Parahisian VT

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Parahisian VT

- VT and PVCs originating in the vicinity of the His-bundle region represent 3%–9% of all idiopathic ventricular arrhythmias

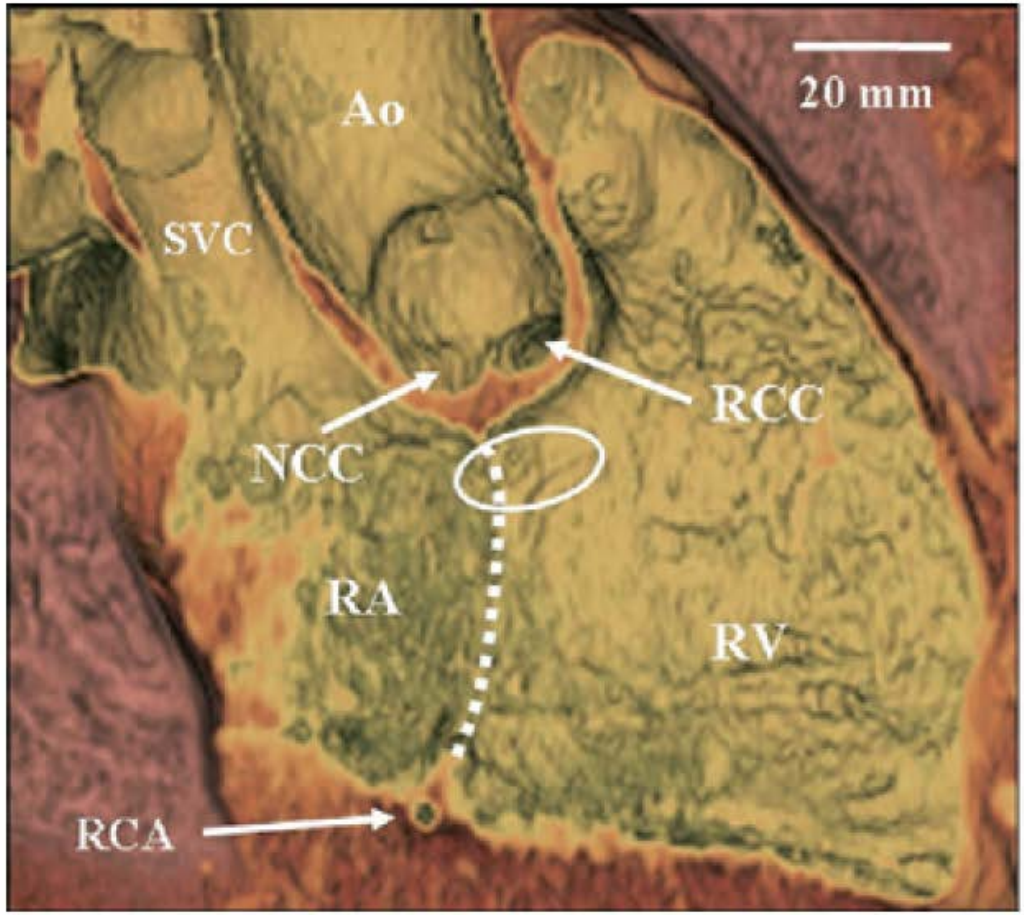
Ban J, et al. J Arrhythm 2014;30:48–54.
Yamada T, et al. Heart Rhythm 2008;5:37–42.

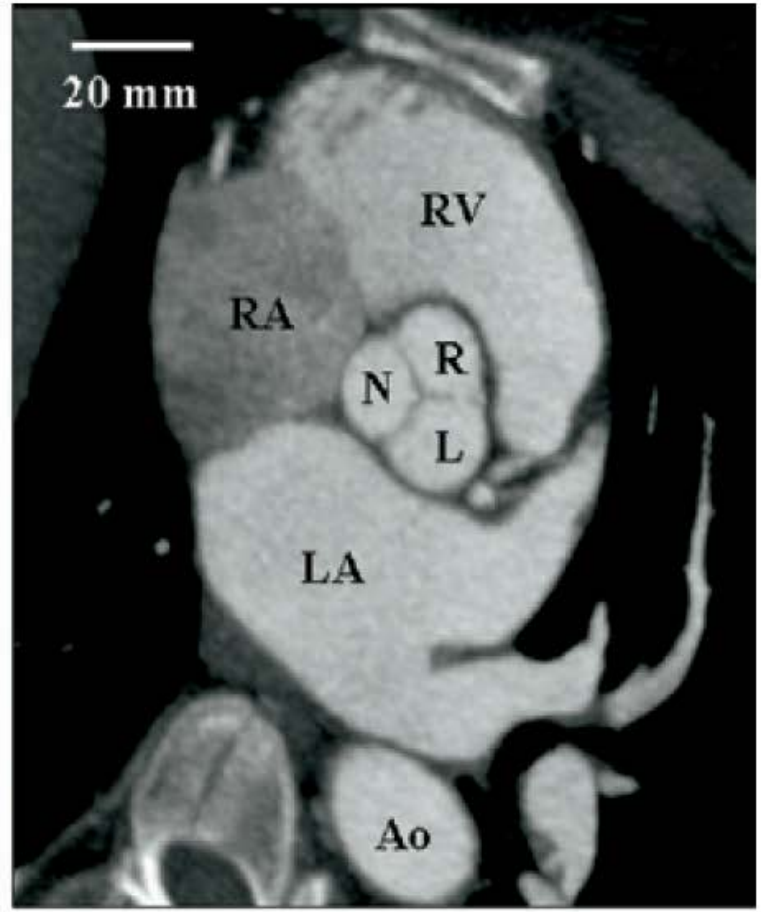
Definition

- Earliest activation is recorded in the presence of a His potential or within 10-mm distance from the His

