Comprehensive Mapping of the Aortic Cusp: Understanding the Anatomy

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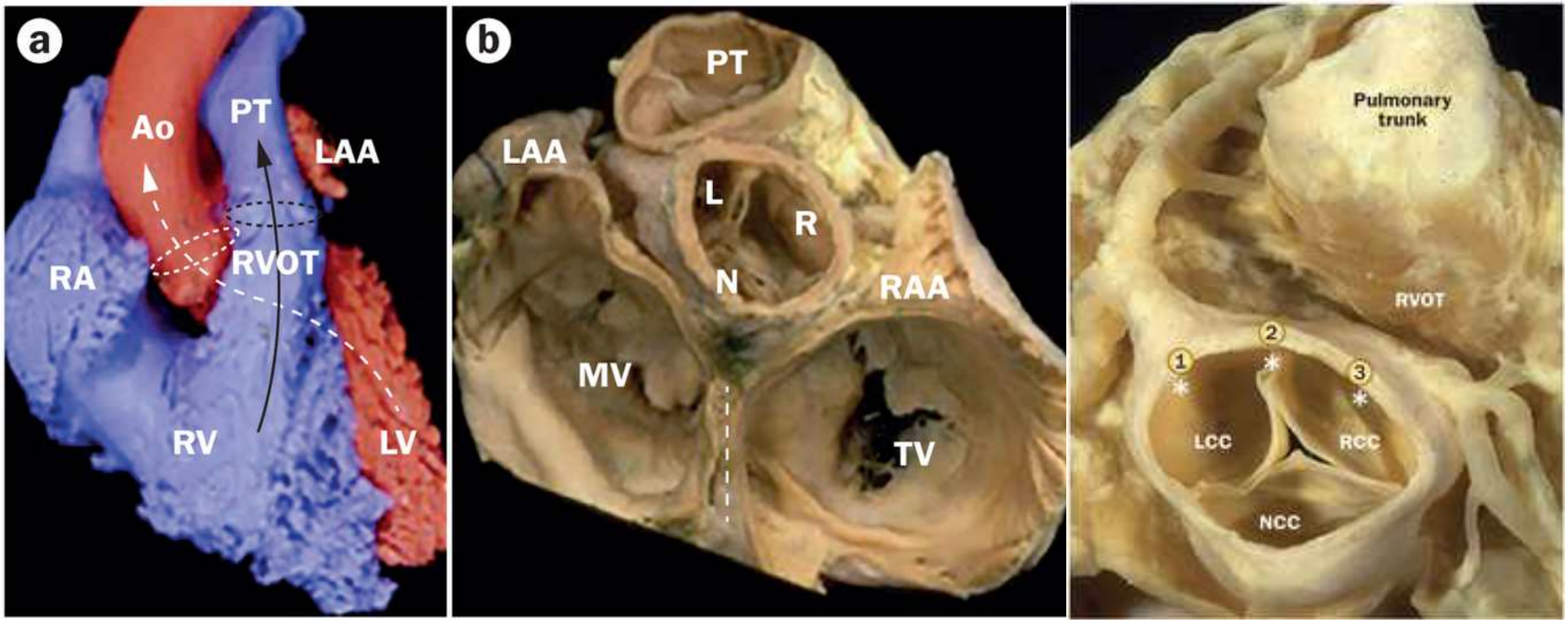
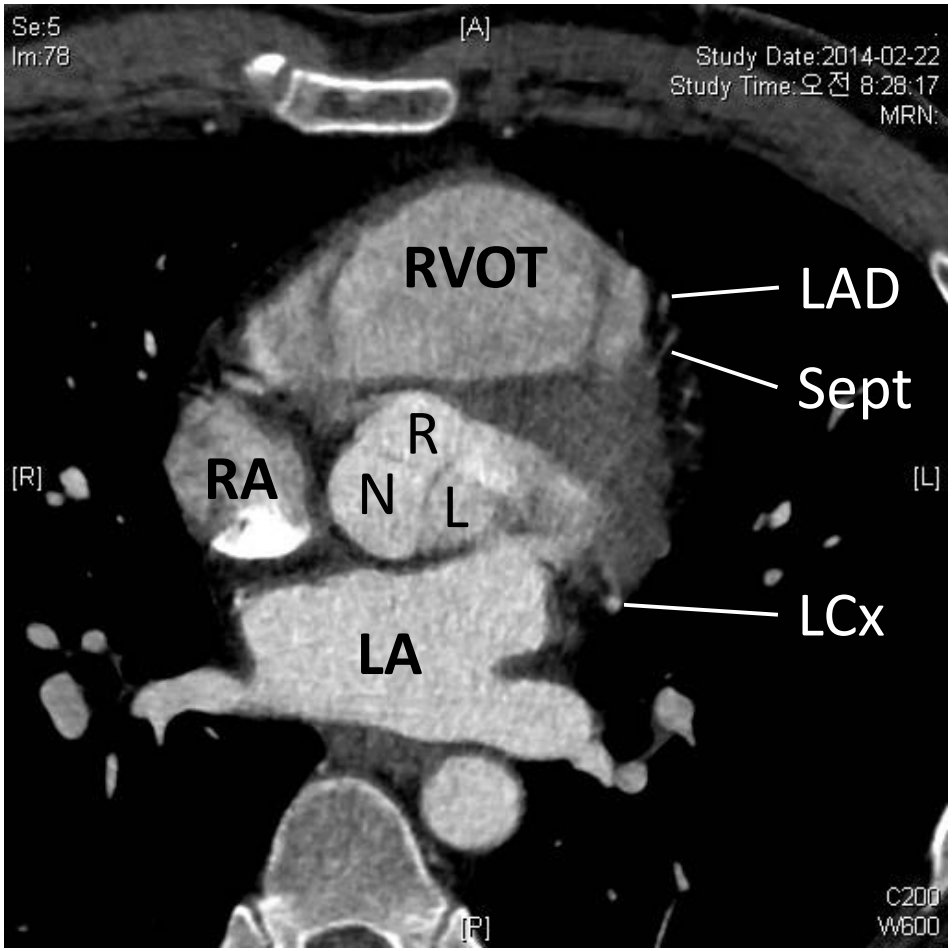
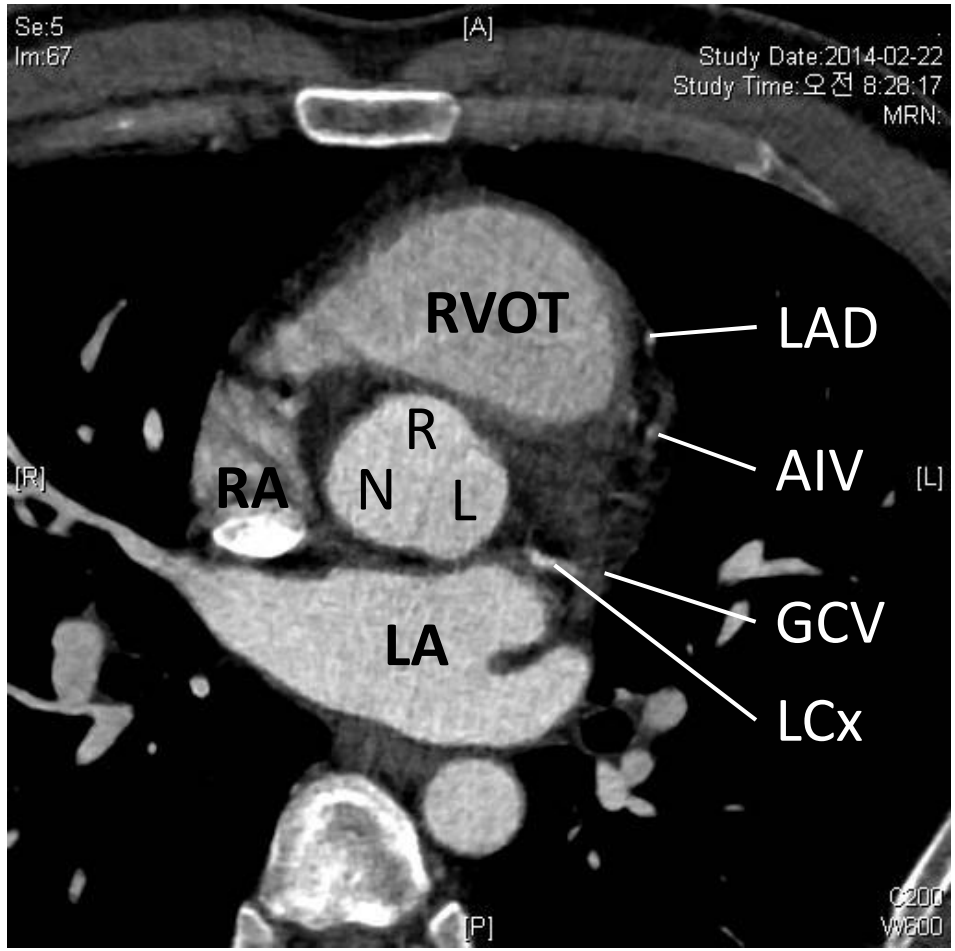
Anatomy of RVOT and LVOT



