Ventricular tachycardia originating from pulmonary artery

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Intro

- Right ventricular outflow tract (RVOT) and left ventricular outflow tract are the most common sites of origin for idiopathic ventricular tachycardia (VT)
- Less commonly, idiopathic ventricular arrhythmias (VAs) can originate from the pulmonary artery (PA)
- 21% to 46% were localized beyond the PV
- Histopathological studies have shown that ventricular myocardium may extend into the aorta and PA
- Extending into the great vessels with abnormal automaticity or triggered activity may be the underlying mechanism of these VAs
- PA-VAs were not induced by programmed stimulation in any patient, strongly suggesting a mechanism most likely due to automaticity from the myocardium with the PSC
- Most of these VAs were located 8 mm above the PV

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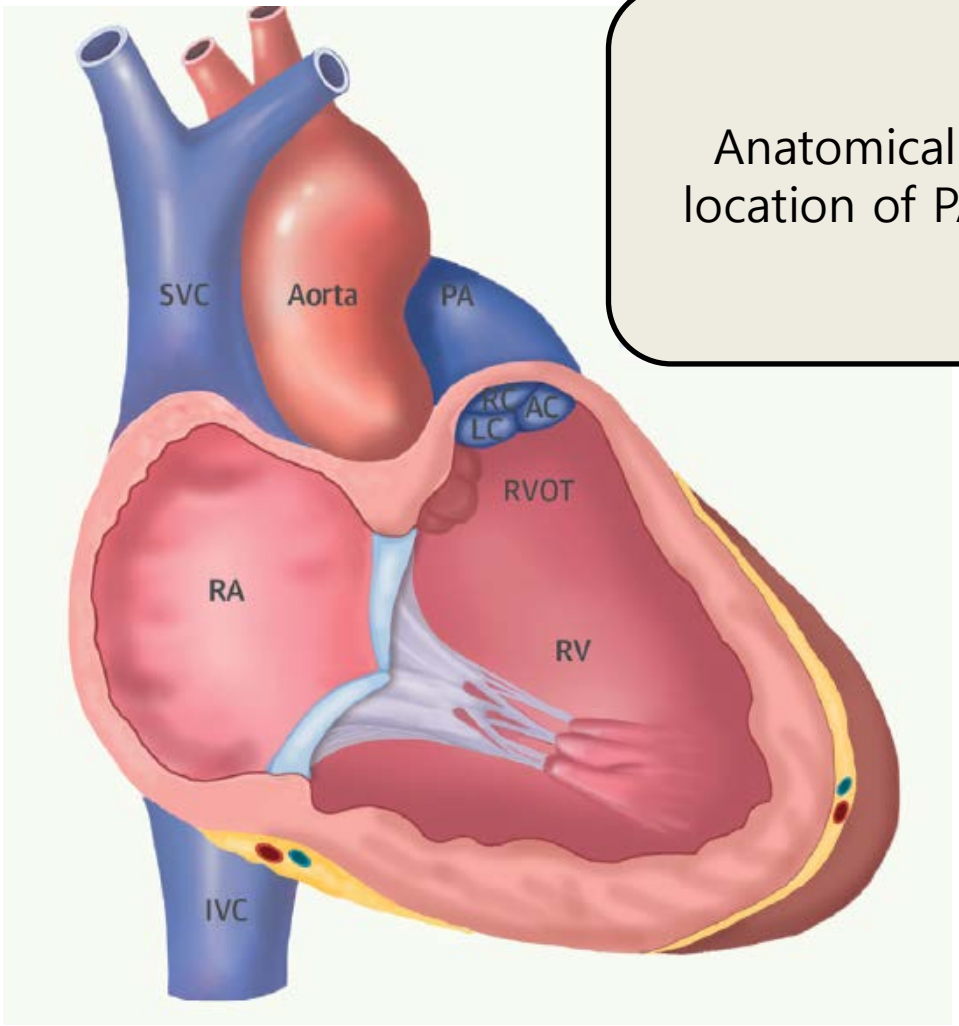
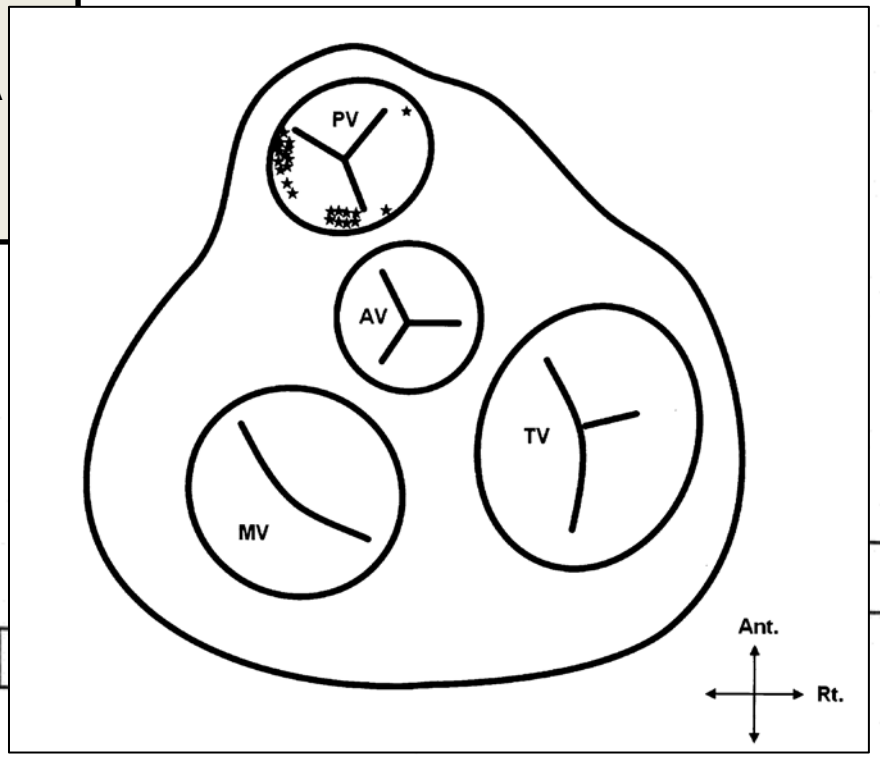
Anatomic location of the successful ablation sites in the pulmonary artery group