Enriquez A et al. Heart Rhythm 2018;15:1268–1274

Anatomic considerations





Yamada T, et al. Heart Rhythm 2008;5:37– 42

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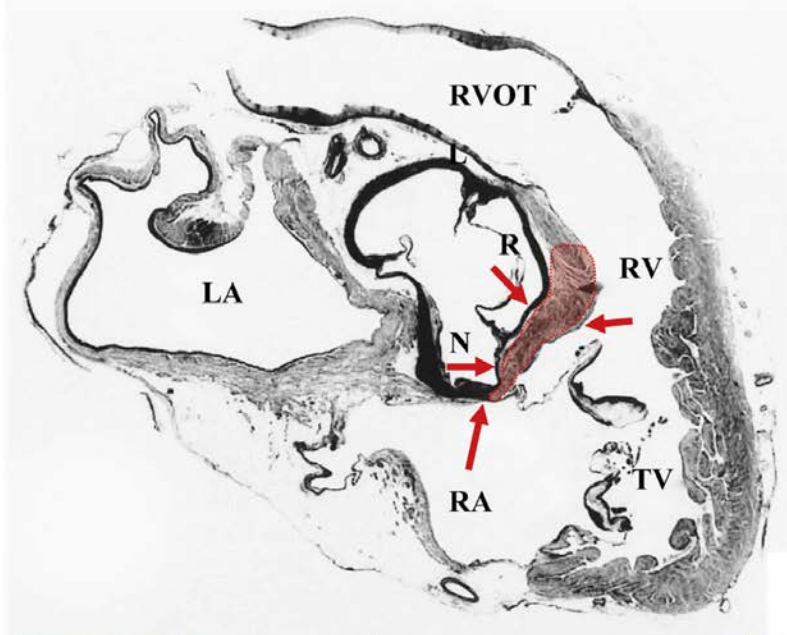
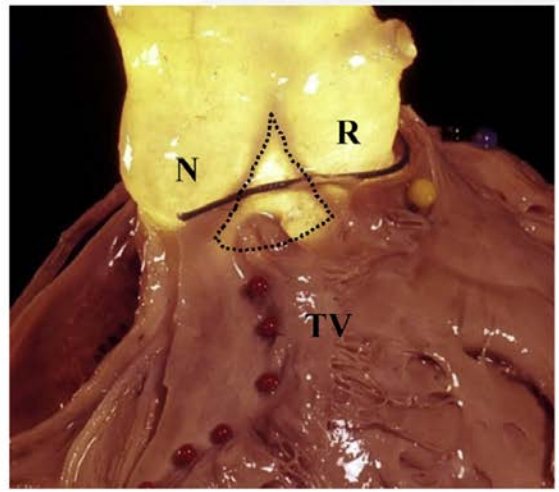
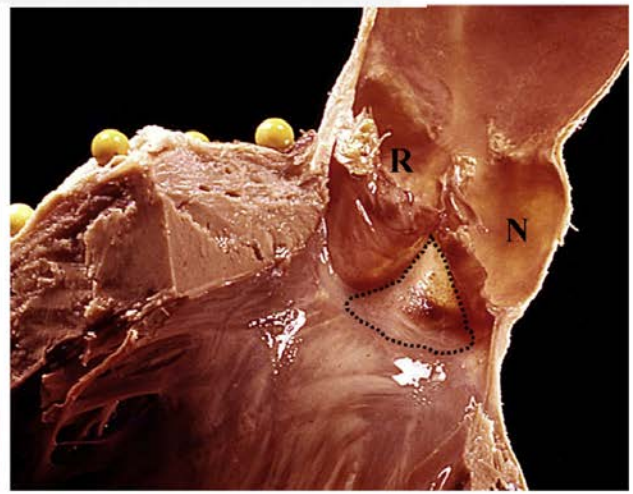
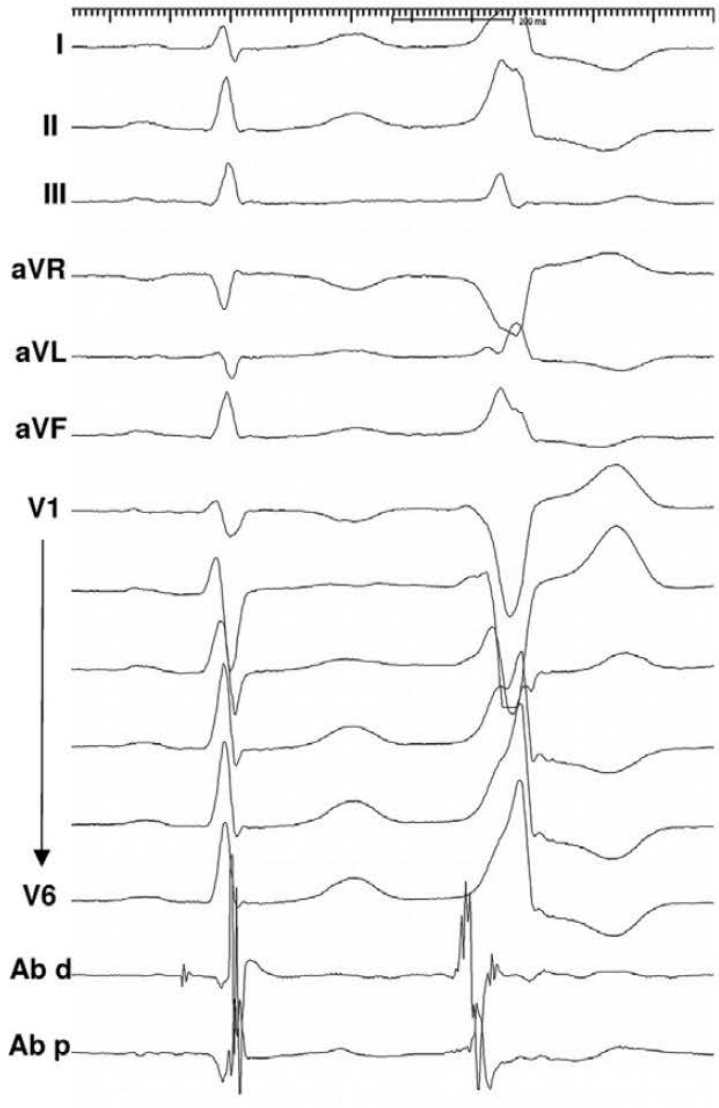






Walmsley R, et al. Clin Anat 1994;7:305–314

Electrocardiographic features



1. Left bundle branch block morphology
2. QS pattern in lead V1
3. Variable precordial transition (V2–V3)
4. Relatively narrow QRS duration (114±12 ms vs 139±12 ms)
5. R wave in aVL (RSR' or RR' pattern)
6. Tall monophasic R wave in lead I
7. Inferior axis with taller R wave in lead II than in lead III, or inferior lead discordance with positive lead II and negative lead III