Ho SY et al. Heart Rhythm. 2009 Aug;6(8 Suppl):S77-80

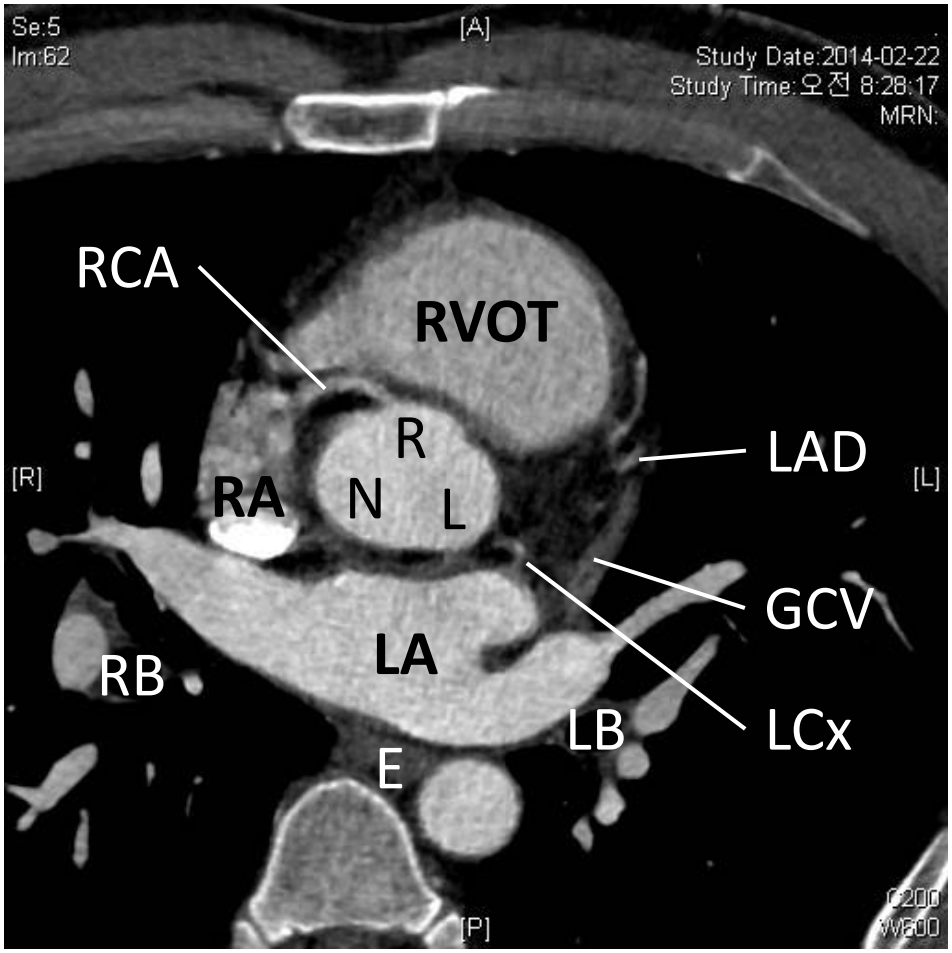
Anatomy of Aortic Cusp in CT

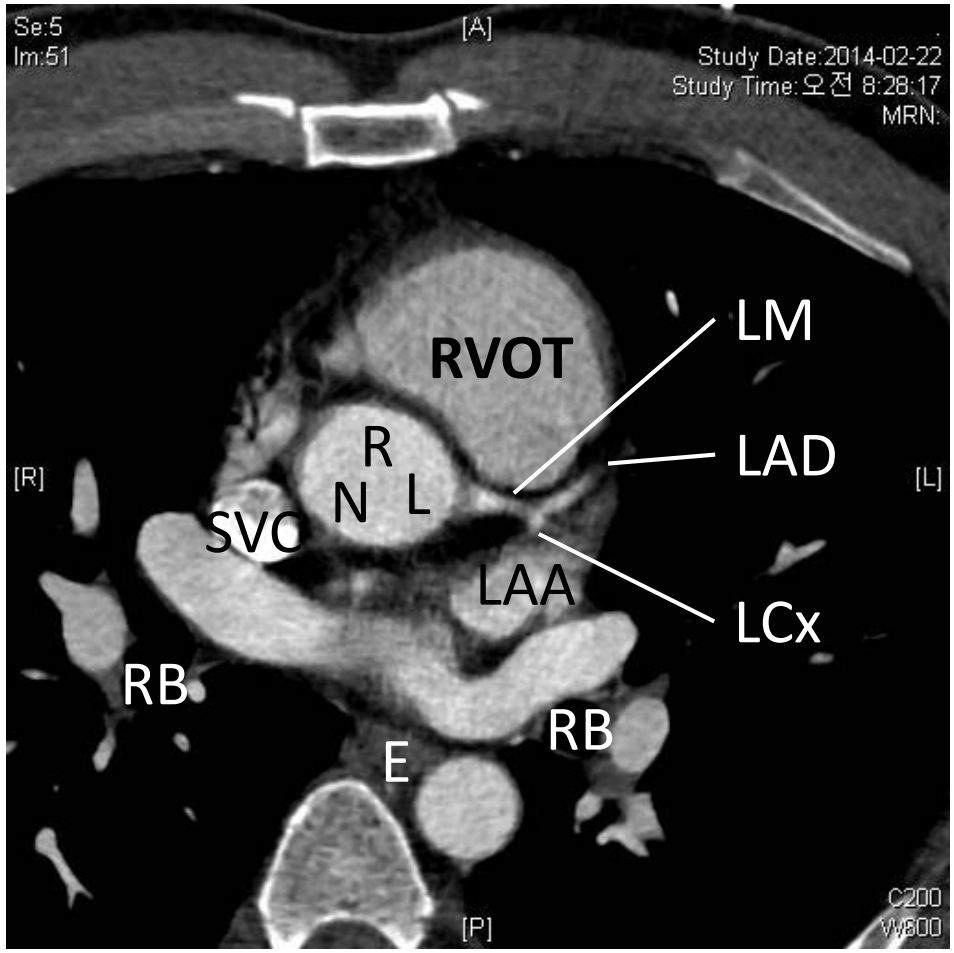




By Courtesy of Prof. Uhm

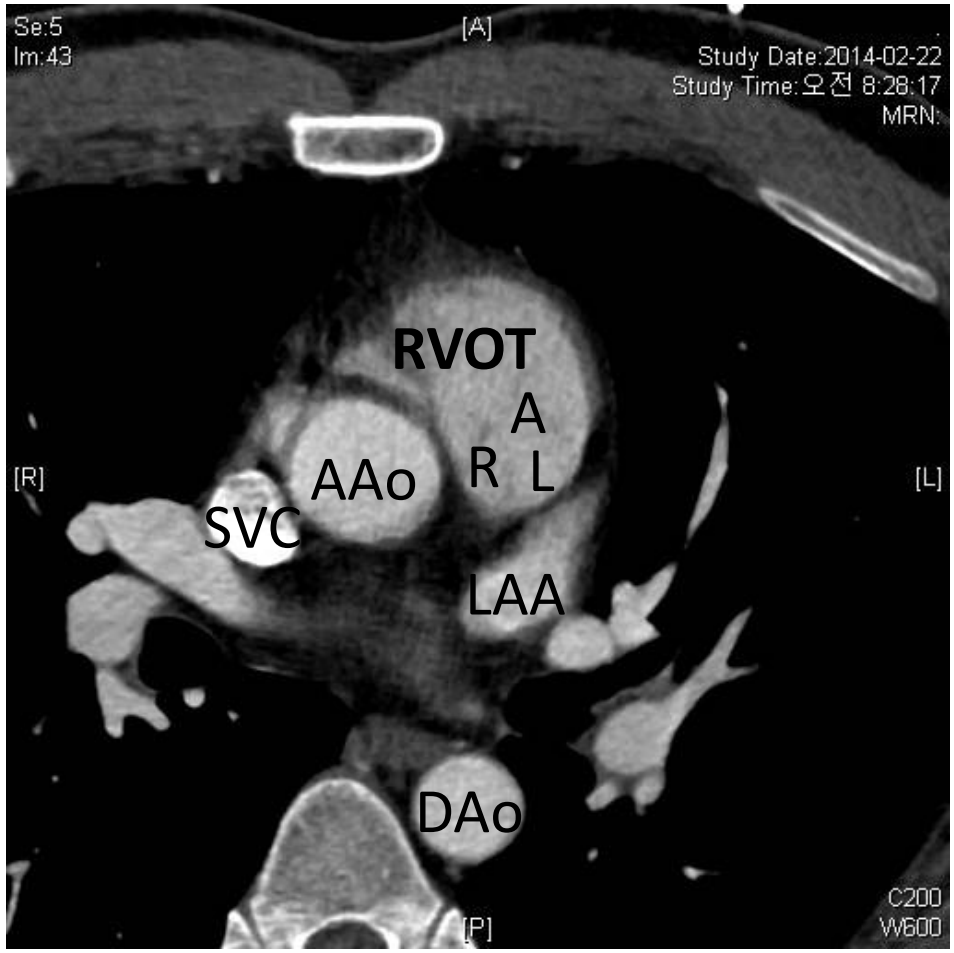
Anatomy of Aortic Cusp in CT

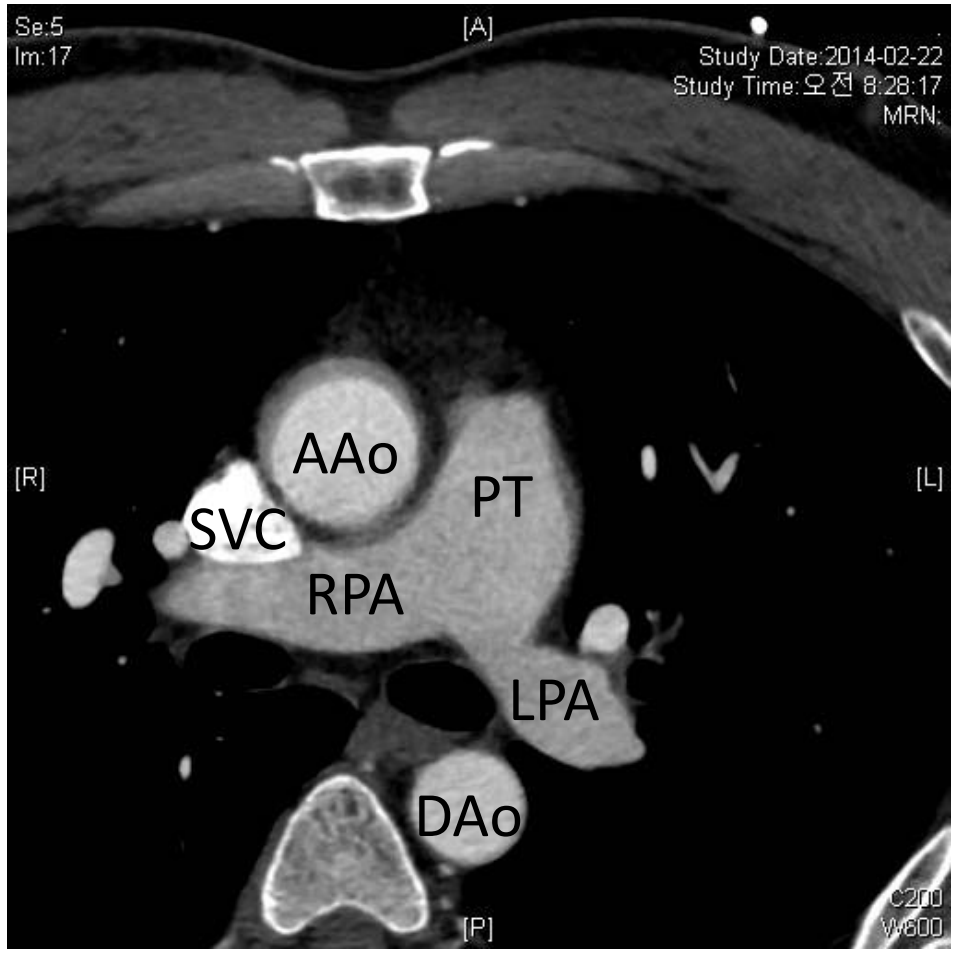




By Courtesy of Prof. Uhm

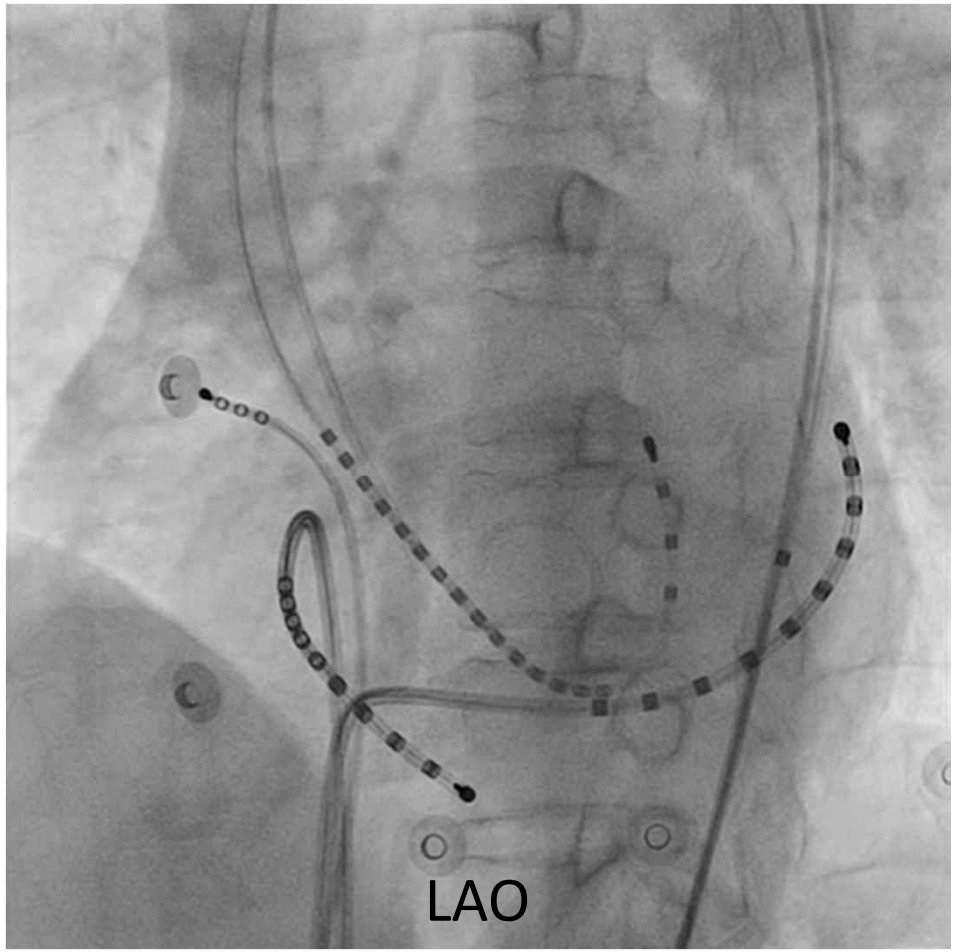
Anatomy of Aortic Cusp in CT

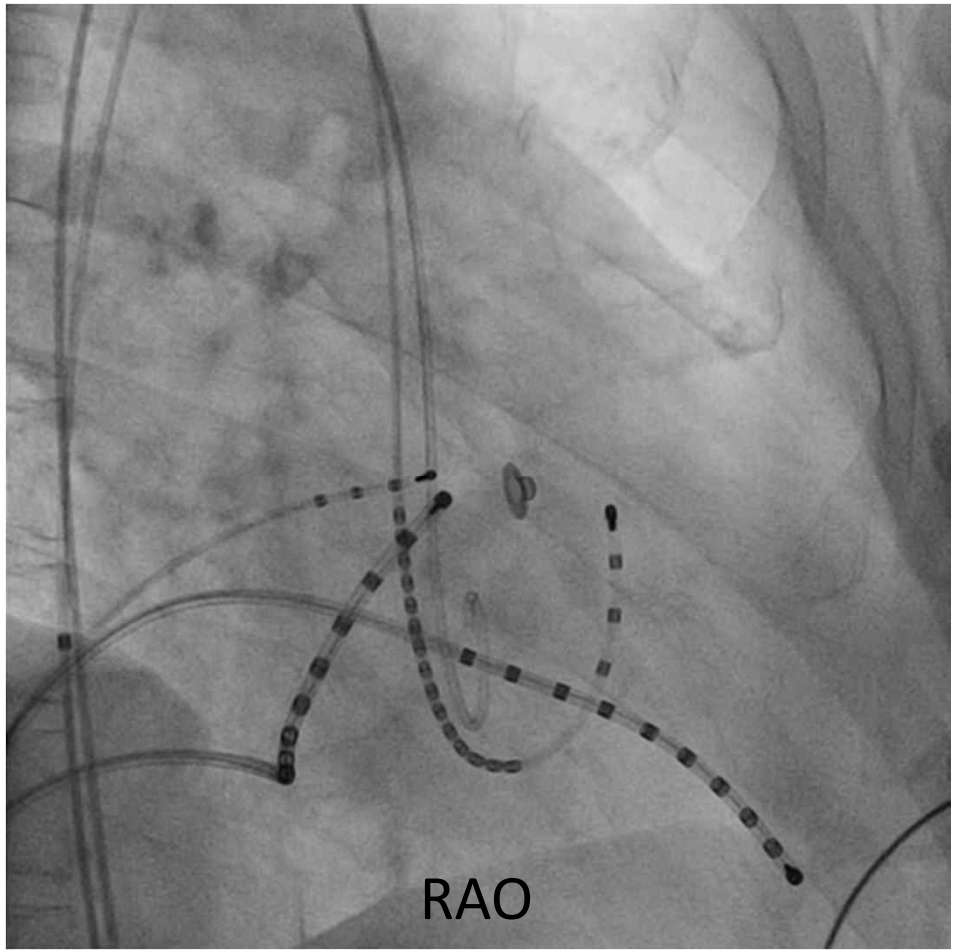