Anatomical location of PA



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Comparison of Clinical Characteristics and Electrophysiologic Data (vs. RVOT VT)

Variable	PA Group	RV-end-OT Group	p Value
Gender (M/F)	9/15	15/33	NS
Age (yrs)	53.7 ± 13.9	58.0 ± 12.1	NS
VPCs per day (n)	20,262 ± 12,636	16,708 ± 11,712	NS
RF applications (n)	3.7 ± 2.2	5.5 ± 4.5	NS
EAT (ms)	−32.9 ± 16.6	−32.4 ± 13.1	NS
Pace mapping score (n/12)	11.3 ± 0.75	11.3 ± 0.74	NS
Use of high-output pacing unit	15/24 (63%)	0/48 (0%)	$p < 0.01$

Values are mean ± SD.

EAT = earliest endocardial activation time; PA = pulmonary artery; RF = radiofrequency; RV-end-OT = endocardial right ventricular outflow tract; VPCs = ventricular premature contractions.

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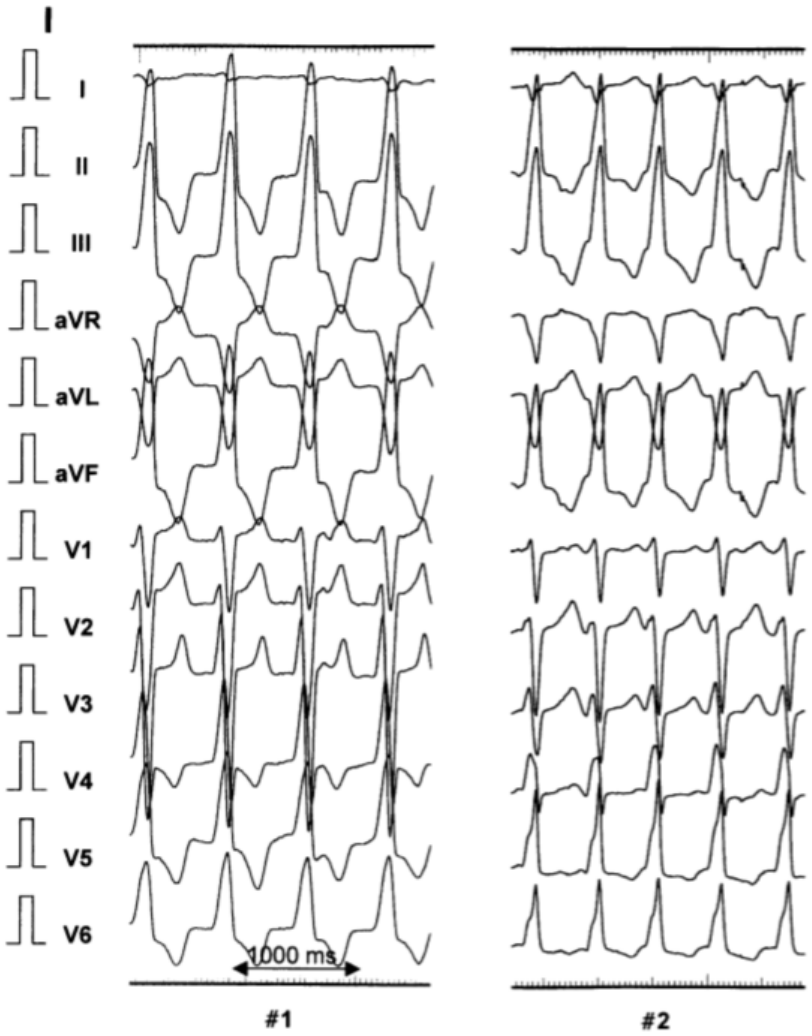
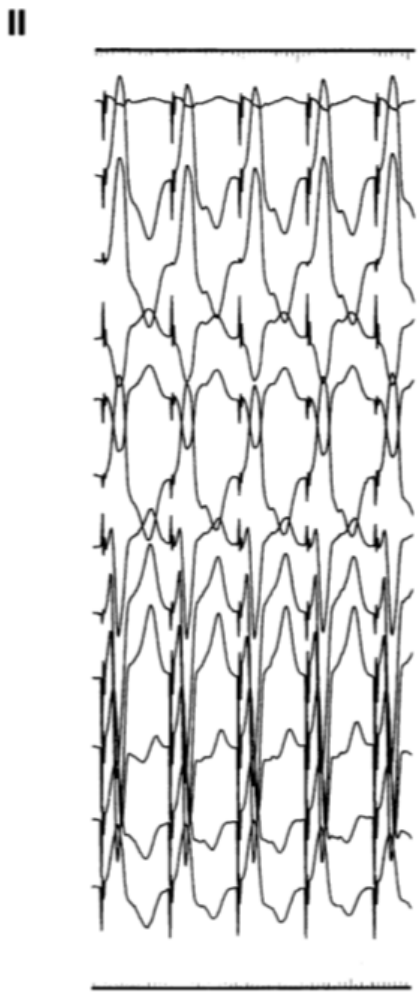
The electrocardiograms





