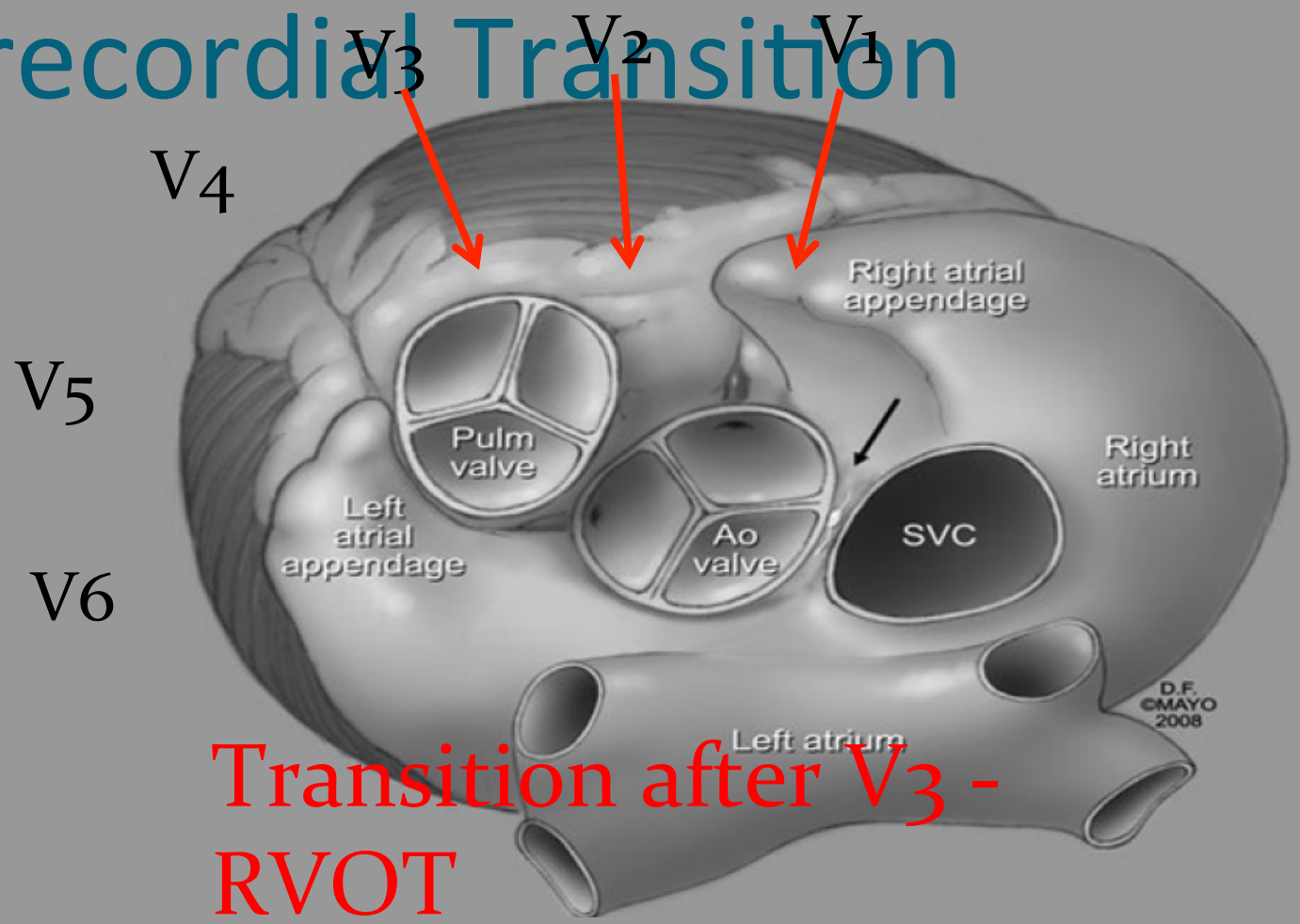
Anderson RH et al. J Anat 2004.