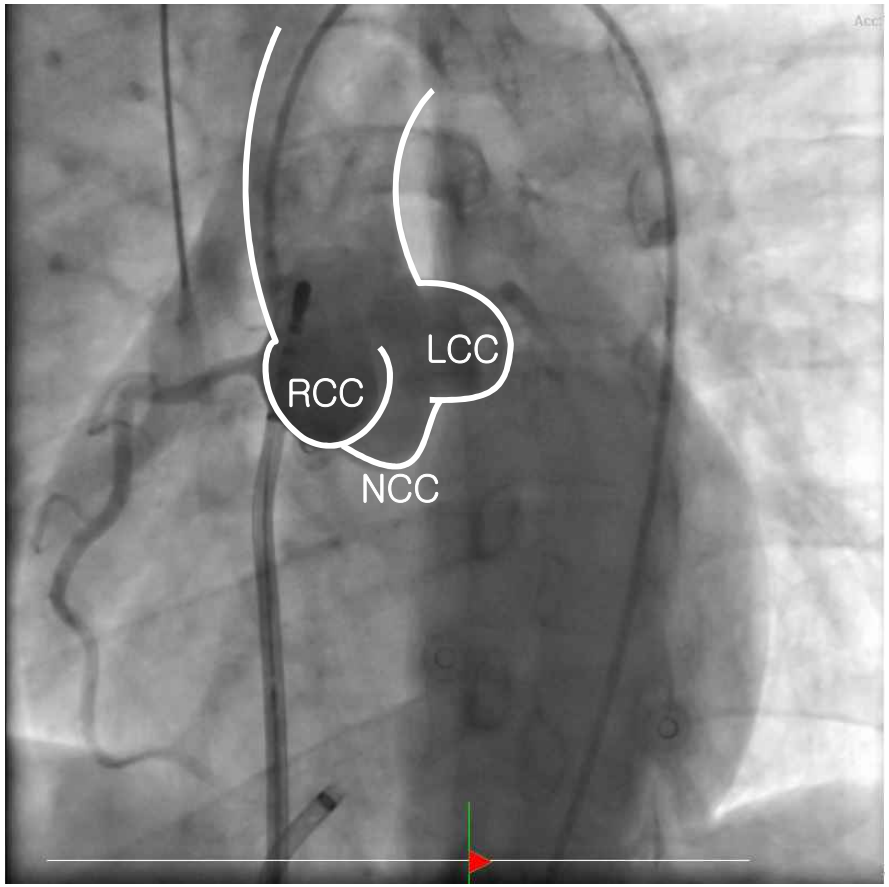
By Courtesy of Prof. Uhm

Left Ventriculography

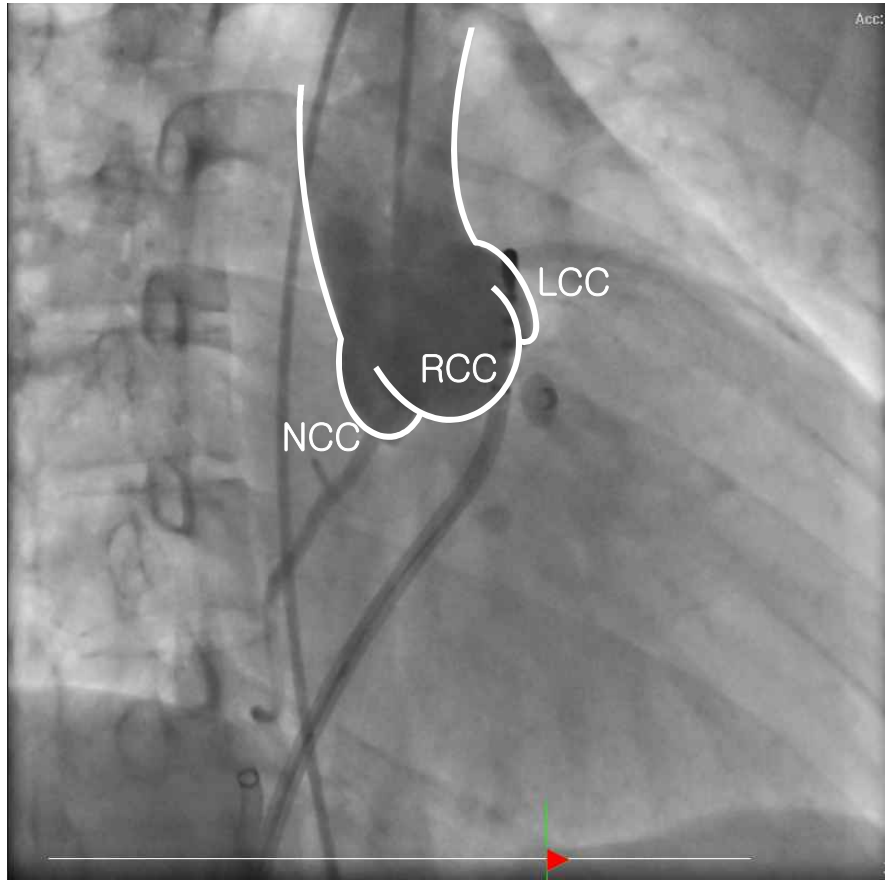




Aortogram

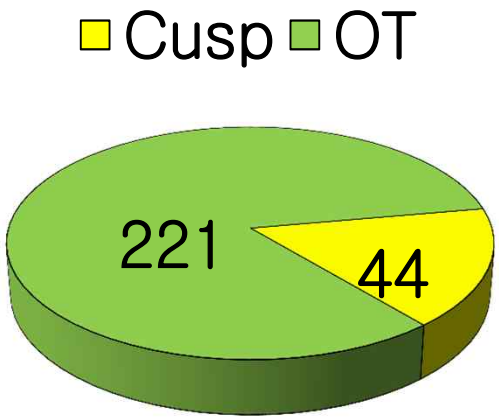


LAO

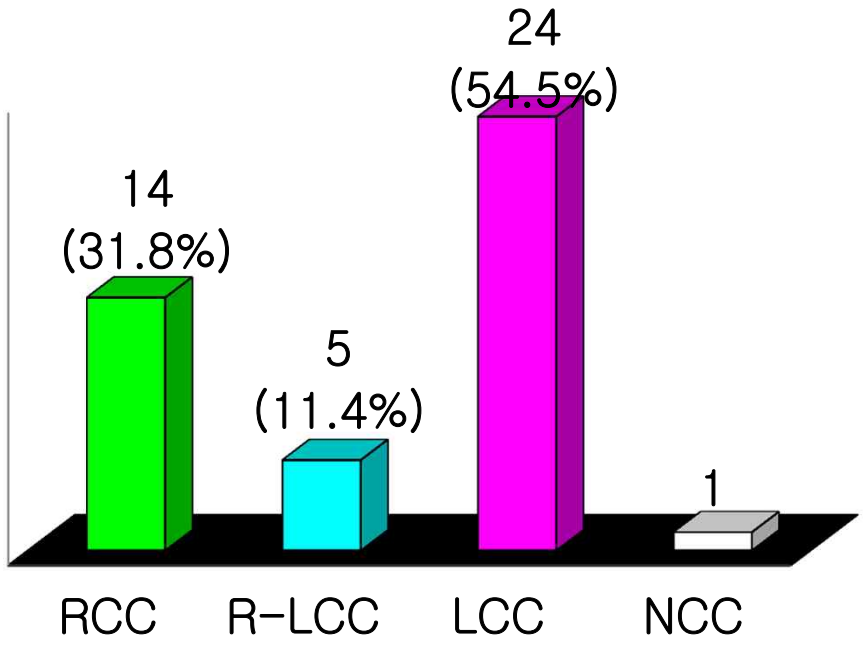


RAO

Prevalence of Cusp VT among OTVT



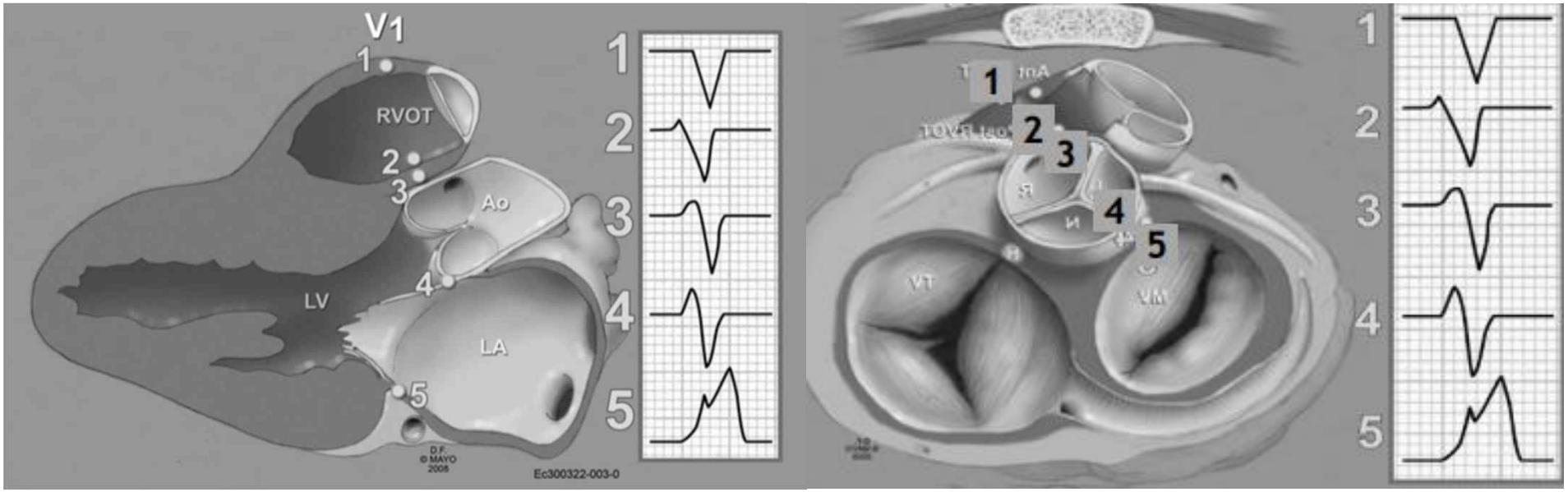
Cusp VA: 16.6%



- **R wave of inferior leads & III/II ratio: LCC > RCC >>> NCC**
- **Pacing mapping unreliable**