M/58, Clinical VT originating 1.1cm above PV

I . Clinical VT
II. Pacemapping

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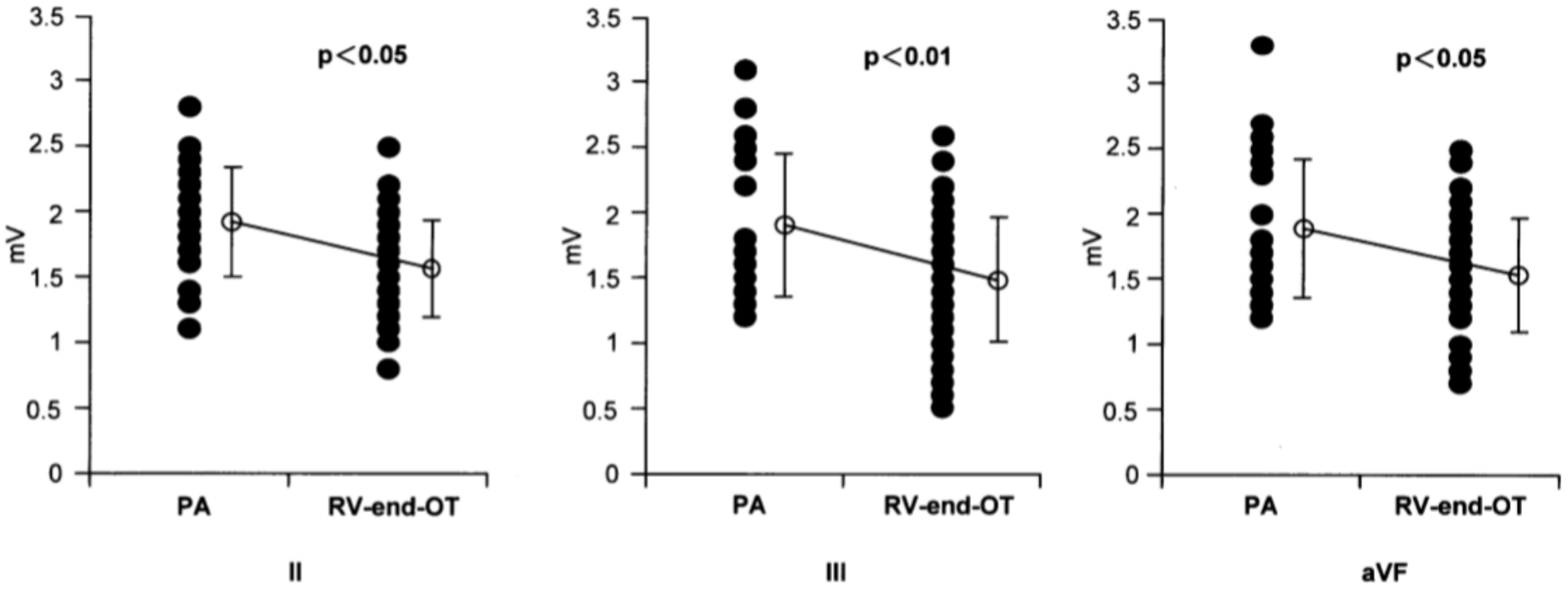