RVOT vs LVOT

PVCs: RVOT vs LVOT note transition at V3-V4



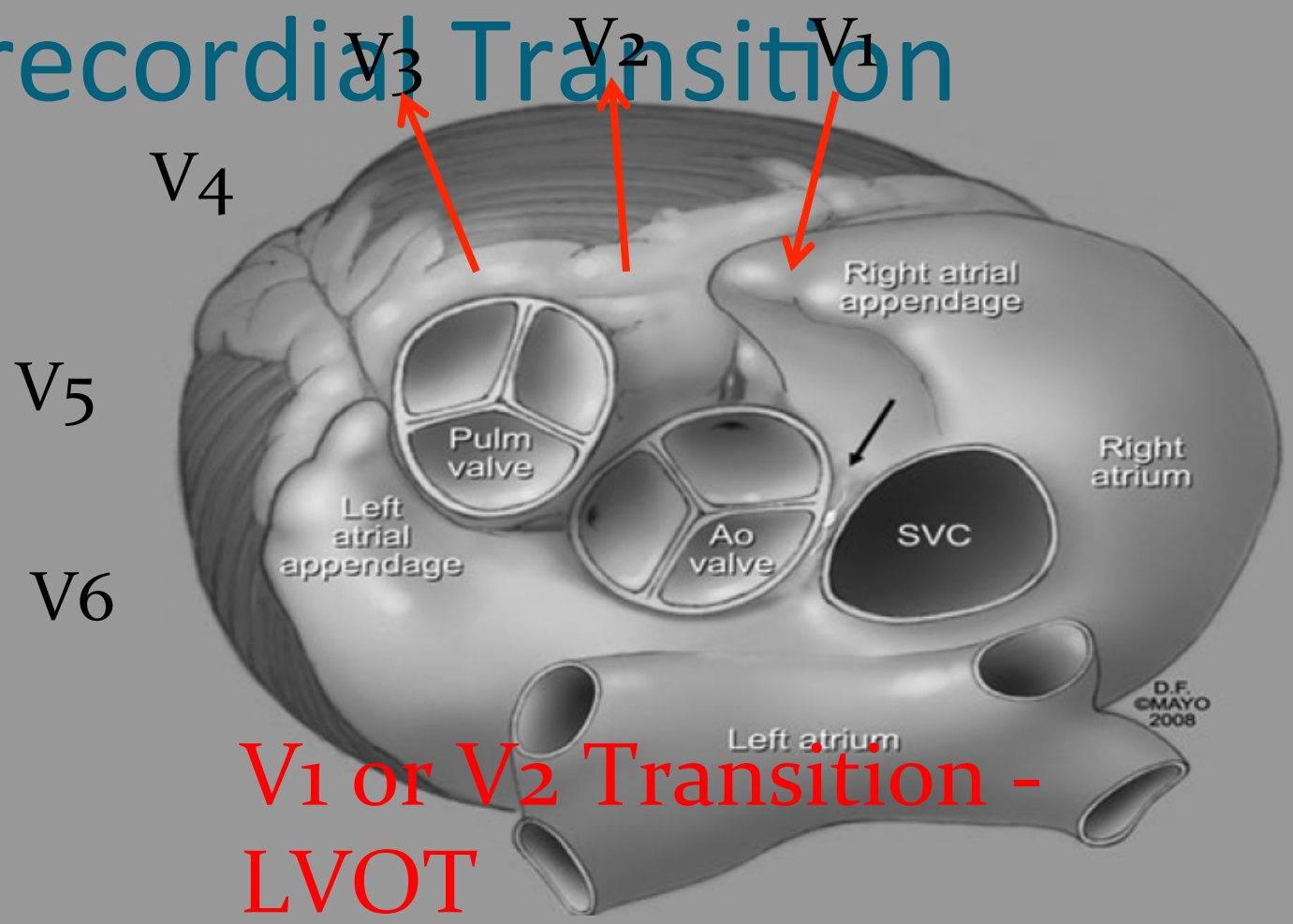
Precordial Transition



Transition after V3 - RVOT

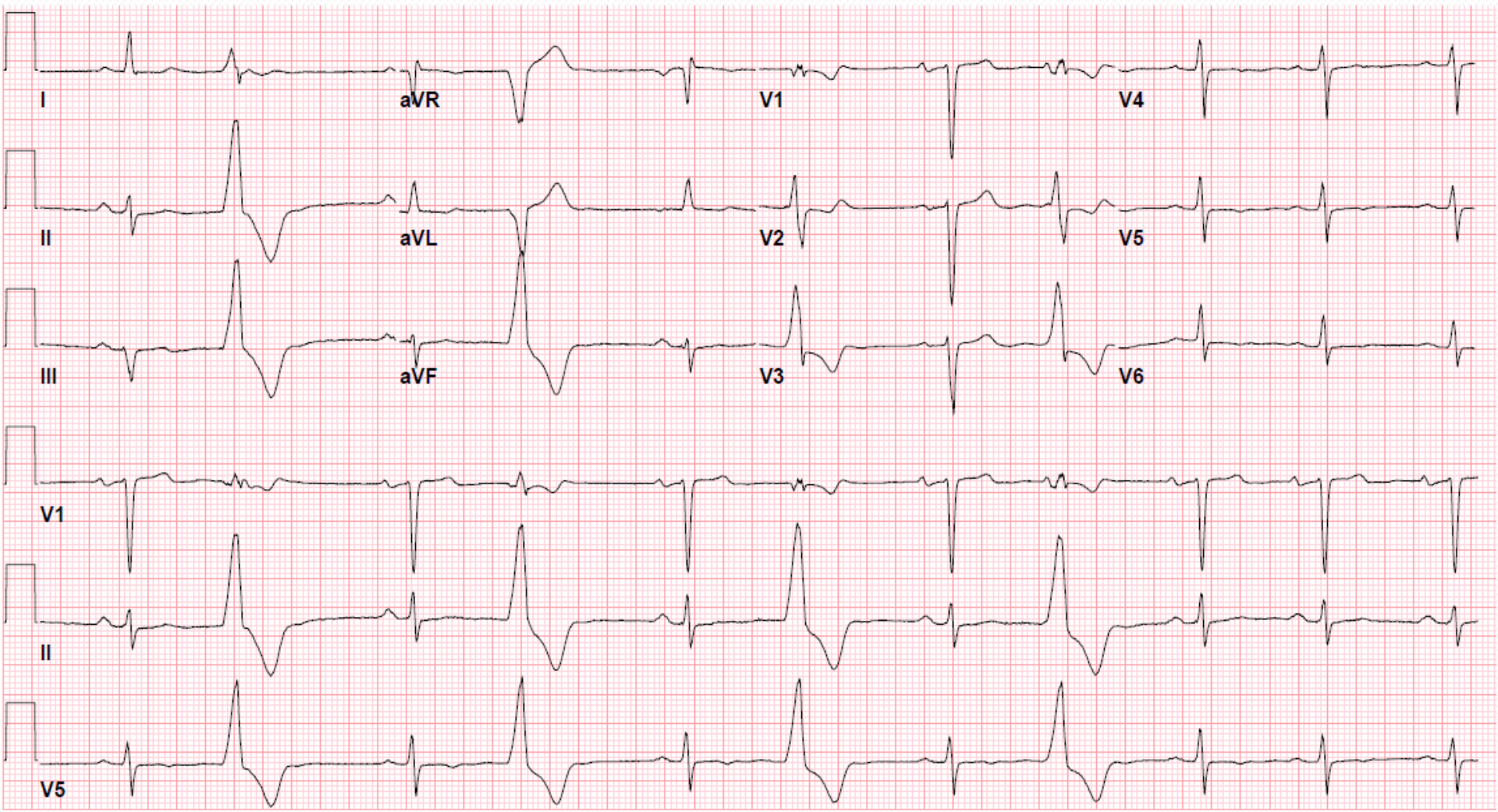
Asirvatham SJ. JICE 2009.

Precordial Transition



V1 or V2 Transition - LVOT

Asirvatham SJ. JICE 2009.