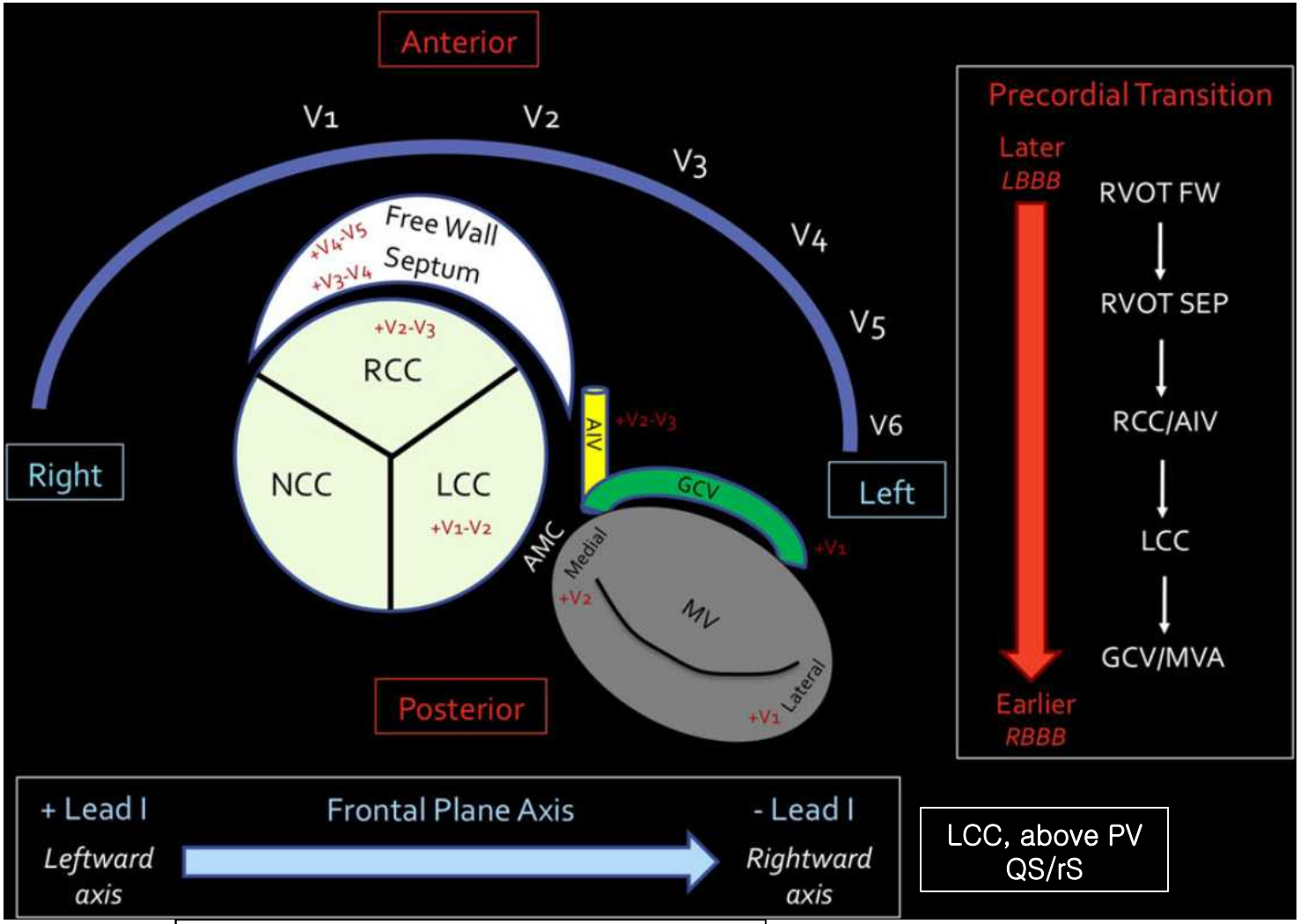
Yamada T et al. J Am Coll Cardiol. 2008 Jul 8;52(2):139-47

ECG Morphology of OT VT
: V1



Hutchinson MD et al. J Cardiovasc Electrophysiol. 2013 Oct;24(10):1189-97

ECG Morphology of OT VT
: Lead I and Transition zone



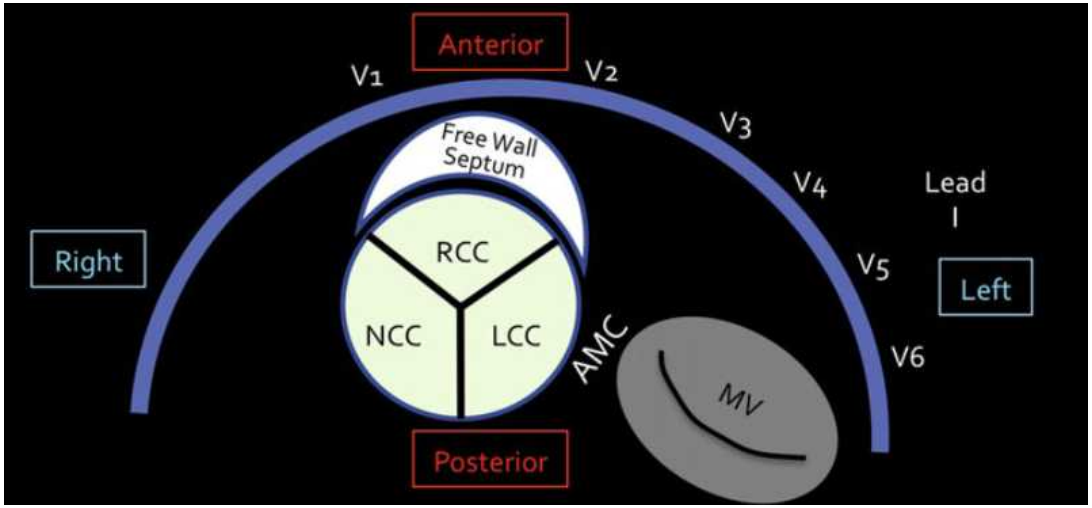
RCC, RVOT FW R− wave

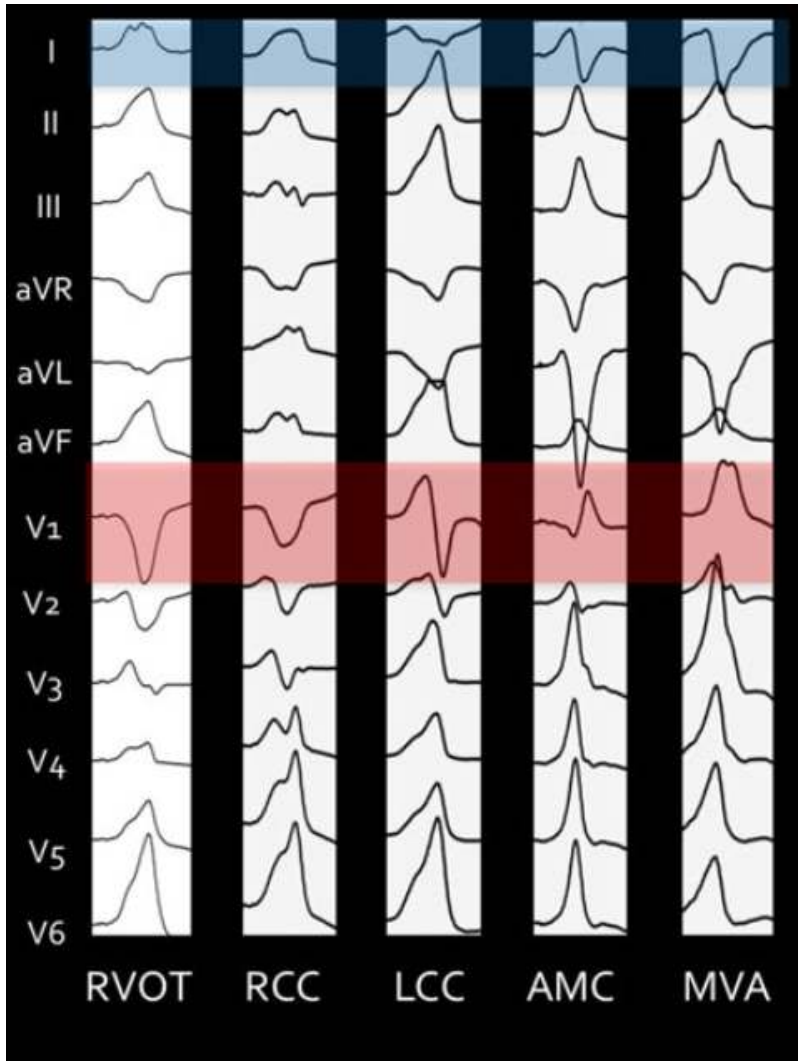
LCC, above PV QS/rS

RVOT septum, RCC/LCC Jx → Biphasic

Hutchinson MD et al. J Cardiovasc Electrophysiol. 2013 Oct;24(10):1189-97

ECG Morphology of OT VT





Hutchinson MD et al. J Cardiovasc Electrophysiol. 2013 Oct;24(10):1189-97

V2 transition ratio ≥ 0.6
: 95% sensitivity, 100% specificity

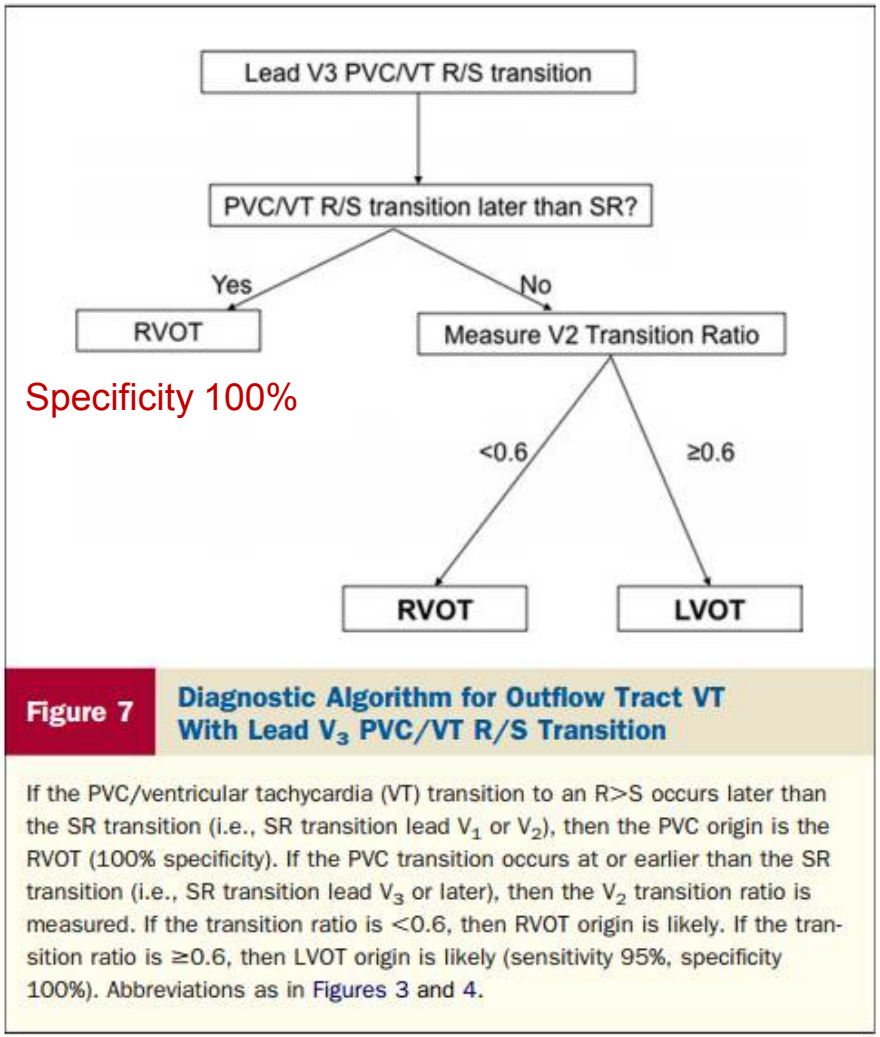
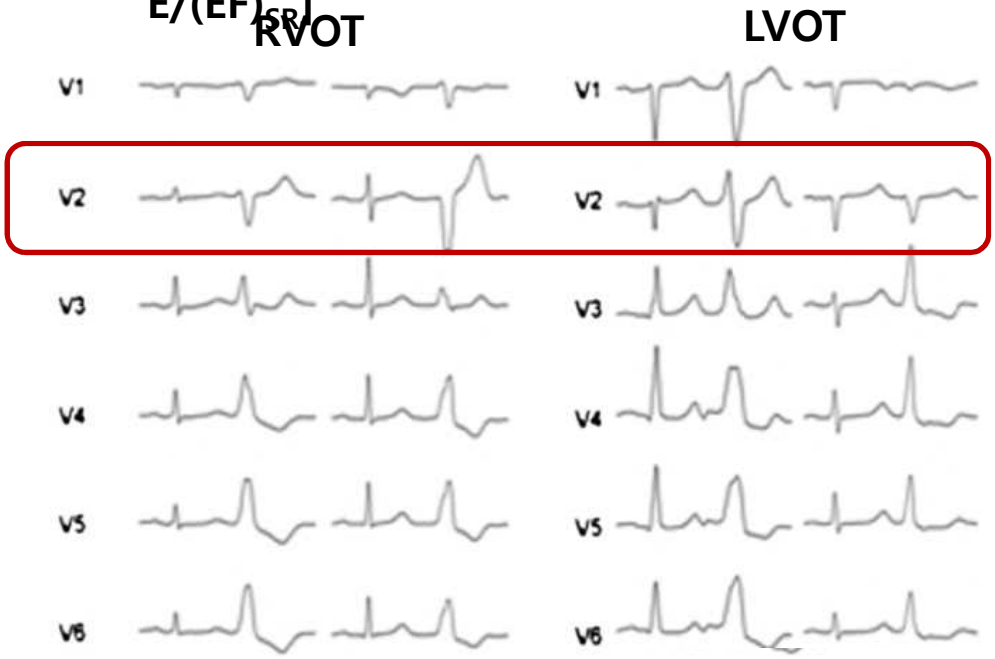


Figure 7 **Diagnostic Algorithm for Outflow Tract VT With Lead V_3 PVC/VT R/S Transition**

If the PVC/ventricular tachycardia (VT) transition to an R>S occurs later than the SR transition (i.e., SR transition lead V_1 or V_2), then the PVC origin is the RVOT (100% specificity). If the PVC transition occurs at or earlier than the SR transition (i.e., SR transition lead V_3 or later), then the V_2 transition ratio is measured. If the transition ratio is <0.6, then RVOT origin is likely. If the transition ratio is ≥0.6, then LVOT origin is likely (sensitivity 95%, specificity 100%). Abbreviations as in Figures 3 and 4.