The R-wave amplitudes on inferior leads (vs. RVOT VT)



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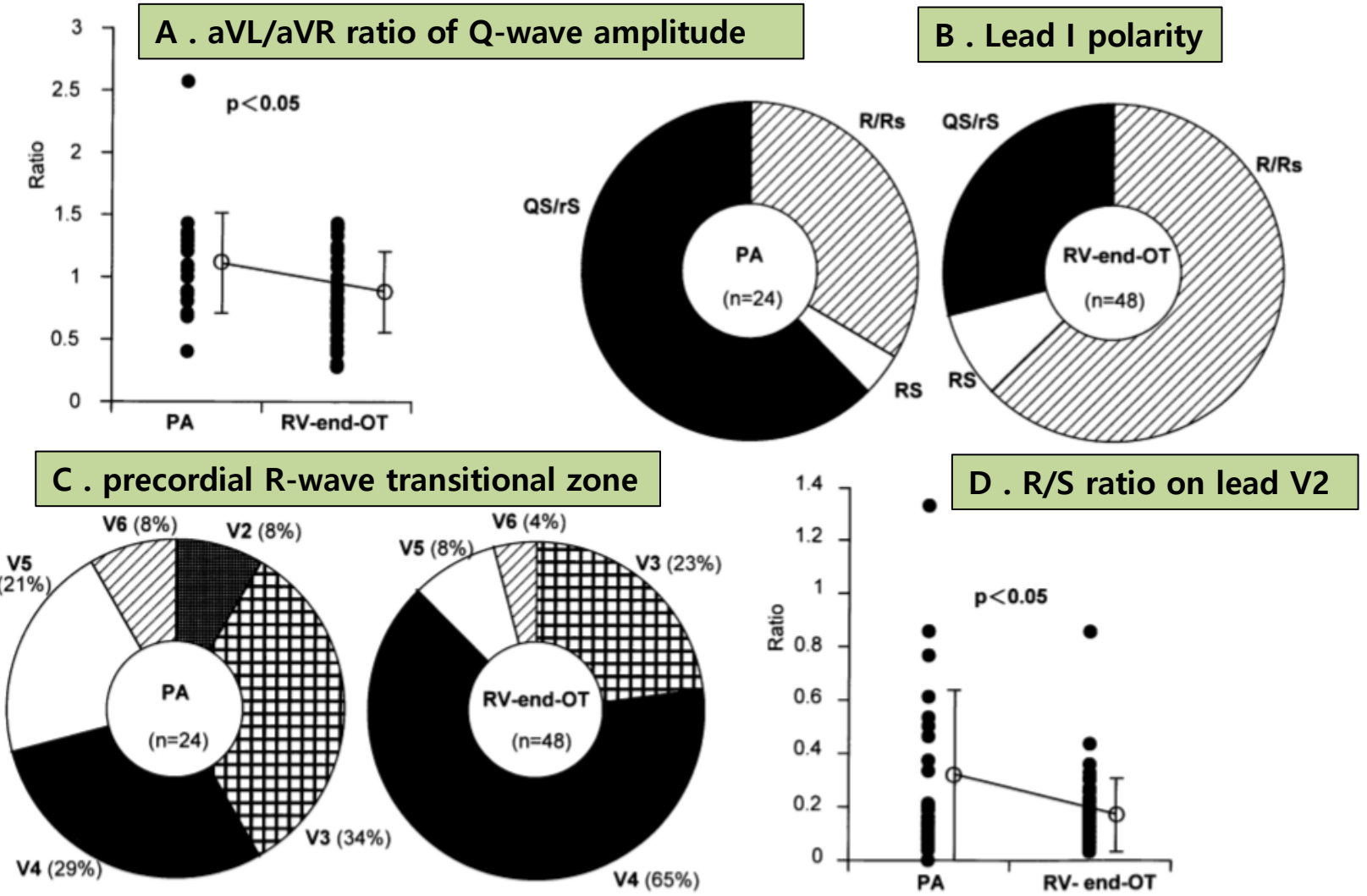
Comparison of electrocardiograms between the PA and RVOT