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5

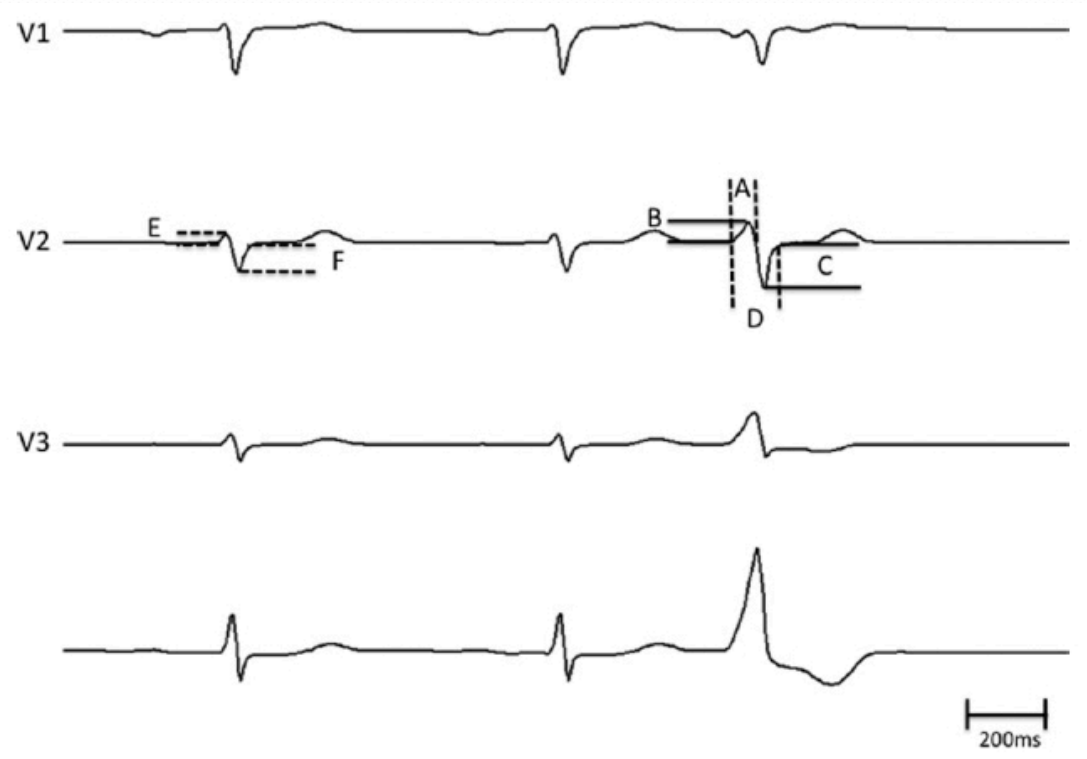
V2, V3 transition ratio

- In RVOT VTs, the precordial transition is typically at or after lead V_3.
- In LVOT VTs, it is typically at or before lead V_3.
- When the transition is at lead V_3, is there a way to distinguish an RVOT from an LVOT origin?

Betensky B et al. JACC 2011.

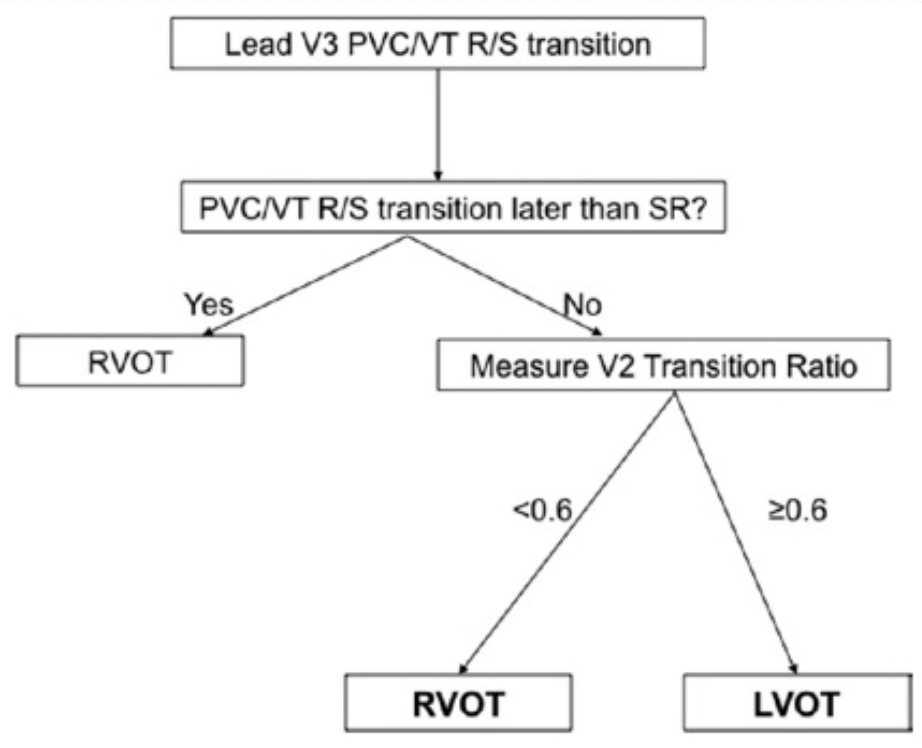
V2 transition ratio

- TP segment: isoelectric baseline used to measure R- and S-wave amplitudes
- B and C: R- and S-wave amplitudes of PVC
- E and F: R- and S-wave amplitudes of sinus-conducted beat
- V_2 transition ratio = % R wave in PVC divided by % R wave in SR = B/(B+C) divided by E/(E+F)



Betensky B et al. JACC 2011.