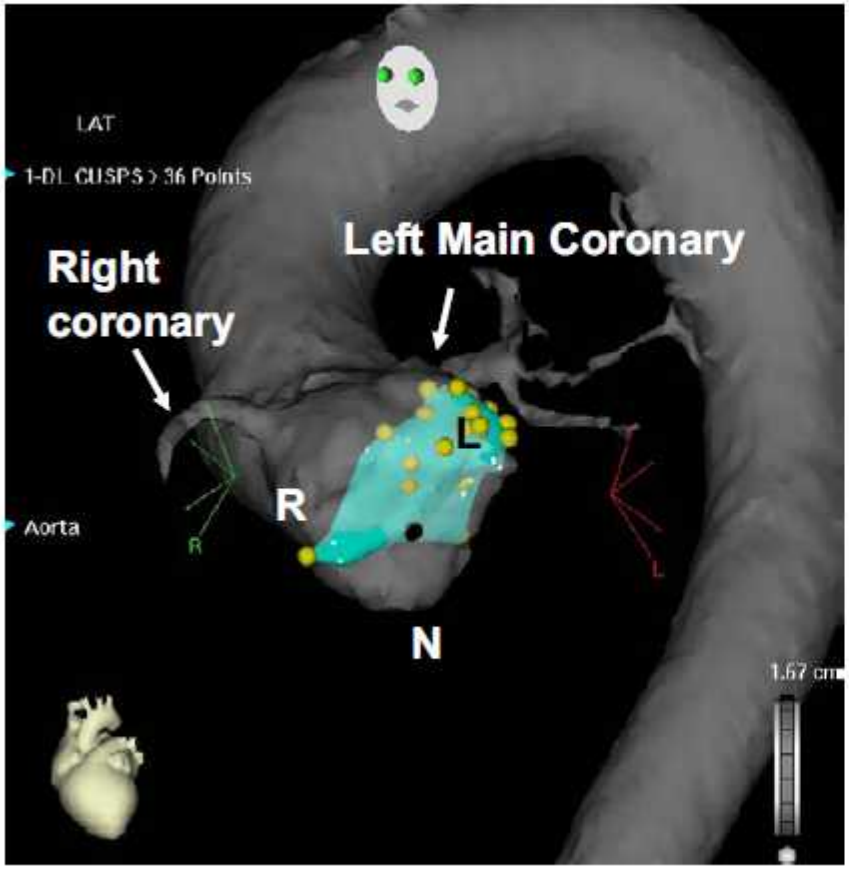
Transition ratio : $[B/(BC)_{VT} \div E/(EF)_{SR}]$