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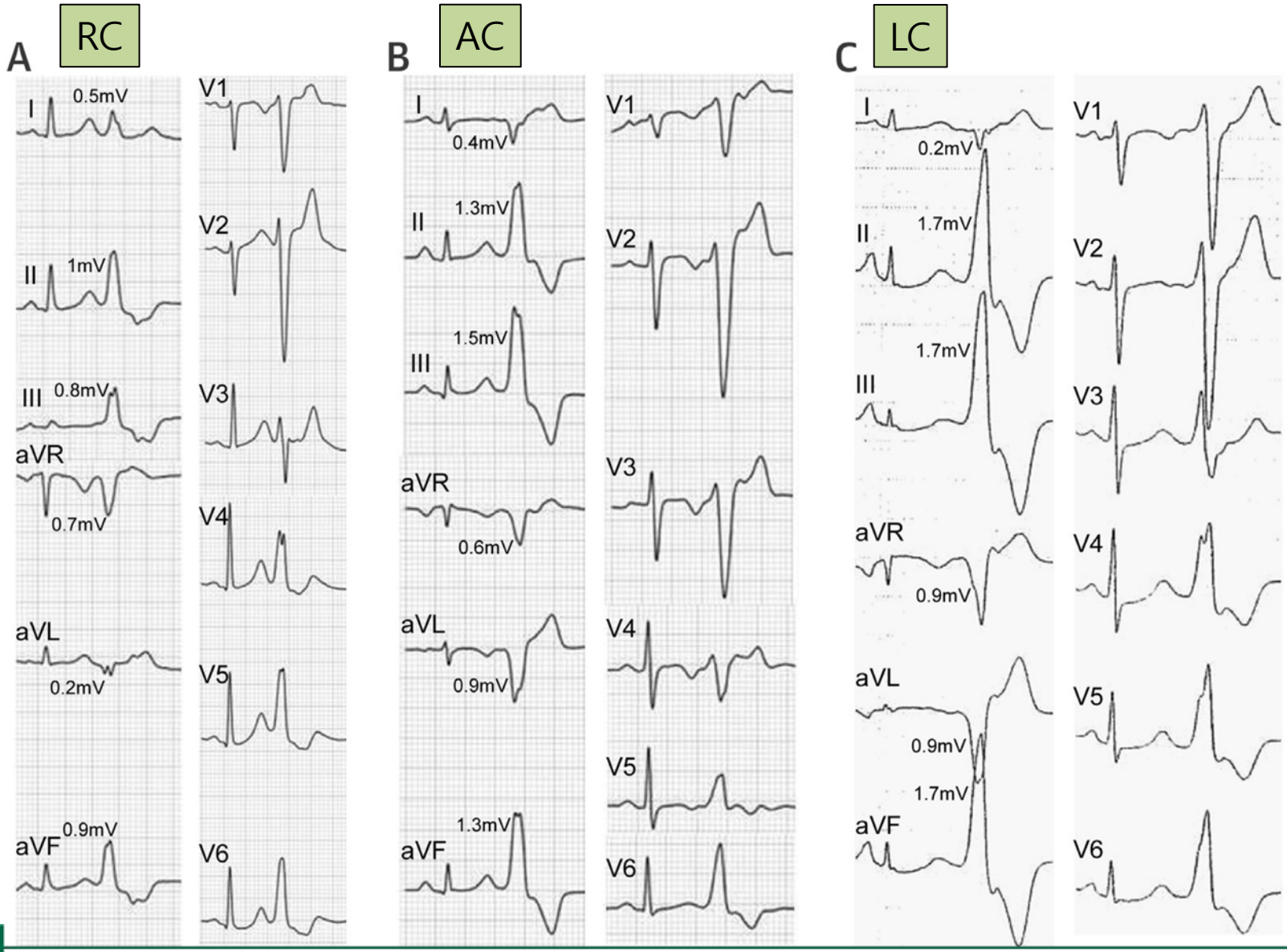
Comparision of EKG among PA-cusp