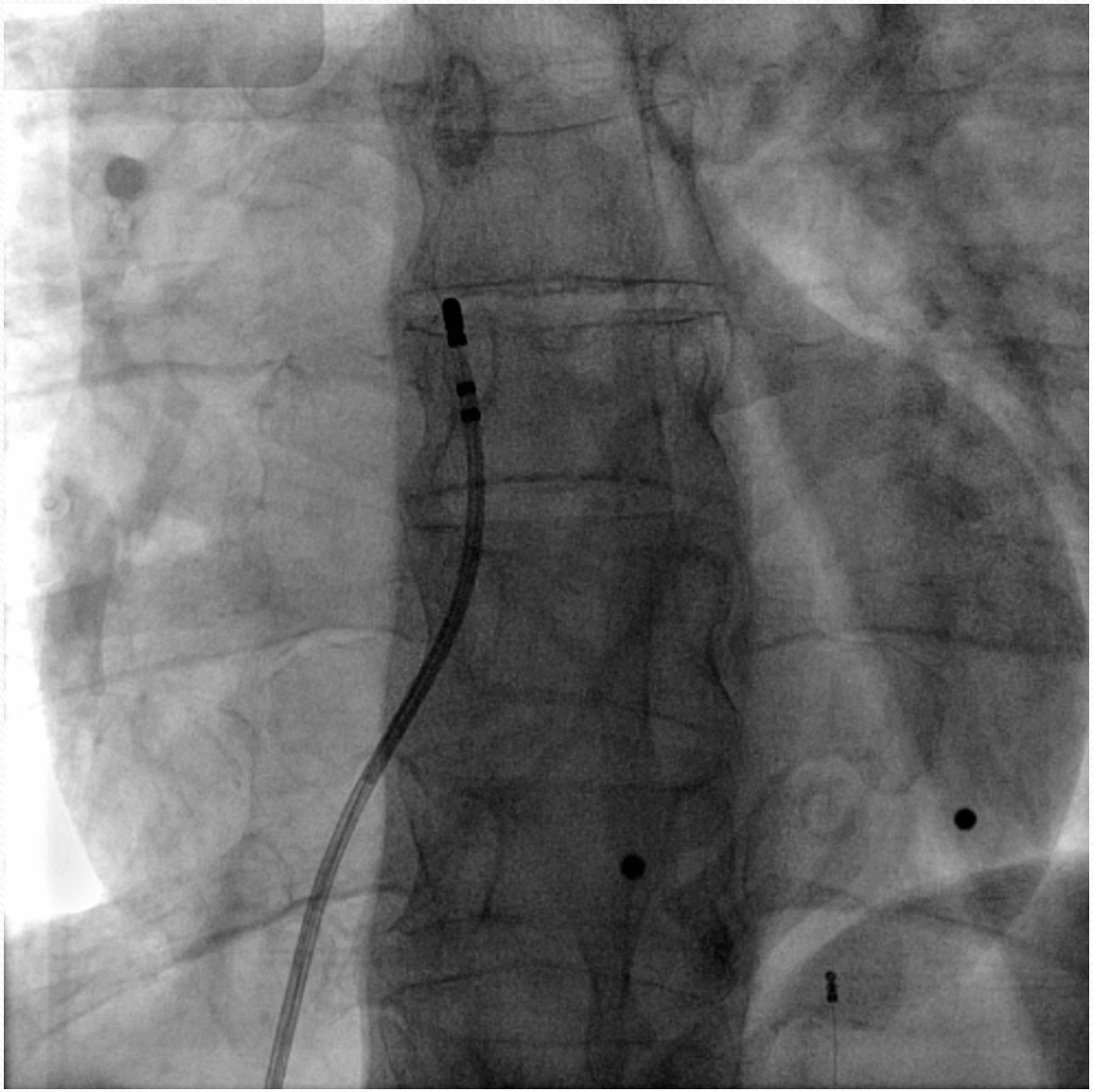
V2, V3 transition ratio



Betensky B et al. JACC 2011.

On to ablation

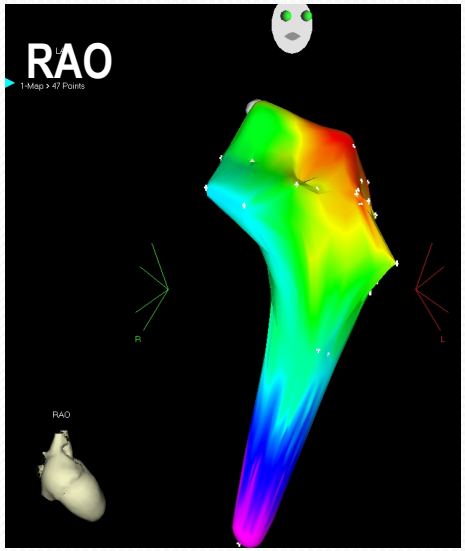
One catheter may be sufficient!