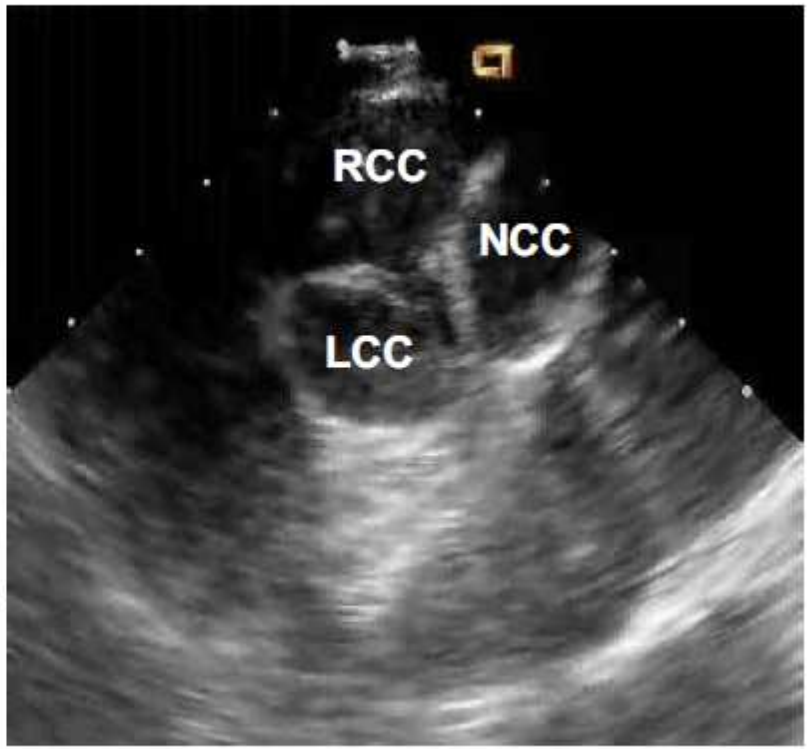


Betensky BP et al. J Am Coll Cardiol. 2011 May 31;57(22):2255-62

3D Cusp mapping and ICE image

LCC **RCC**

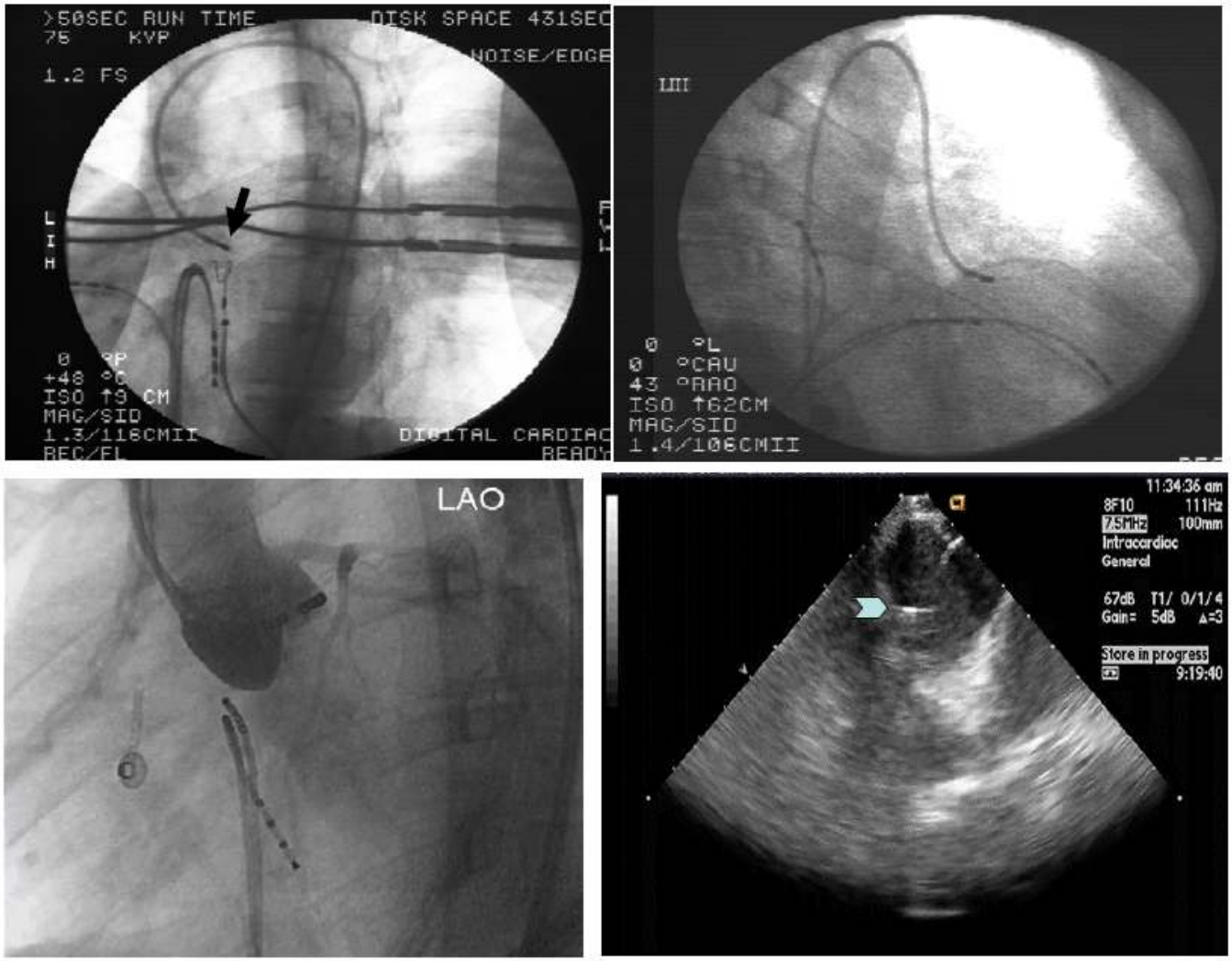




Lin D et al. Heart Rhythm. 2008 May;5(5):663-9

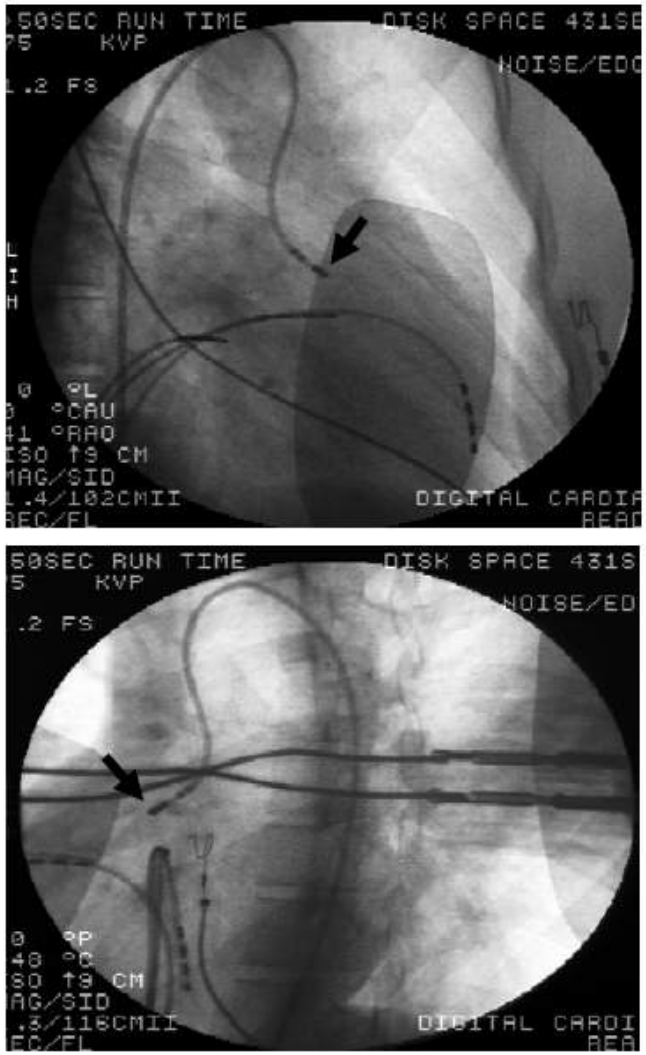
LCC mapping

Left coronary cusp

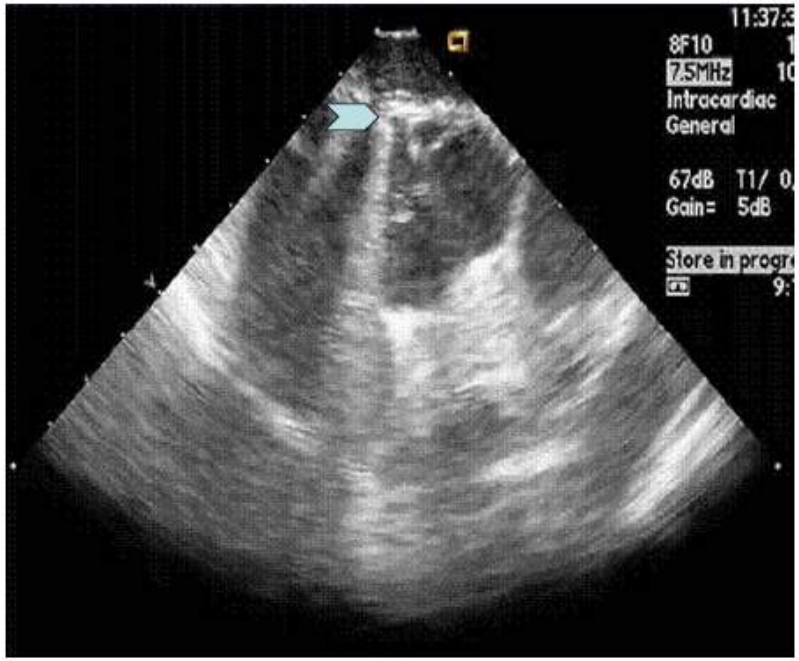


Lin D et al. Heart Rhythm. 2008 May;5(5):663-9

RCC mapping

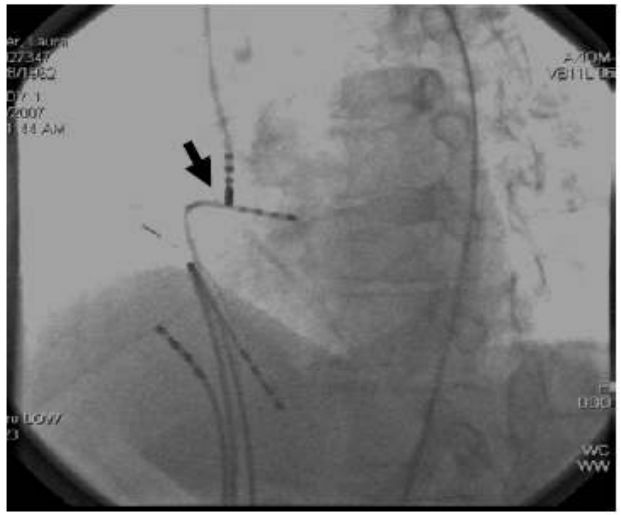


Right coronary cusp

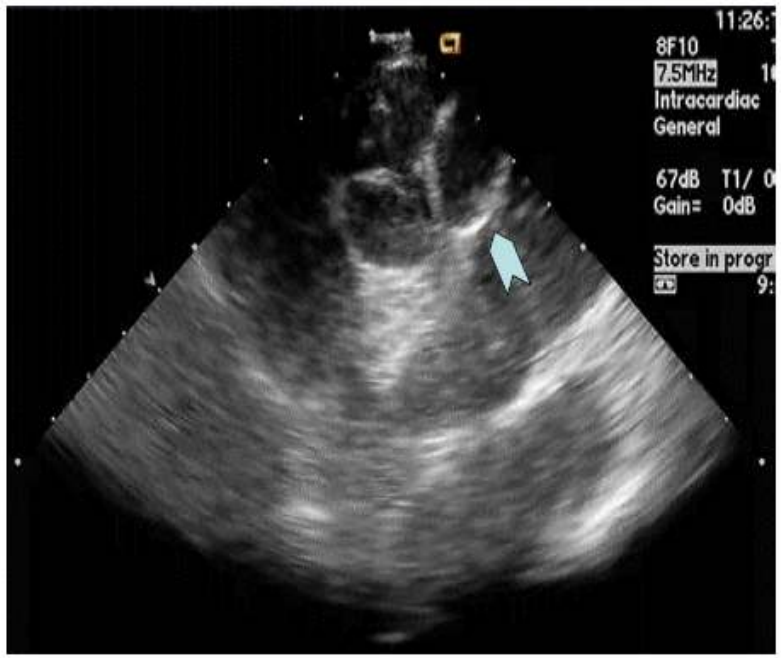


Lin D et al. Heart Rhythm. 2008 May;5(5):663-9

NCC mapping

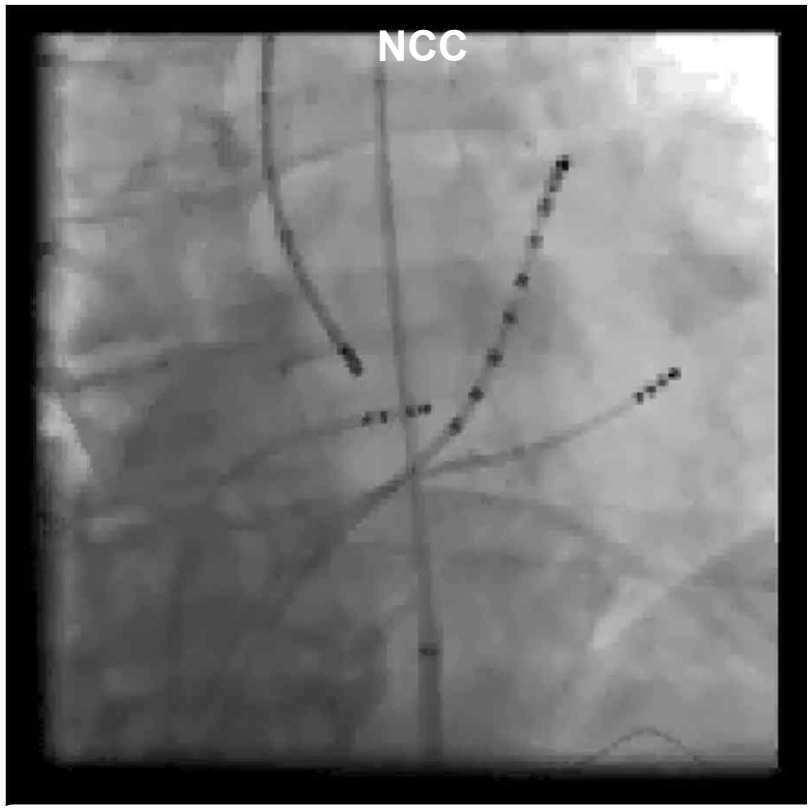


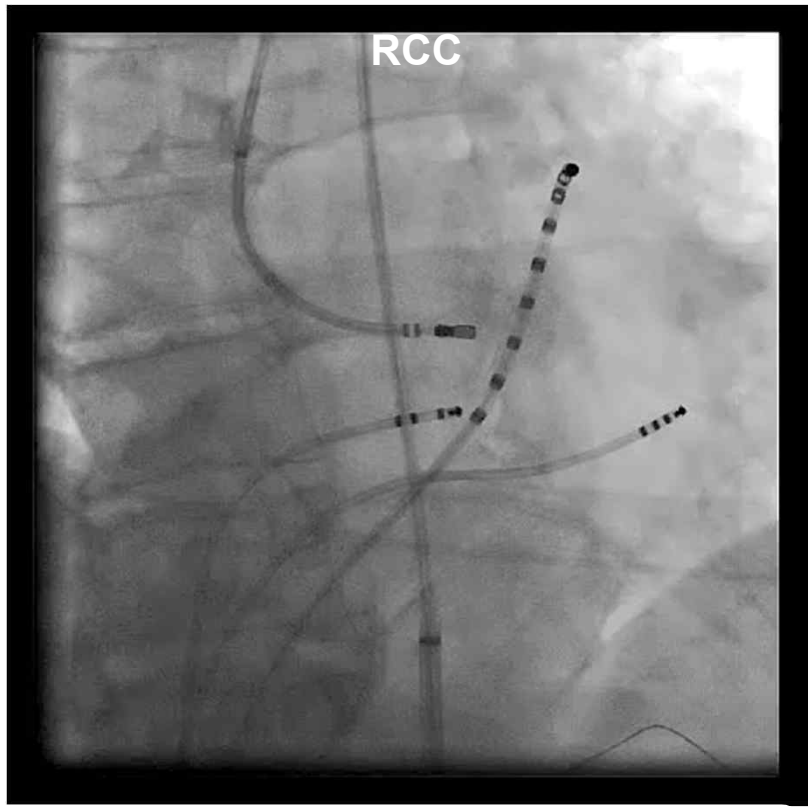
Noncoronary cusp



Lin D et al. Heart Rhythm. 2008 May;5(5):663-9

Cusp EGM – NCC vs RCC (RAO View)

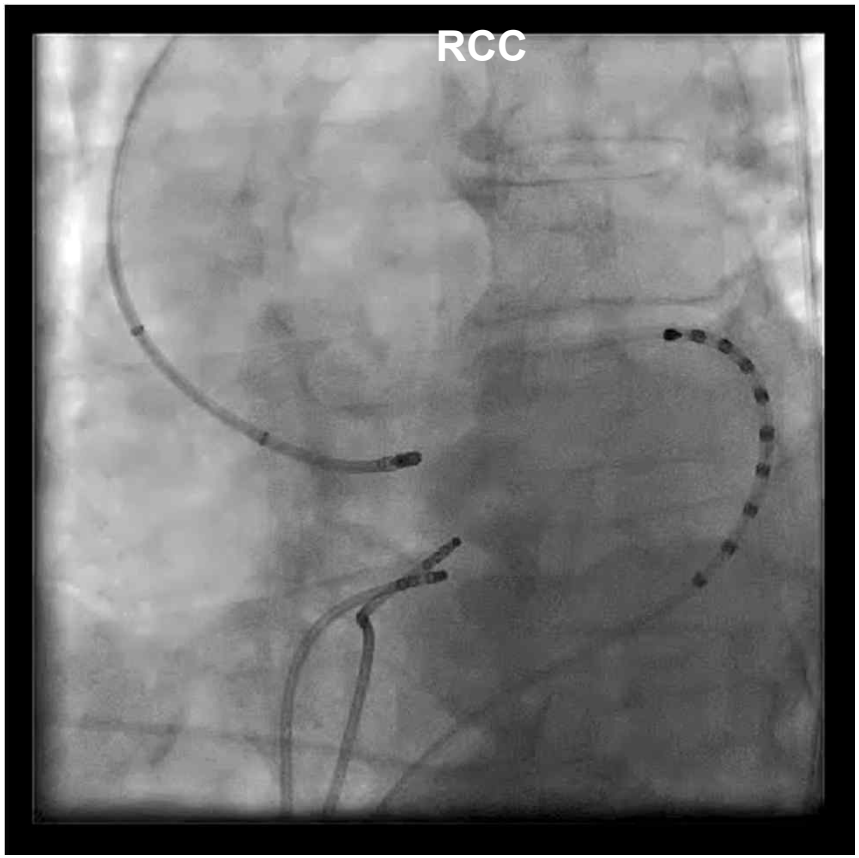


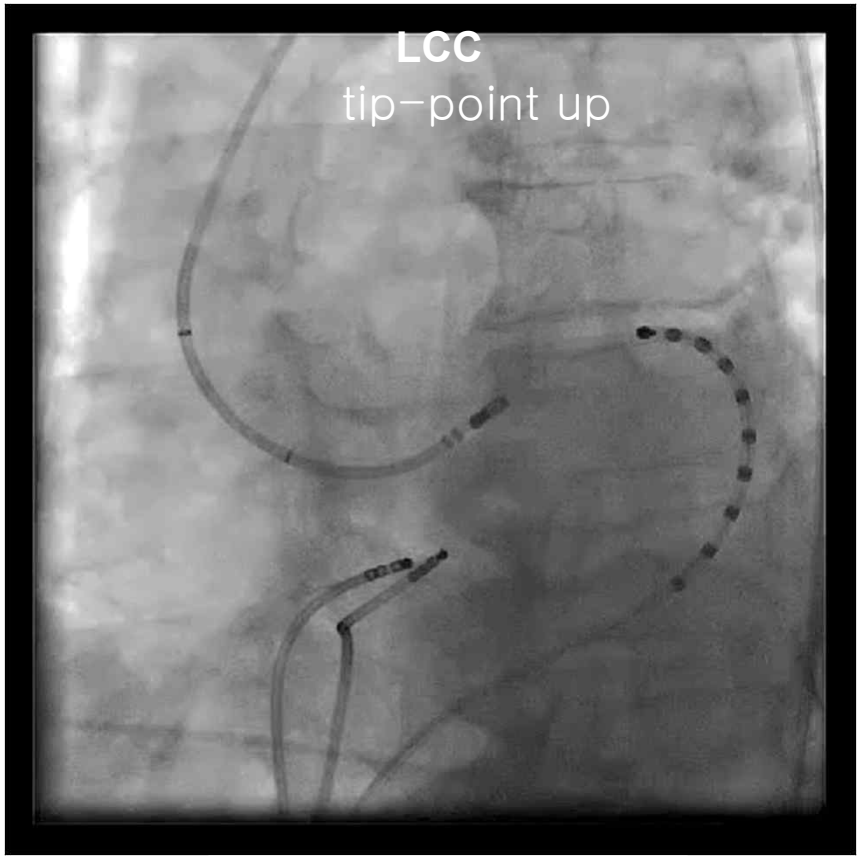


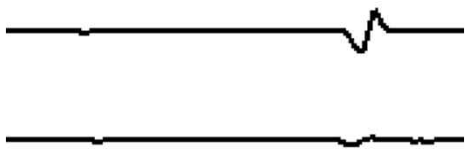
Bigger A, small V

Small A, Bigger V

Cusp EGM – RCC vs LCC (LAO view)