Enriquez A et al. Heart Rhythm 2018;15:1268–1274

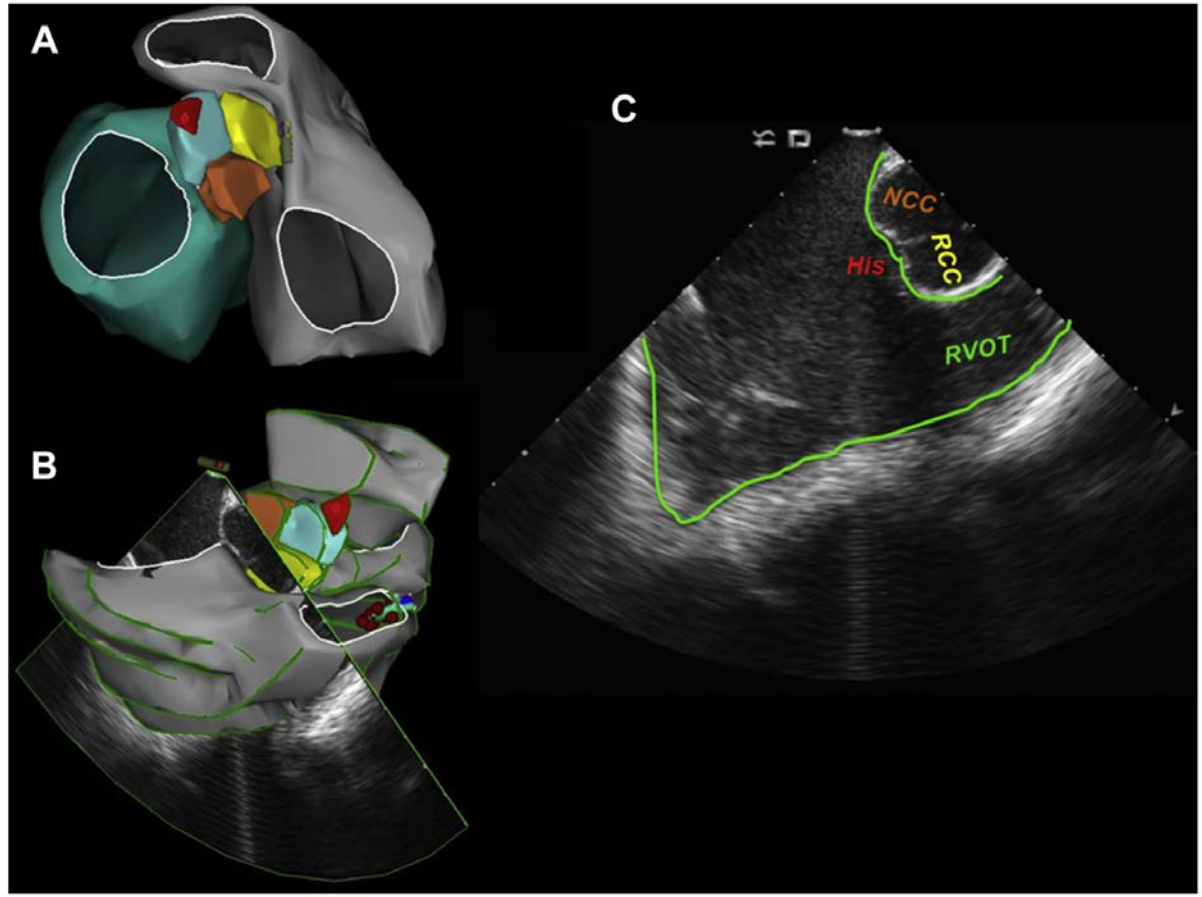
Electrocardiographic features

- Posterior, lower, and rightward location of the His bundle region within the RVOT
- Leftward shift of the depolarization vector, leading to R waves in leads I and aVL and taller R waves in lead II than lead III.
- Septal posterior RVOT VAs can be differentiated from parahisian VAs by taller and wider R waves in the inferior leads and negative QRS complex in lead aVL.

Mapping and ablation

- 1st step;

Detailed anatomic reconstruction of the RV and LV, with a focus on the outflow tracts, aortic cusps, and septum.



Enriquez A et al. Heart Rhythm 2018;15:1268–1274

Mapping and ablation

- 2nd step;

  Activation mapping of the arrhythmia.

  Induction of VT or PVCs with isoproterenol or dobutamine and ventricular or atrial burst pacing.

- Mapping should cover all the structures adjacent to the His-bundle region, including (1) RV septum with the area underneath the V; (2) RCC and NCC; (3) LV septum below the aortic valve; and (4) contiguous RA.

- Cf) Pacemapping; complementary role

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Mapping and ablation

- In case of absent or infrequent VT/PVCs and failure to induce, it is better to postpone the procedure.

- Targets of radiofrequency (RF) delivery
  - Earliest local bipolar activation preceding the QRS
  - QS pattern in the unipolar electrogram

- Distance of at least 5 mm away from the site recording the largest His potential is desired.

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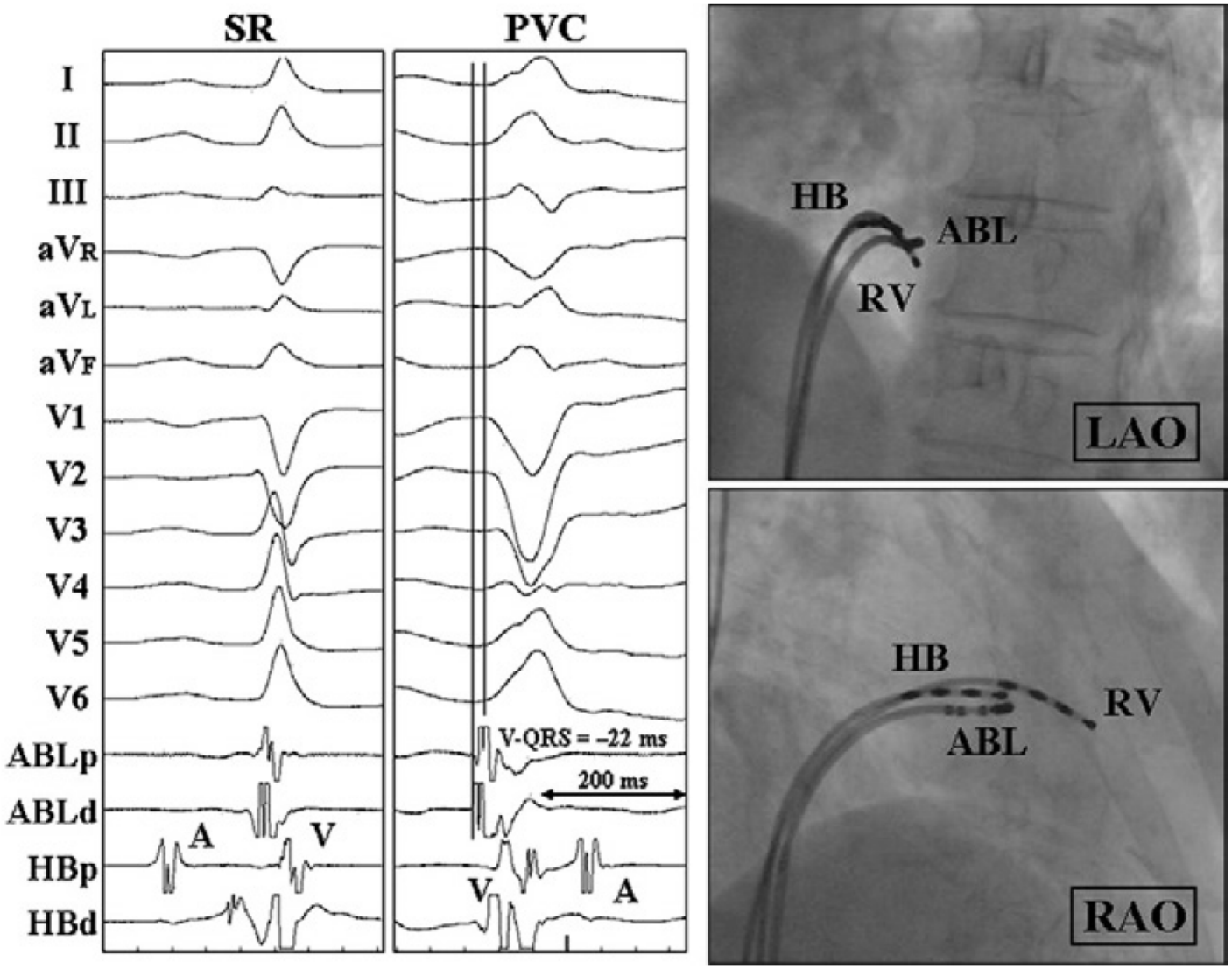
Mapping and ablation