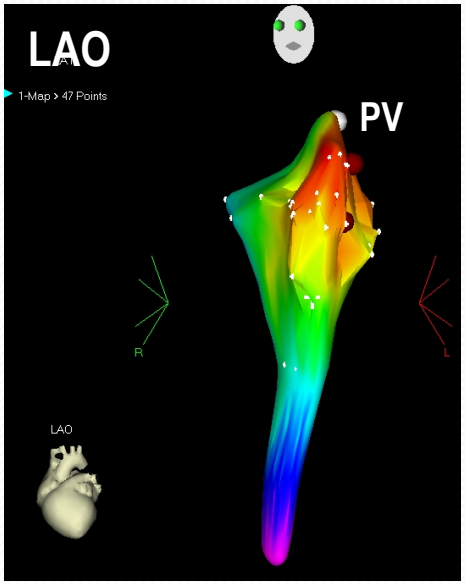


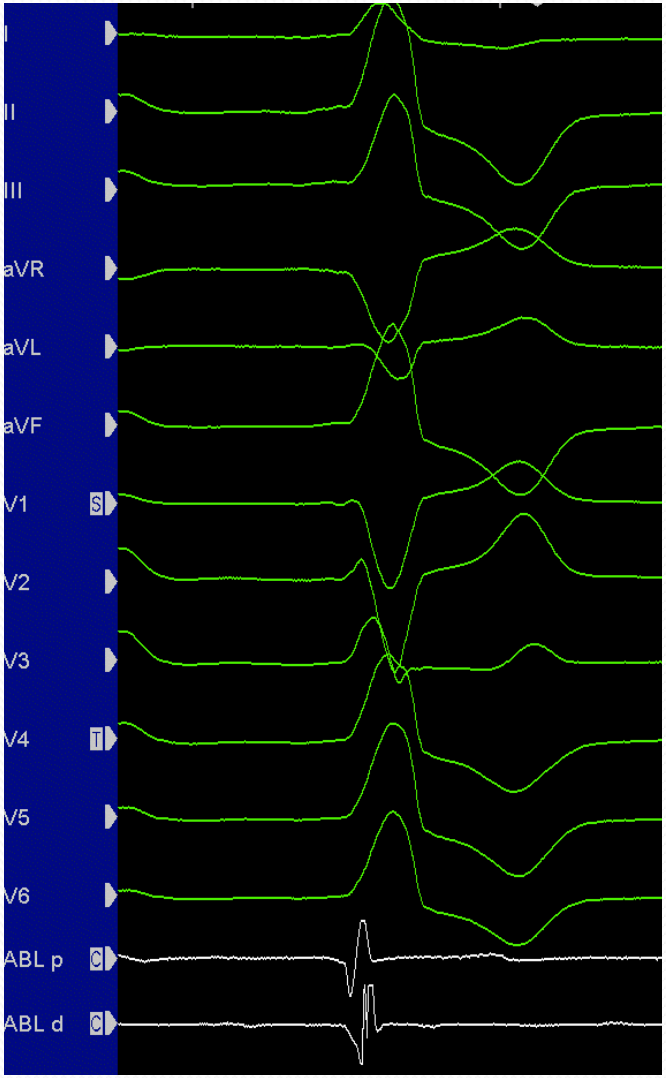
RVOT Mapping

- Define level of pulmonic valve
  - Advance catheter superiorly until no bipolar EGM's in distal bipole
  - Retract catheter until EGM's reappear and pacing results in capture of RVOT
- Electroanatomic map of RVOT PVC's
  - Activation mapping (bipolar and **unipolar** EGM's)
  - Pace mapping