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Comparision of EKG among PA-cusp

	Right Cusp (n = 10)	Anterior Cusp (n = 6)	Left Cusp (n = 8)
R-wave amplitude in I, mV	0.37 ± 0.17*	-0.30 ± 0.31	-0.03 ± 0.29
R-wave amplitude in II, mV	1.29 ± 0.20	1.56 ± 0.46	1.98 ± 0.42
R-wave amplitude in III, mV	1.04 ± 0.28*	1.74 ± 0.34	1.98 ± 0.35
R-wave amplitude III/II	0.80 ± 0.16*	1.16 ± 0.23	1.00 ± 0.09
Q-wave amplitude in aVR, mV	0.79 ± 0.12	0.79 ± 0.33	1.06 ± 0.28
Q-wave amplitude in aVL, mV	0.48 ± 0.18*	0.97 ± 0.18	1.11 ± 0.33
Q-wave amplitude aVL/aVR	0.63 ± 0.29*	1.37 ± 0.43	1.07 ± 0.32
R-wave amplitude in aVF, mV	1.14 ± 0.25*	1.62 ± 0.42	2.11 ± 0.45
R-wave amplitude in V_1, mV	0.16 ± 0.07	0.32 ± 0.28	0.26 ± 0.09
S-wave amplitude in V_1, mV	1.47 ± 0.43	1.17 ± 0.48	1.58 ± 0.65
R/S ratio on V1	0.11 ± 0.03	0.28 ± 0.20	0.19 ± 0.10
R-wave amplitude in V_2, mV	0.34 ± 0.17	0.50 ± 0.29	0.48 ± 0.23
S-wave amplitude in V_2, mV	2.17 ± 0.92	2.22 ± 0.80	2.53 ± 0.74
R/S ratio on V_2	0.16 ± 0.06	0.28 ± 0.25	0.20 ± 0.08
Incidence of large R in I	10 (100)*	1 (17)	2 (25)
Incidence of notching in II, III, and aVF	7 (70)	2 (33)	2 (25)
Duration of QRS, ms	155 ± 15.2*	134.2 ± 14.0	133.8 ± 12.5