Yamada T, et al. Heart Rhythm 2008;5:37– 42

Mapping and ablation

- If the site with earliest ventricular activation also exhibits a His potential, initial ablation from adjacent structures such as the NCC or RCC is reasonable, even if the activation in those structures is simultaneous or slightly later and/or far-field.

- If VT/PVC suppression or acceleration occurs in the first 10 seconds, RF delivery is continued for an additional 30–60 seconds. If no effect is observed after 10–15 seconds, RF delivery is terminated and the catheter repositioned.

- RF should be stopped;

  - AH prolongation, junctional rhythms, RBBB or transient heart block.

Yamada T, et al. Heart Rhythm 2008;5:37– 42

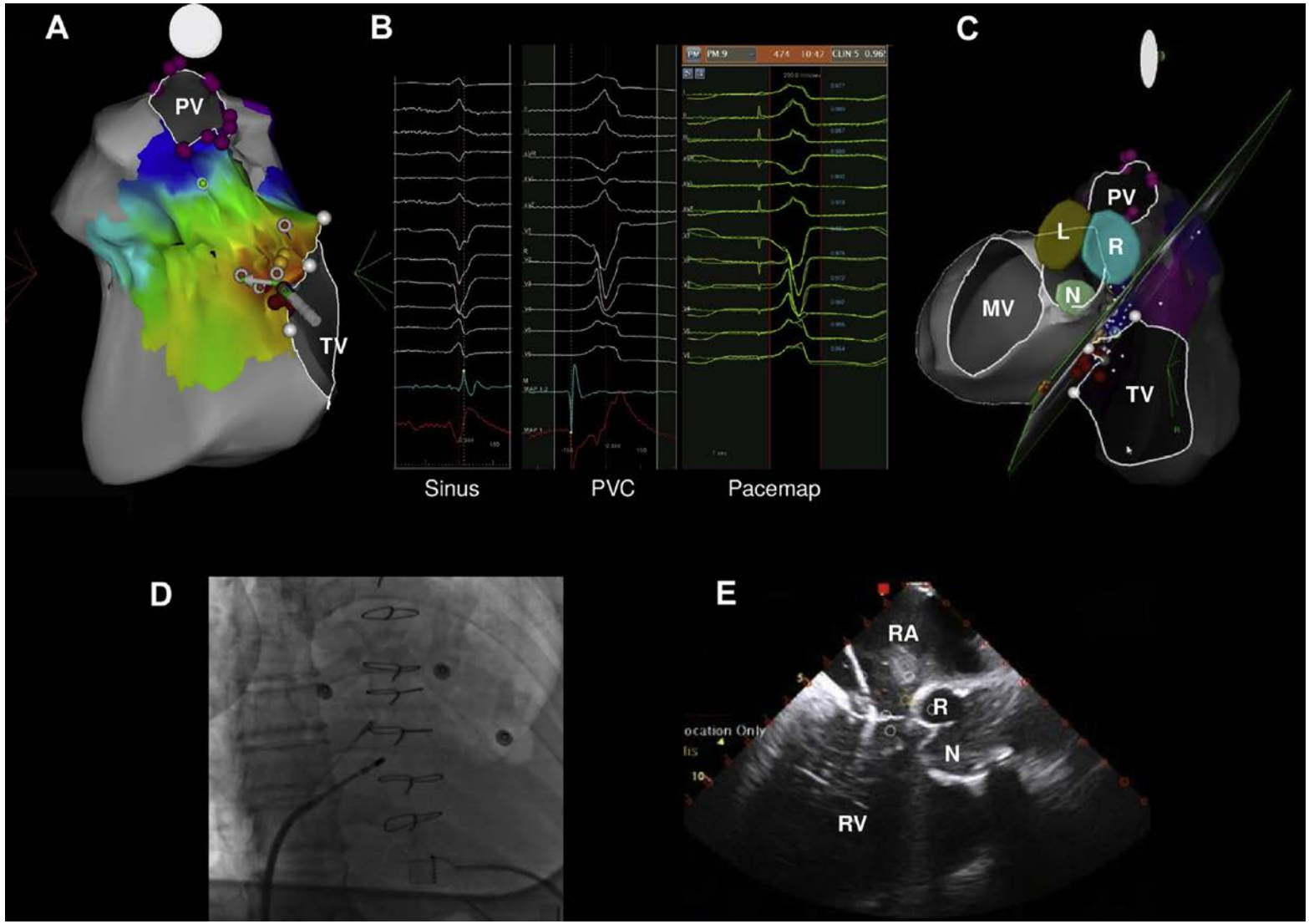
Strategies for mapping and ablation at particular structures- RV septum

- Start mapping the parahisian region of the RV.