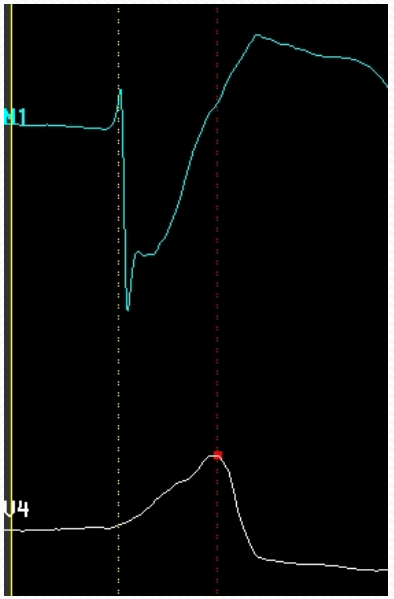
Activation map



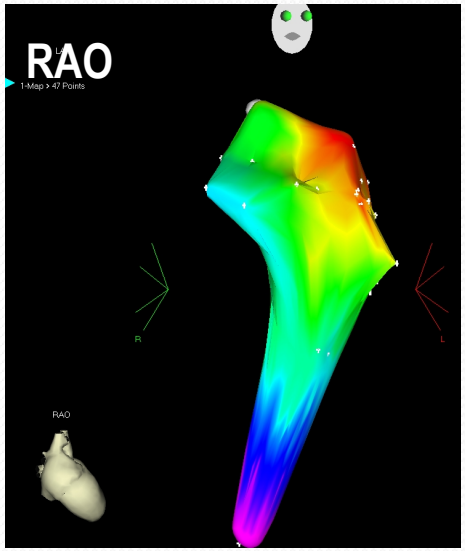


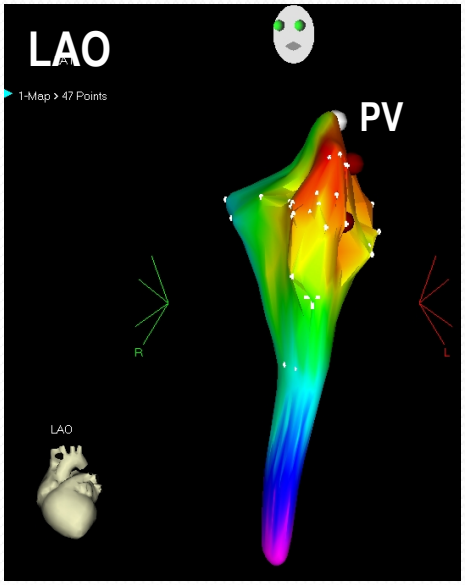


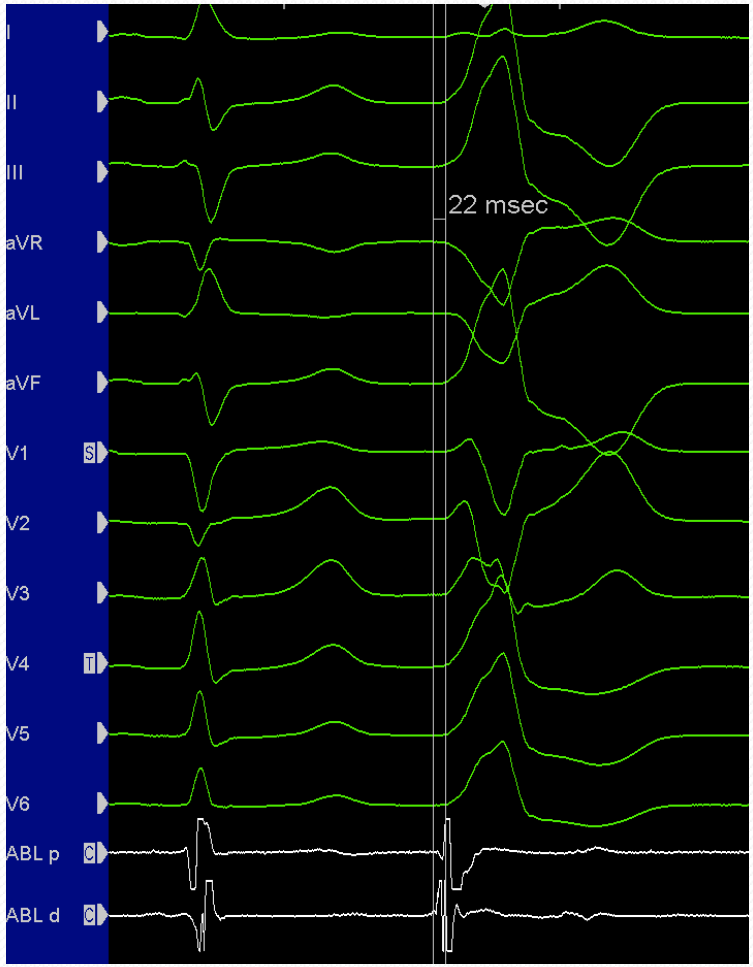
Unipolar signal



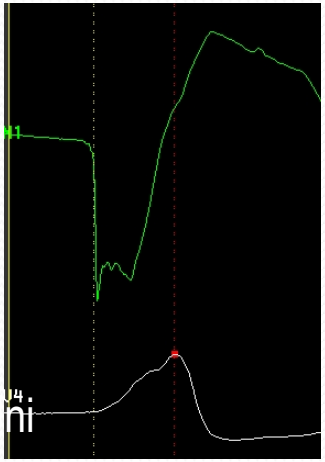
A better site





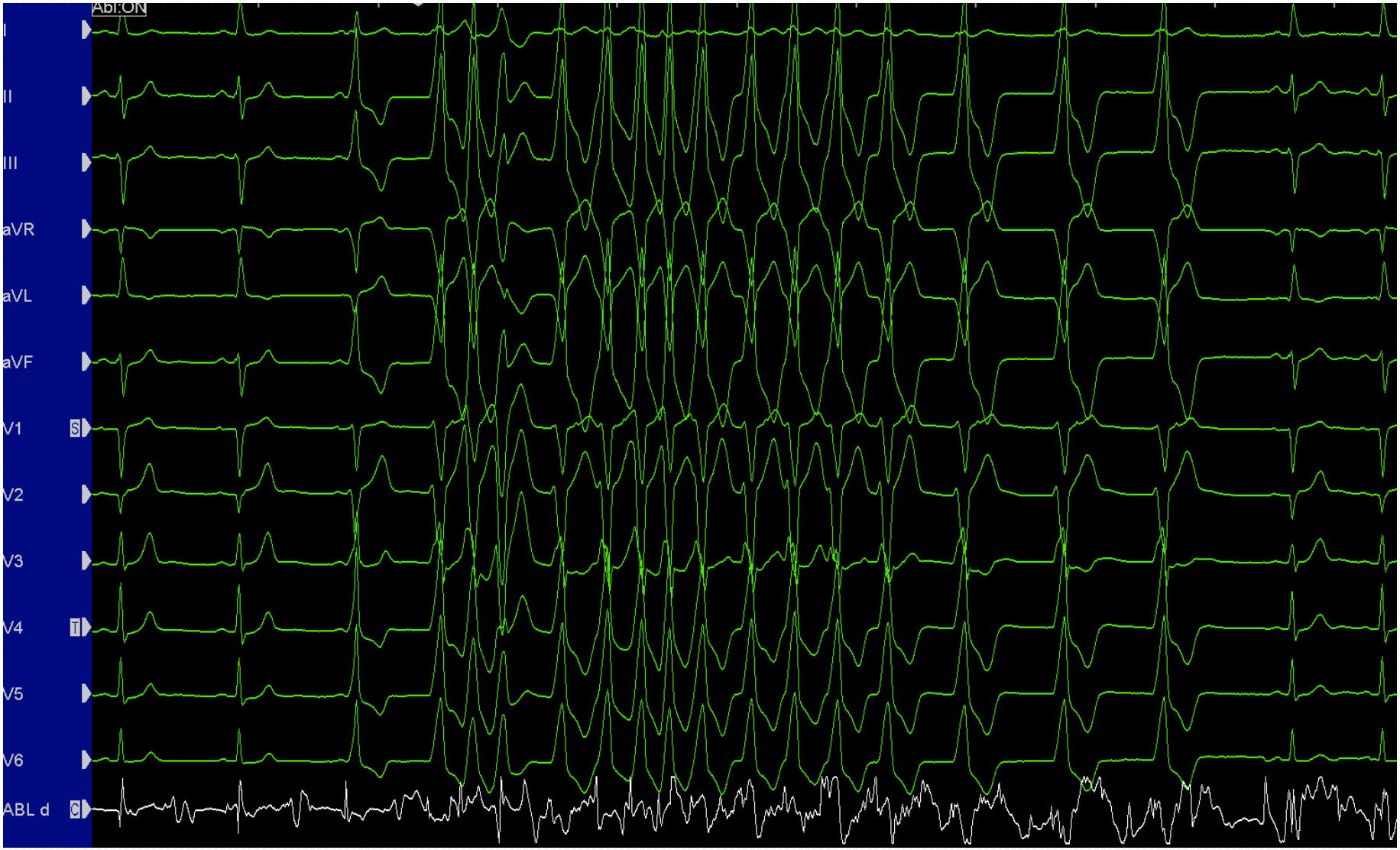


Unipolar



Bipolar EGM 22 ms early.
Note QS in unipolar EGM.