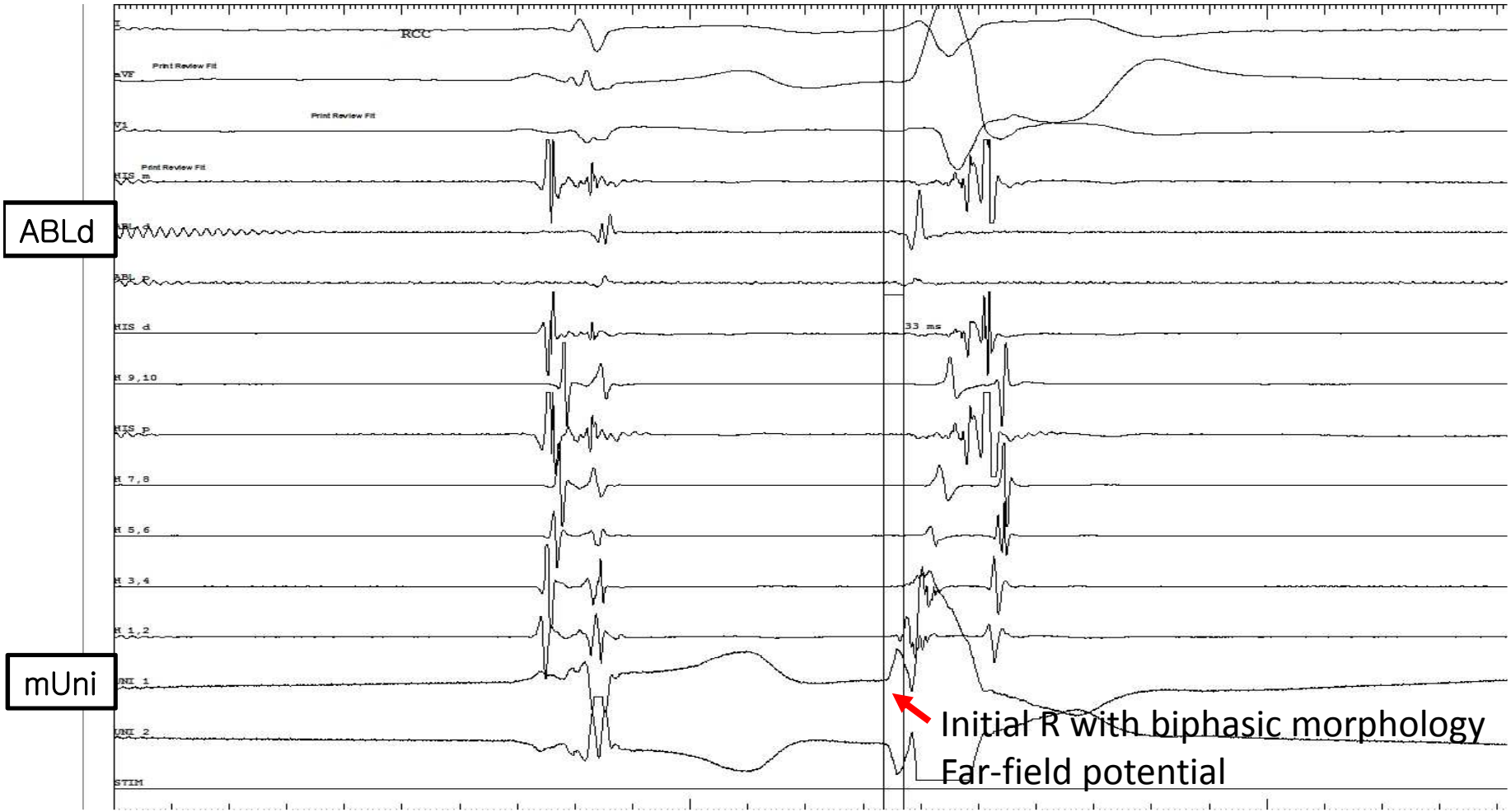




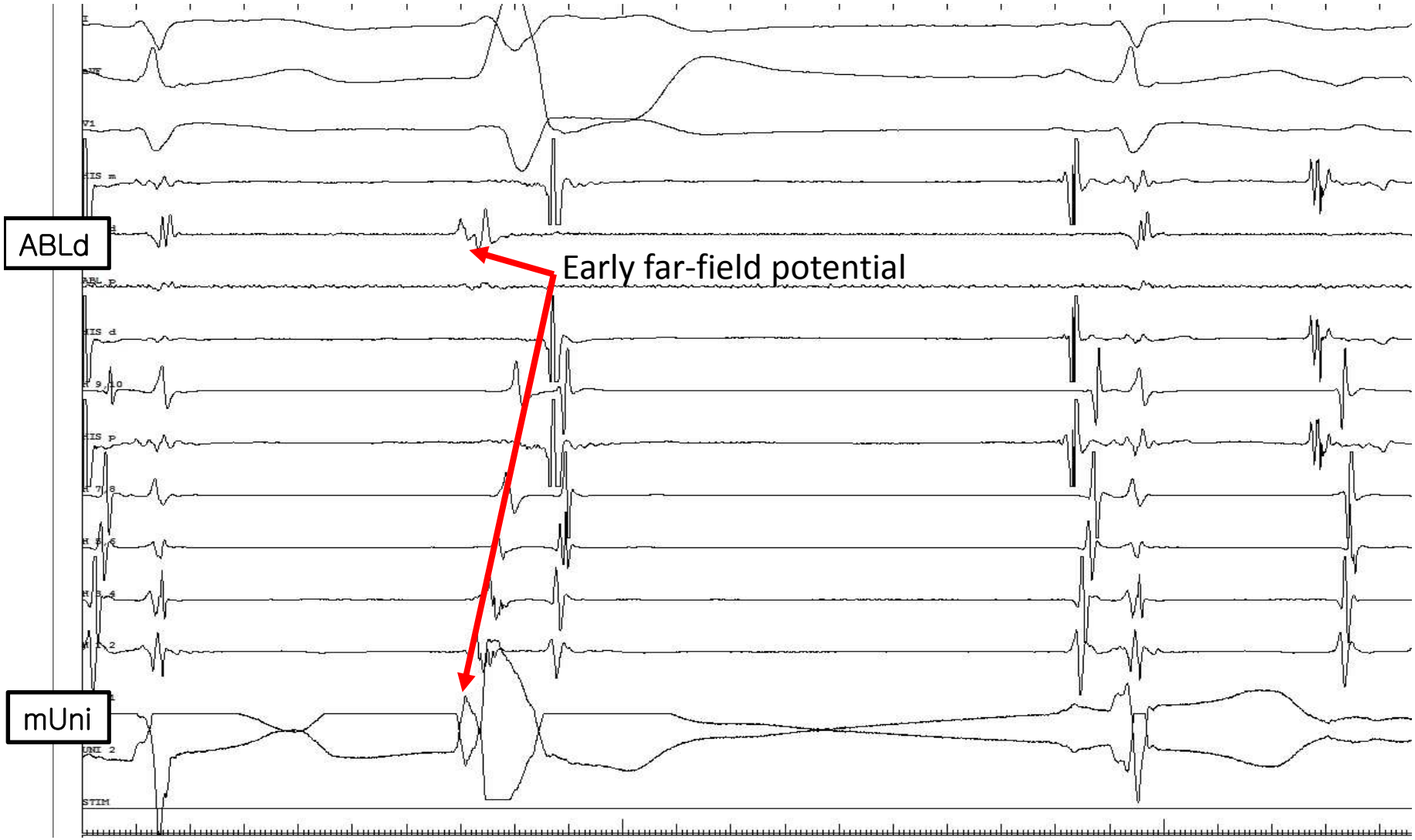
Quick, bigger amplitude R

Delayed, fragmented R

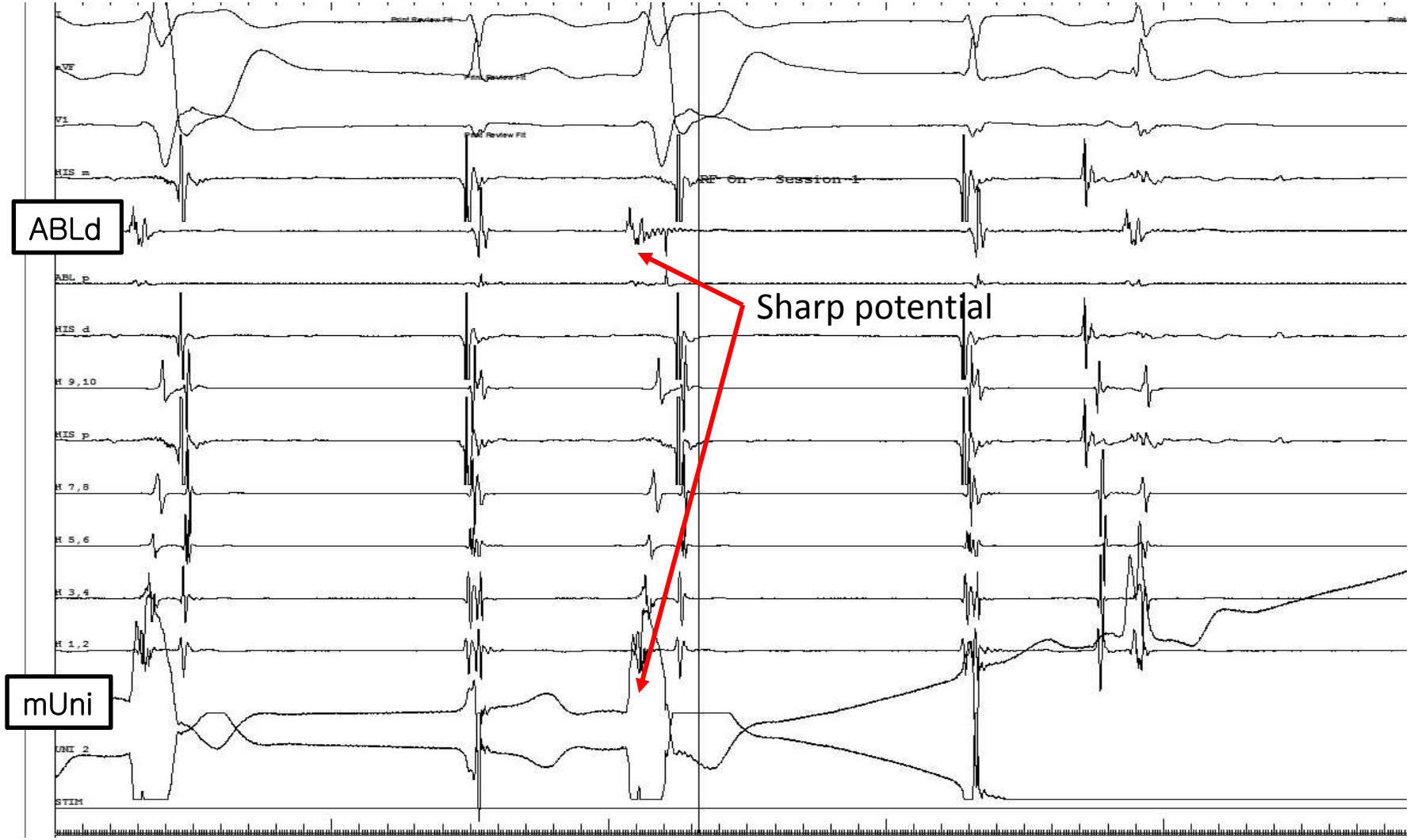
Unipolar EGM
:Ablation catheter on RCC



Unipolar EGM
:Ablation catheter on RCC

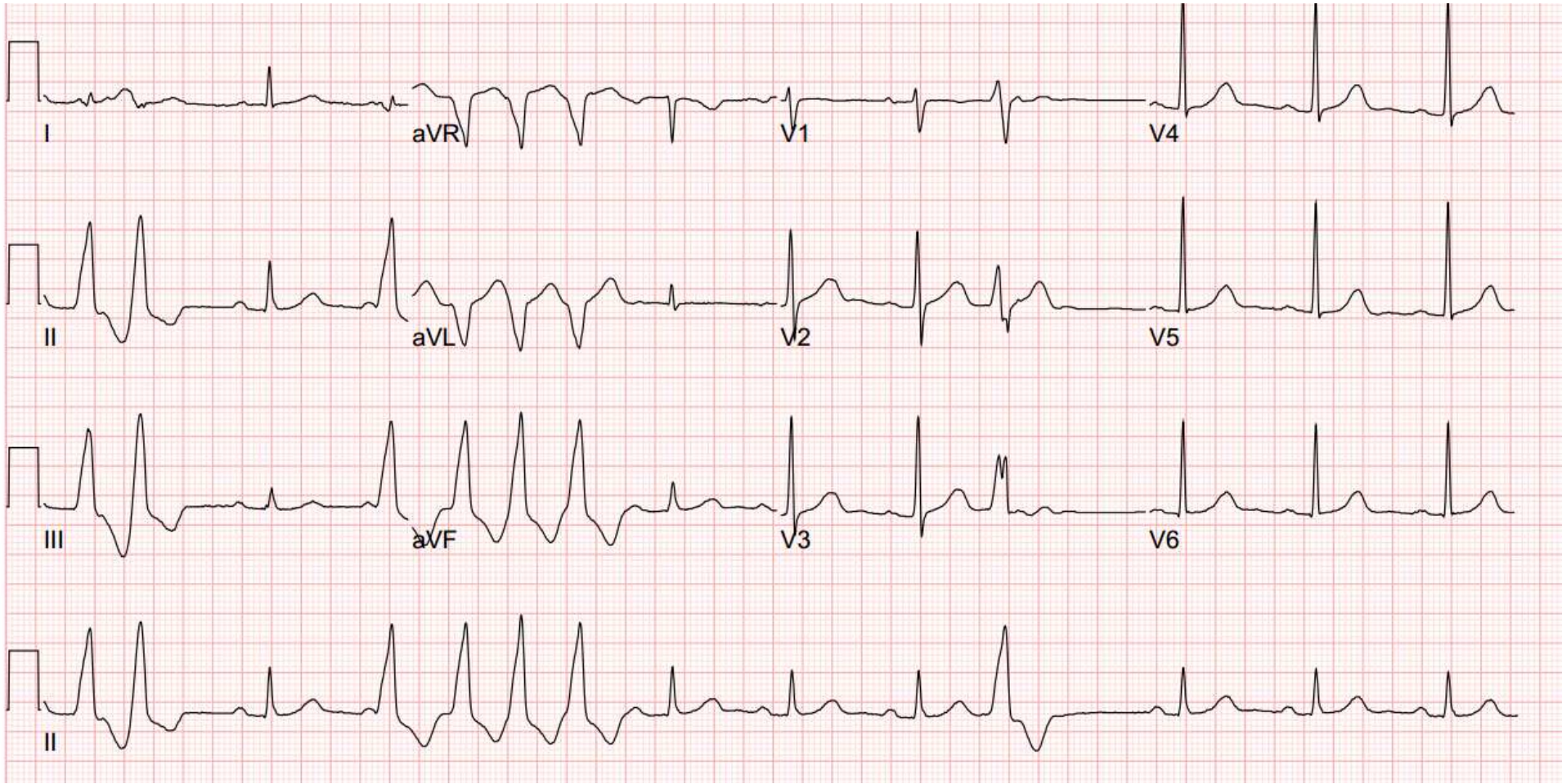