- Contact and stability sometimes may be limited by factors such as a prominent eustachian ridge, the presence of the tricuspid valve leaflets, and tricuspid regurgitation.

- These obstacles can be overcome by using a steerable sheath (Agilis, St. Jude Medical, St. Paul, MN) to displace the eustachian ridge downward and to achieve appropriate support to enter the RV.

Strategies for mapping and ablation at particular structures- RV septum



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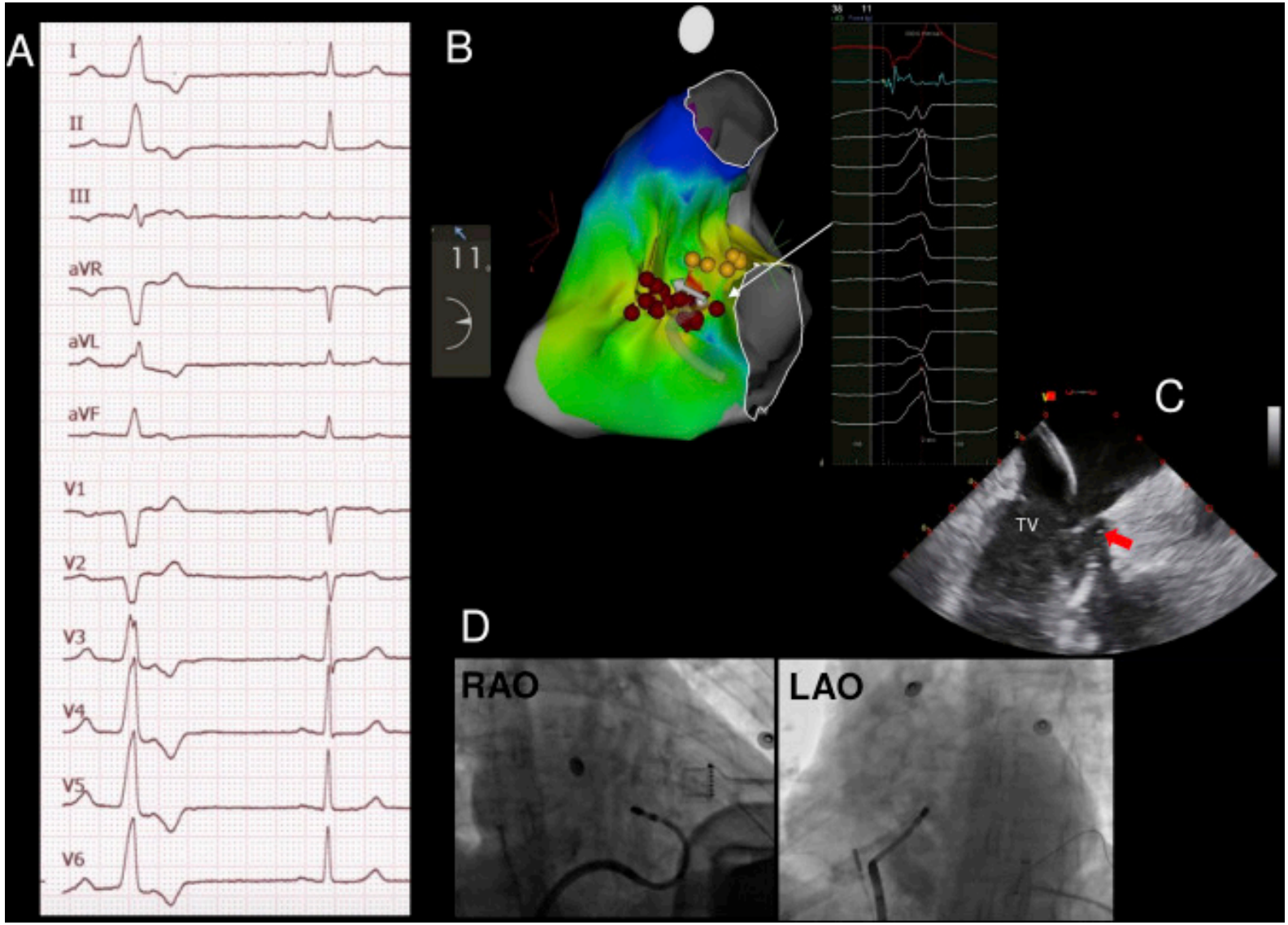

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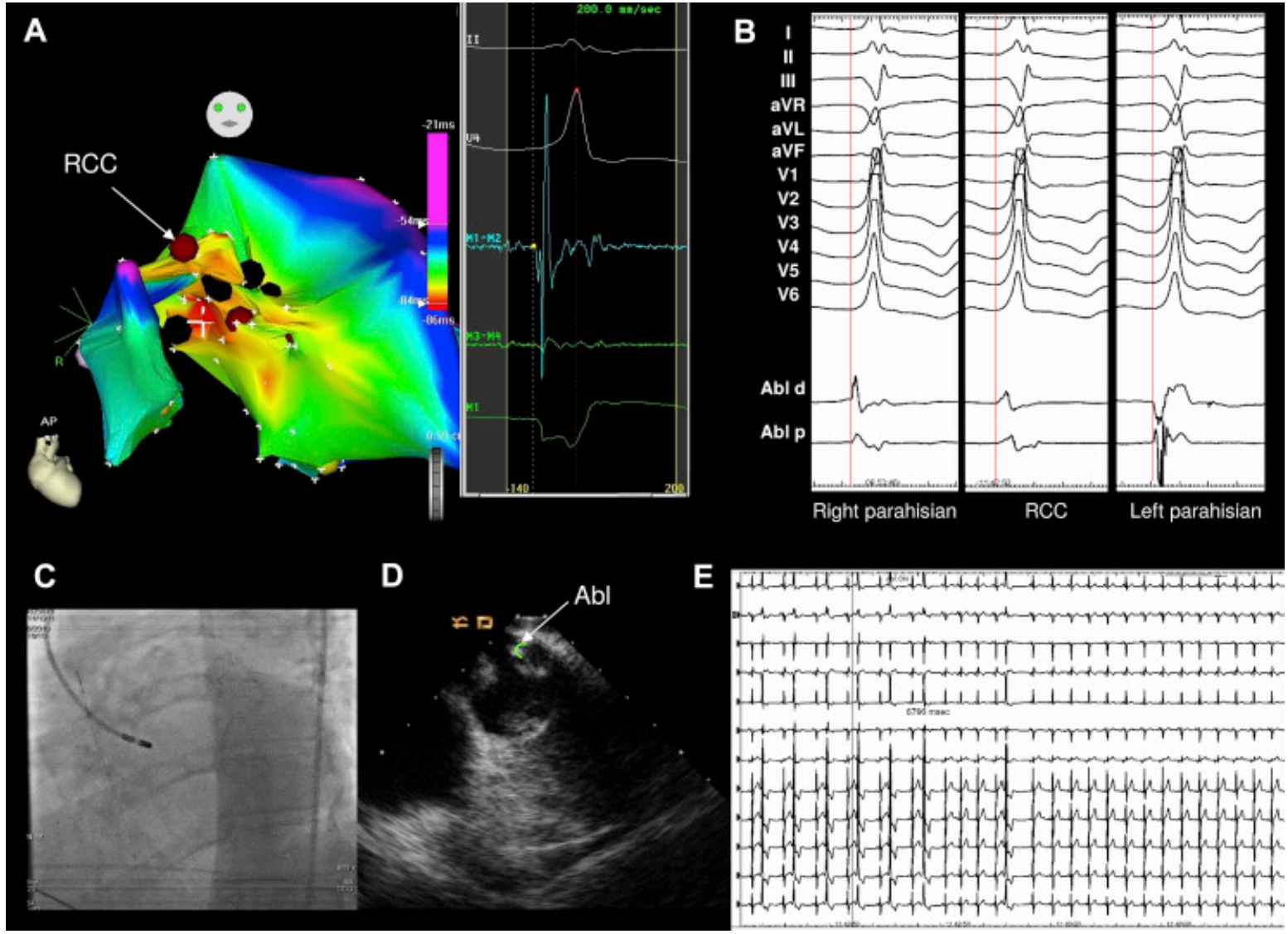
Strategies for mapping and ablation at particular structures- RCC, NCC