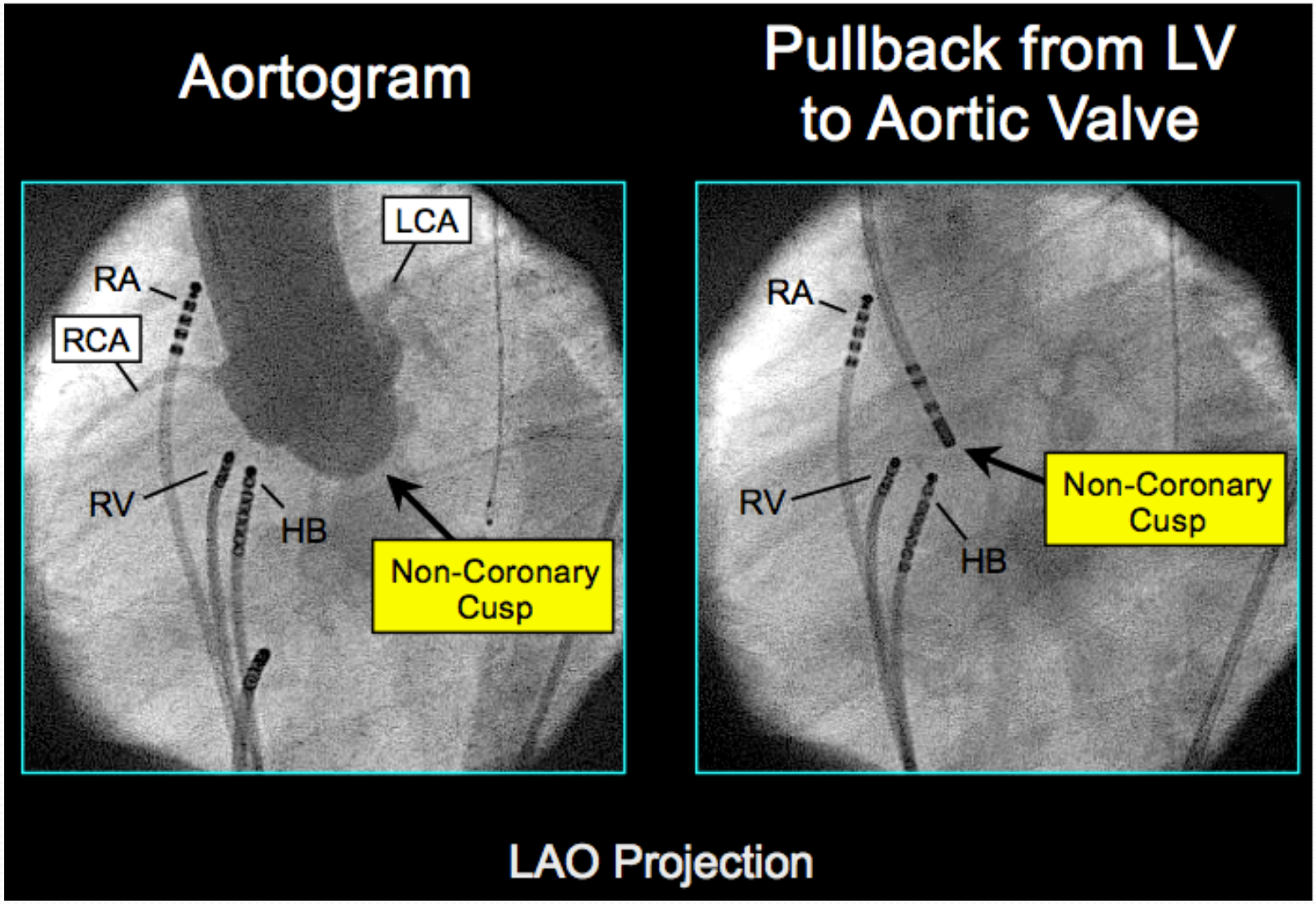
Response to RF



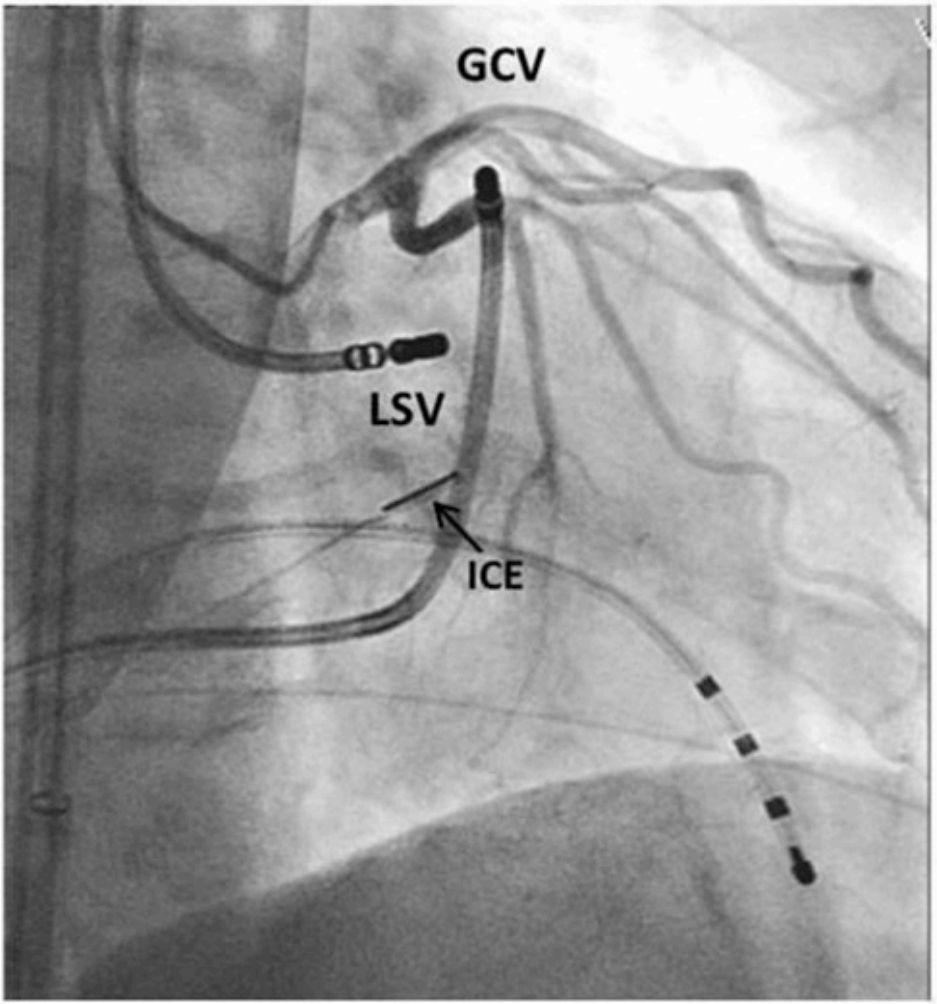
LVOT tips

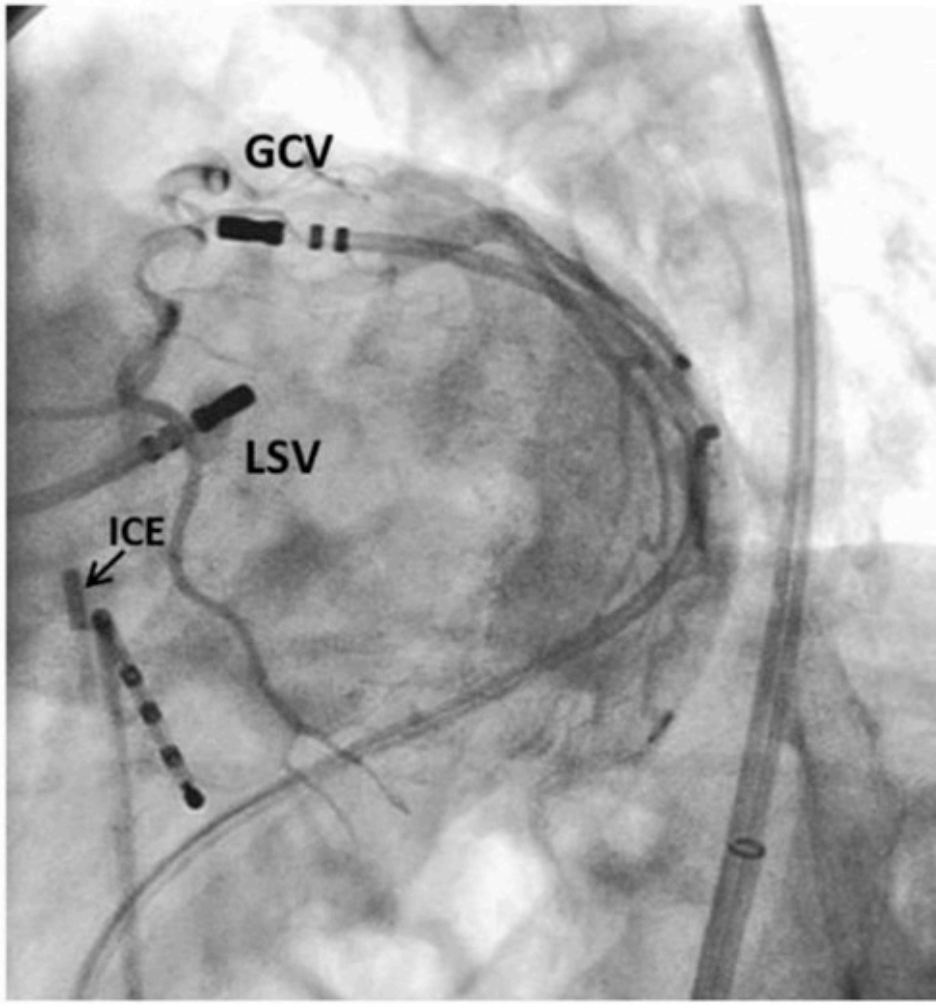
- Shoot coronary angios and superimpose on catheter positions.
- Consider using CartoSound (or at least ICE)
- Pace mapping in coronary cusps is less reliable than activation (variable exits).
- If Left coronary cusp and unable to get an early spot, try within CS (from femoral approach but may need to come from neck

Aortic sinuses



LV Summit: GCV and LCC