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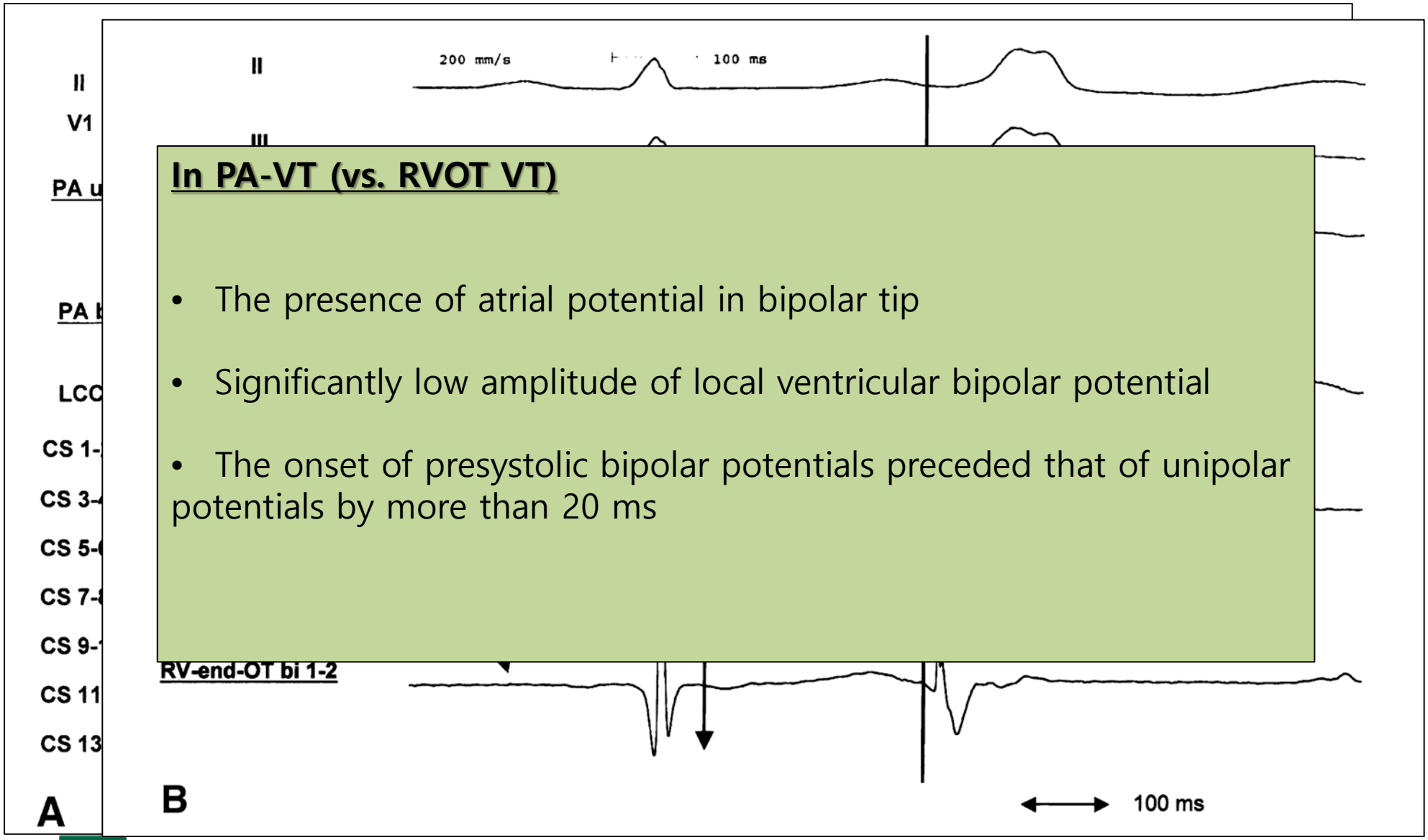
M/39 PA VT vs. F/60 RVOT VT



In PA-VT (vs. RVOT VT)

- The presence of atrial potential in bipolar tip
- Significantly low amplitude of local ventricular bipolar potential
- The onset of presystolic bipolar potentials preceded that of unipolar potentials by more than 20 ms