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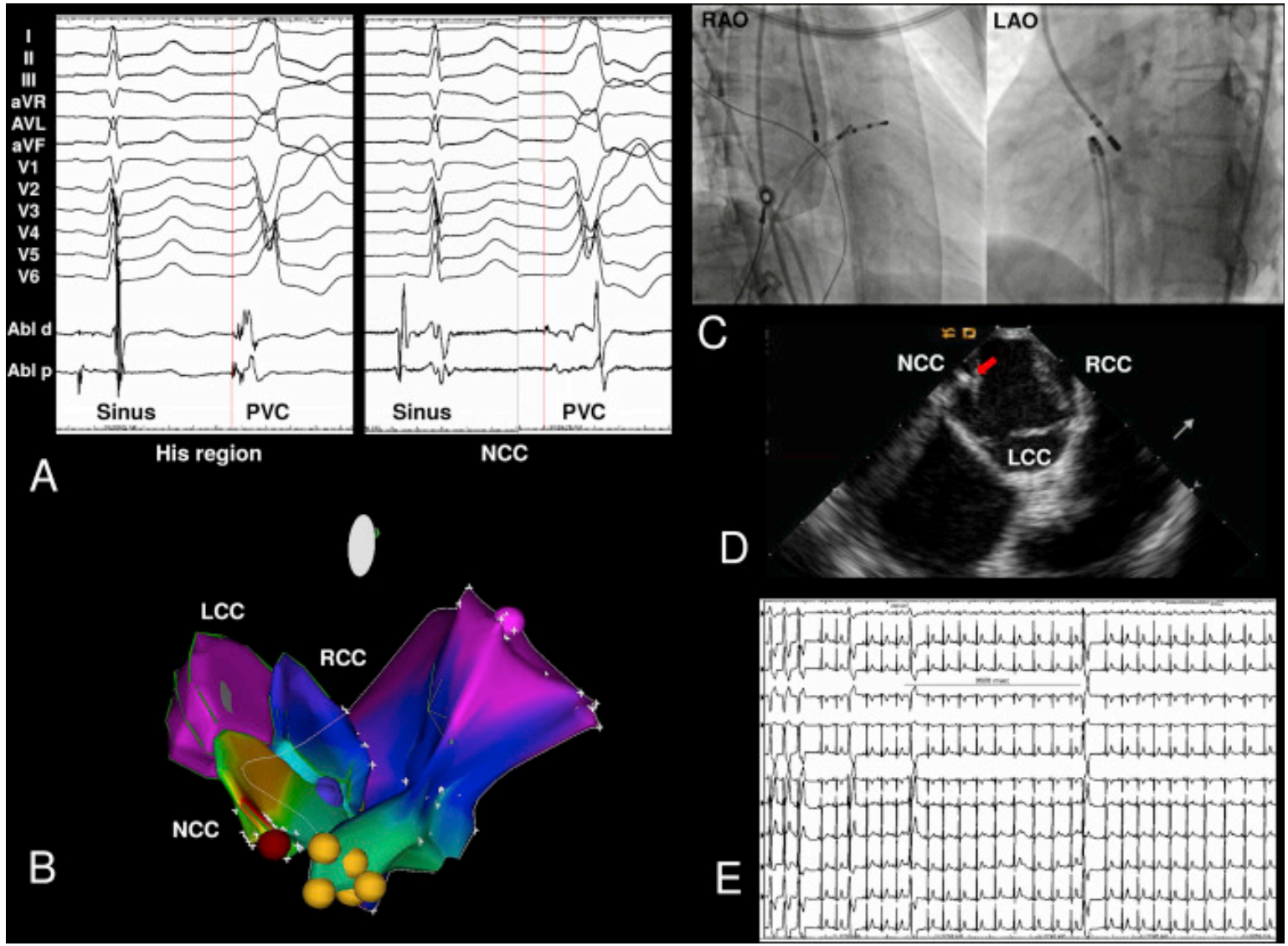