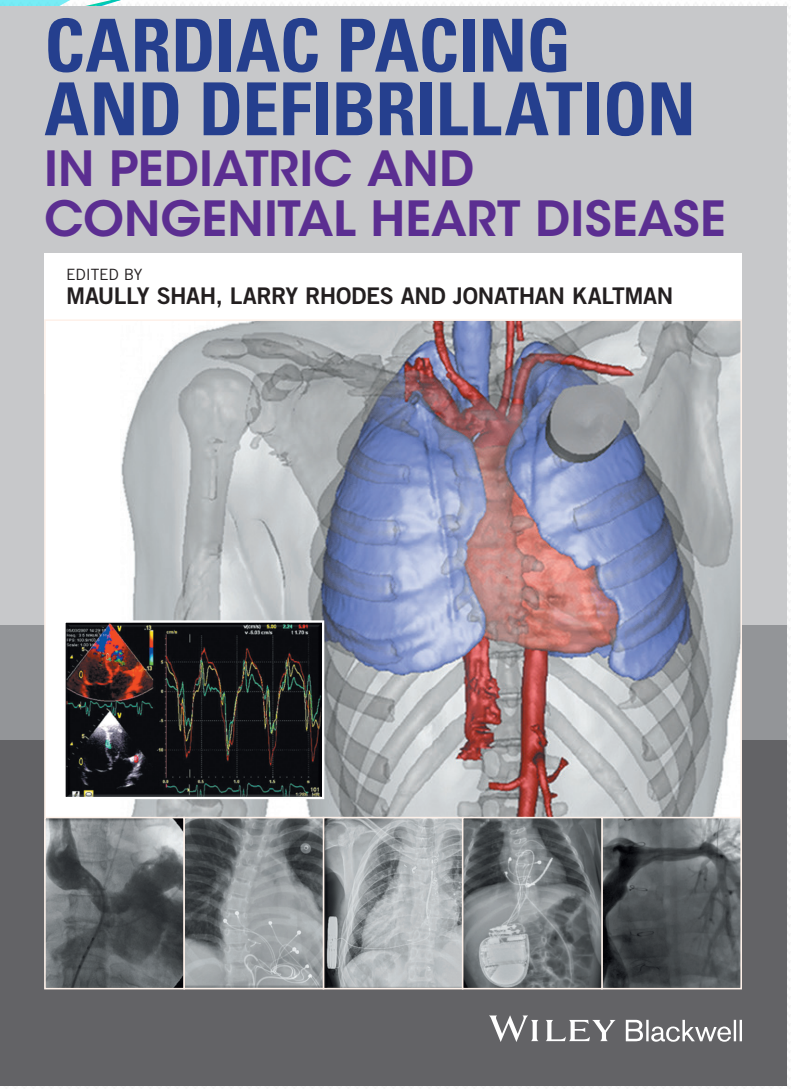


Finally

- If RVOT, LVOT and coronary sinus fail: consider an epicardial approach.

Conclusions

- Benign PVCs very common in kids: be sure ablation is necessary or indicated.
- Use ECG criteria to determine site of origin.
- 3 D mapping + superimposed fluoro helps.
- Pace-mapping less reliable.
- Unipolar EGMs are very useful.
- beware the thin RVOT
- Beware the coronary arteries, especially the origins.



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