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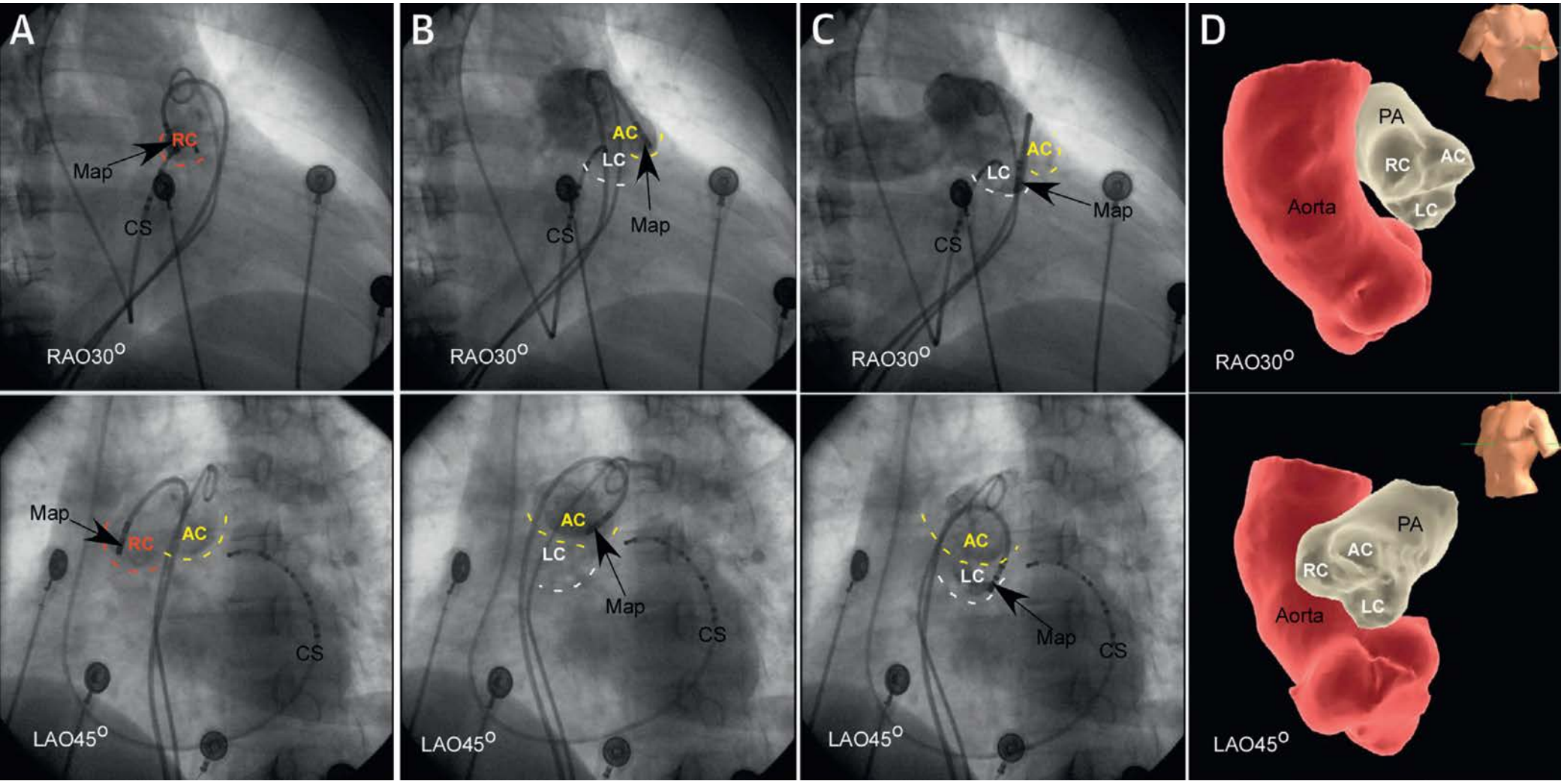
Anatomical ablation site



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Ablation tips

- Complications : PA stenosis and damage to the left main coronary artery may occur

  - Better contact with effective energy delivery within the PSC by curving the ablation catheter to form a reversed U curve
  - Supported with a long sheath in the right ventricle.

- Different from mapping and ablation results of VA

  - VAs were located at the PSC nadir, the origin from RVOT close to the PSC cannot be totally excluded in some patients
  - During VAs, conduction propagates through preferential conduction pathways and exits from the distal RVOT.

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Summaries

- VA demonstrating LBBB morphology and inferior axis deviation
- Mapping in the RVOT may not identify the site of earliest activation and/or mismatched QRS morphology by pace mapping
- In failed ablation in RVOT ablation

⇒ Mapping at the PSC should be performed, and VAs arising from the PSC are not uncommon

⇒ These VAs can be successfully ablated with a reversed U curve within the PSC.

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Thank you for your attention !!

Ewha, Light of healing

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