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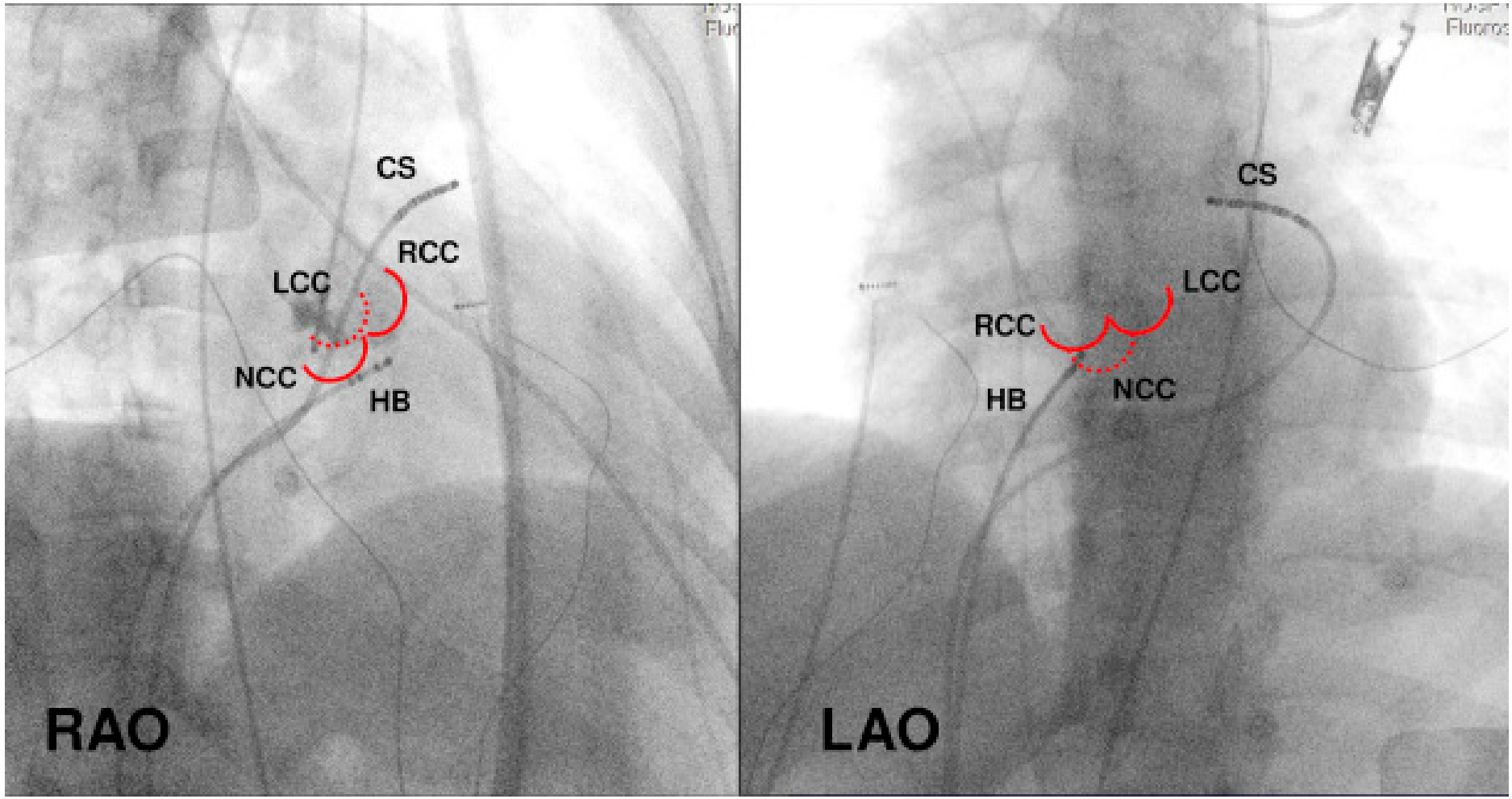
Right and noncoronary cusp - Fluoroscopy



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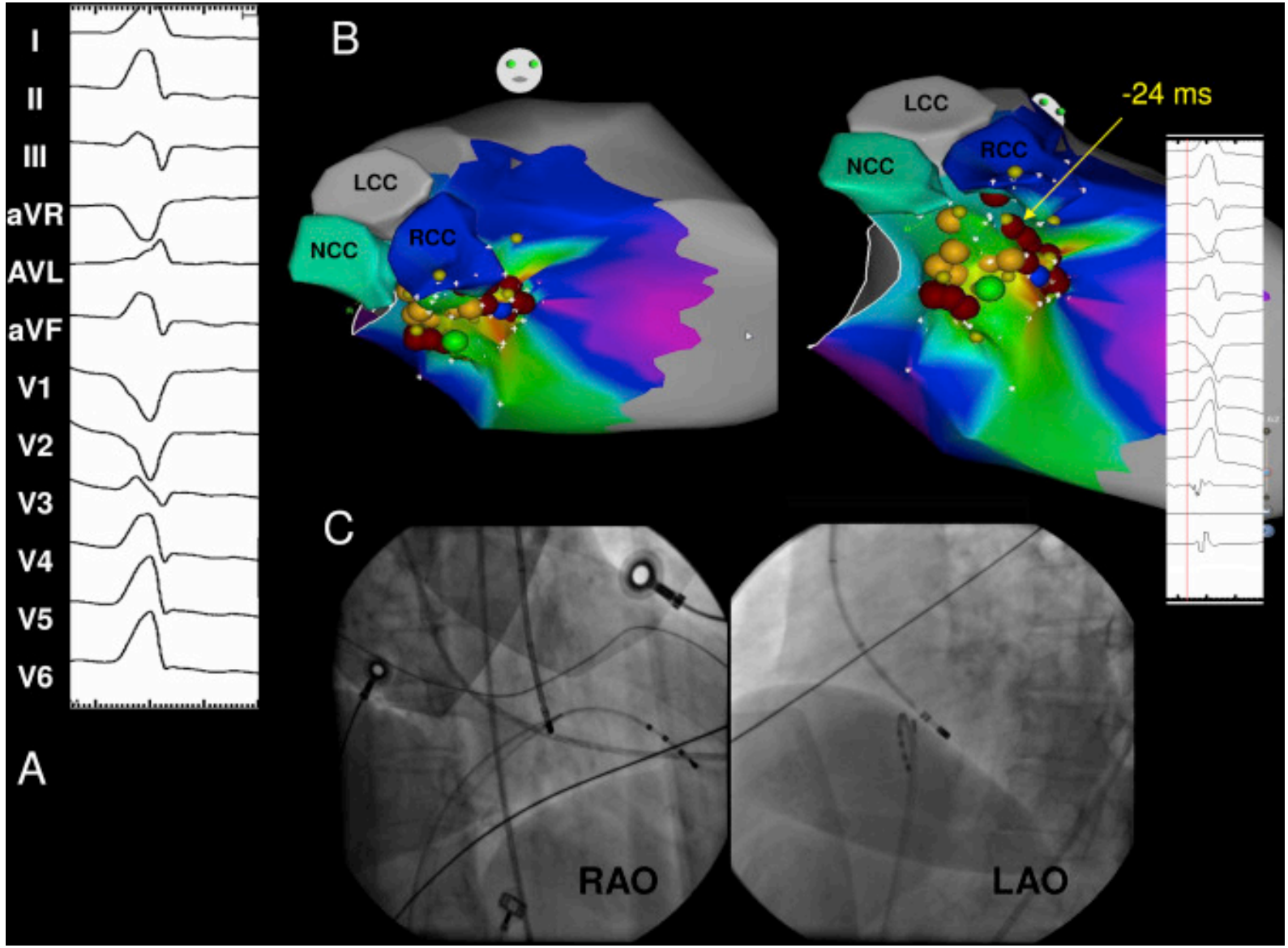
LV septum



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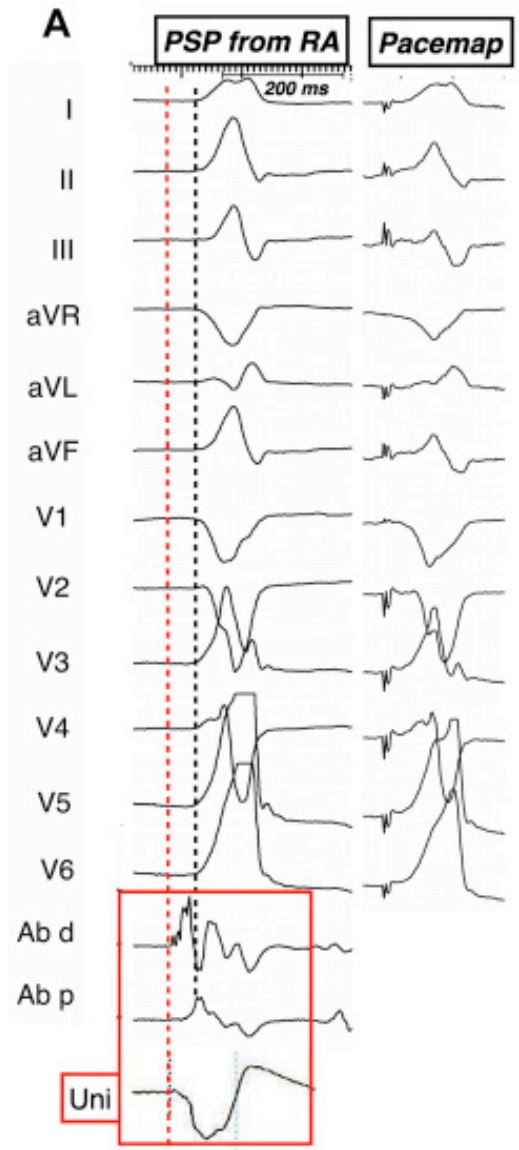
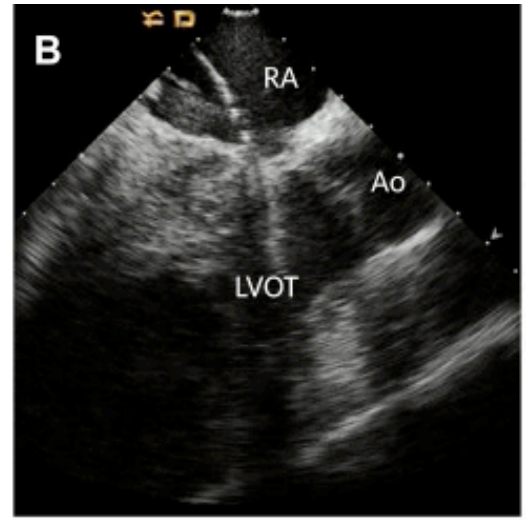
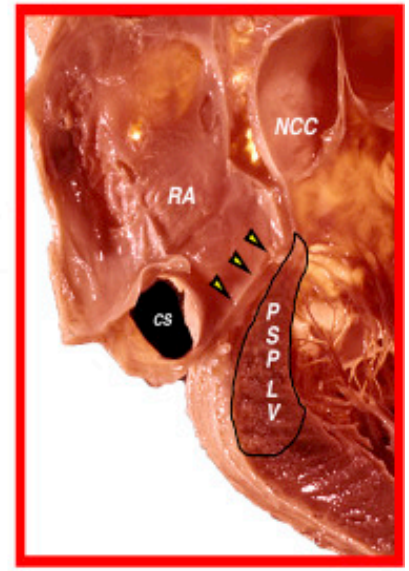
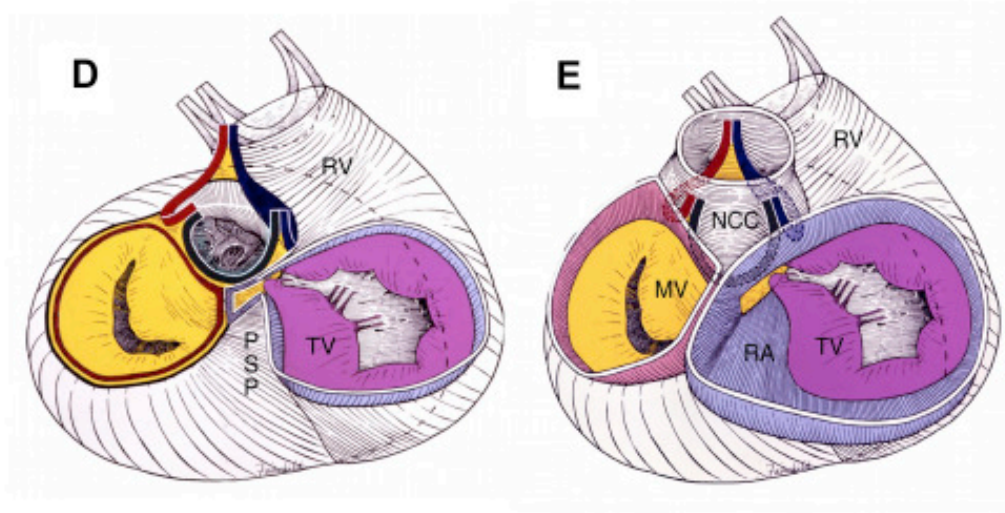
Right atrium









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Key teaching points

- Mapping of premature ventricular contractions (PVCs) originating from the para-hisian region should be performed bi-ventricularly, including the aortic coronary cusp.

- The precocity, Qs pattern in the unipolar electrogram of the ablation catheter, and good pace-mapping can help in finding a successful ablation site.

Key teaching points

- Ablation at the para-Hisian region has a risk of atrioventricular conduction injury.

- Radiofrequency application in this region should be started with low power energy and discontinued immediately if accelerated junctional beats or BBB, AV block is observed.