Unipolar EGM
:Ablation catheter on RCC

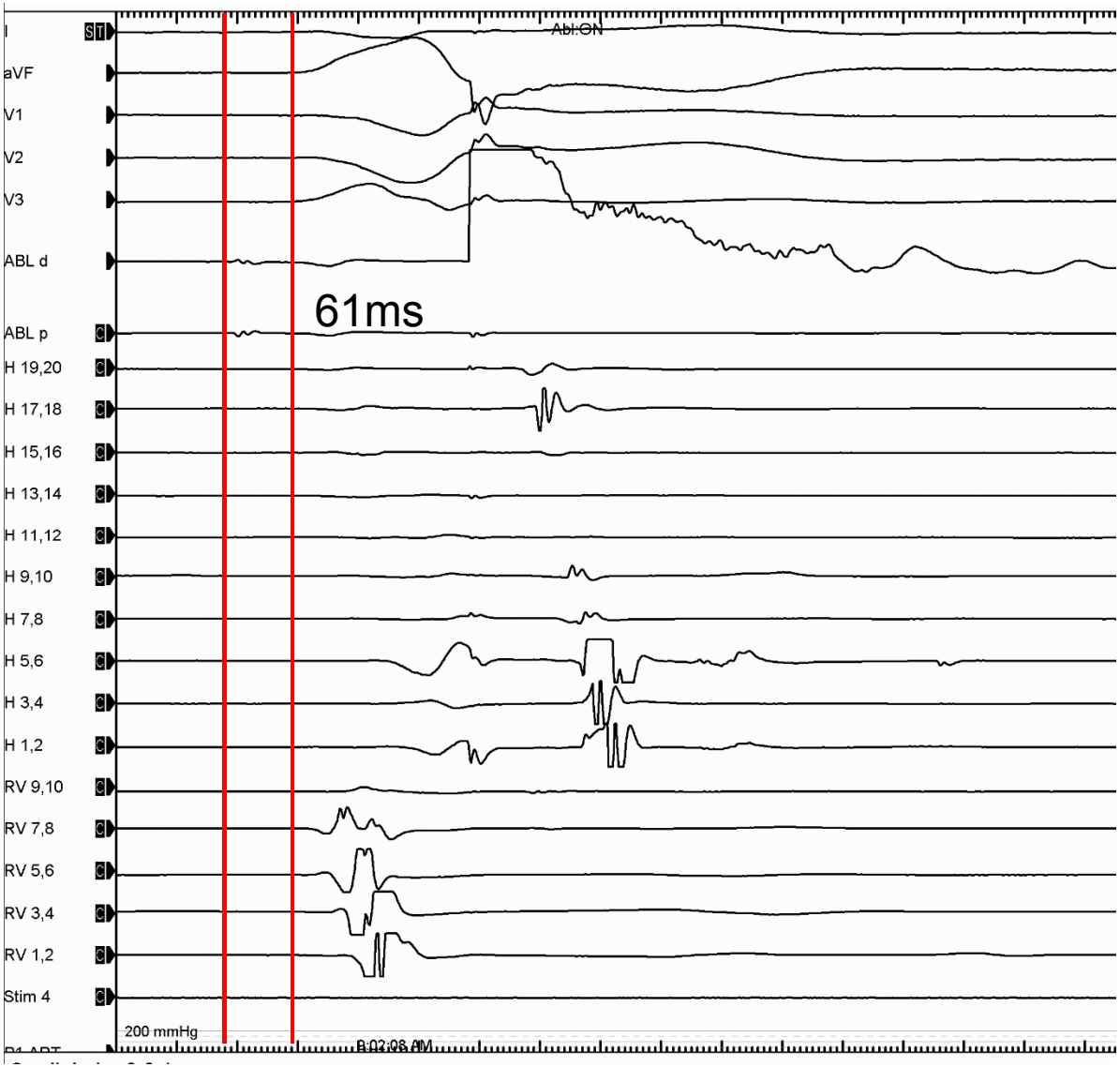


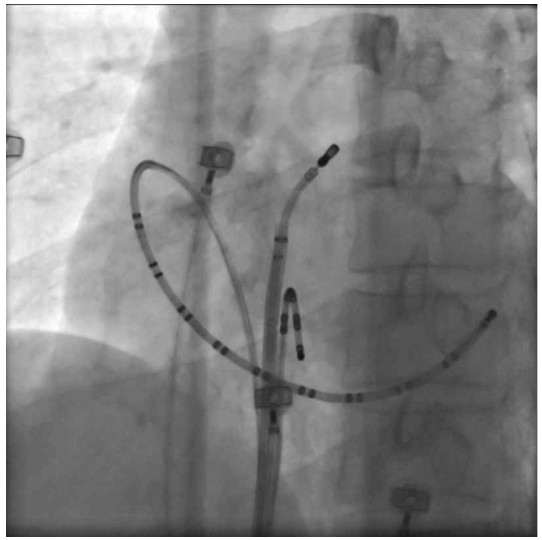
Case
: M/61, recurred VT after RVOT VT ablation

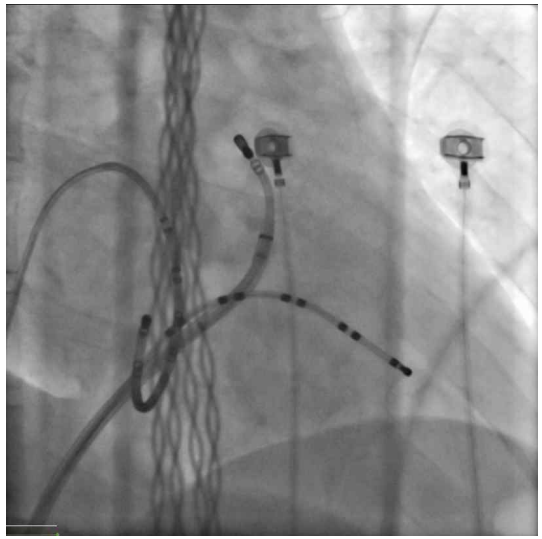
HR: 85bpm



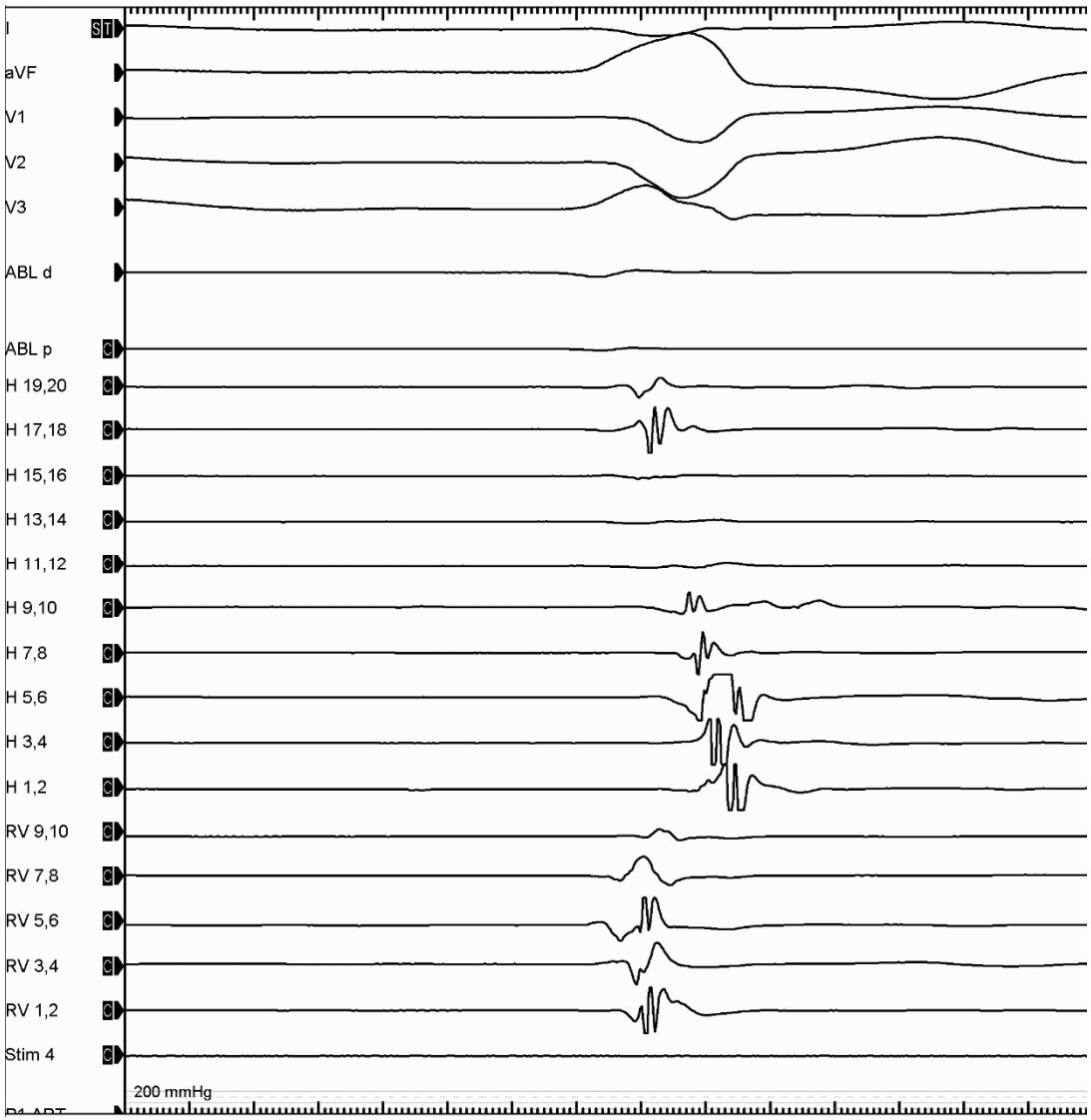
RF ablation - RVOT posteroseptum

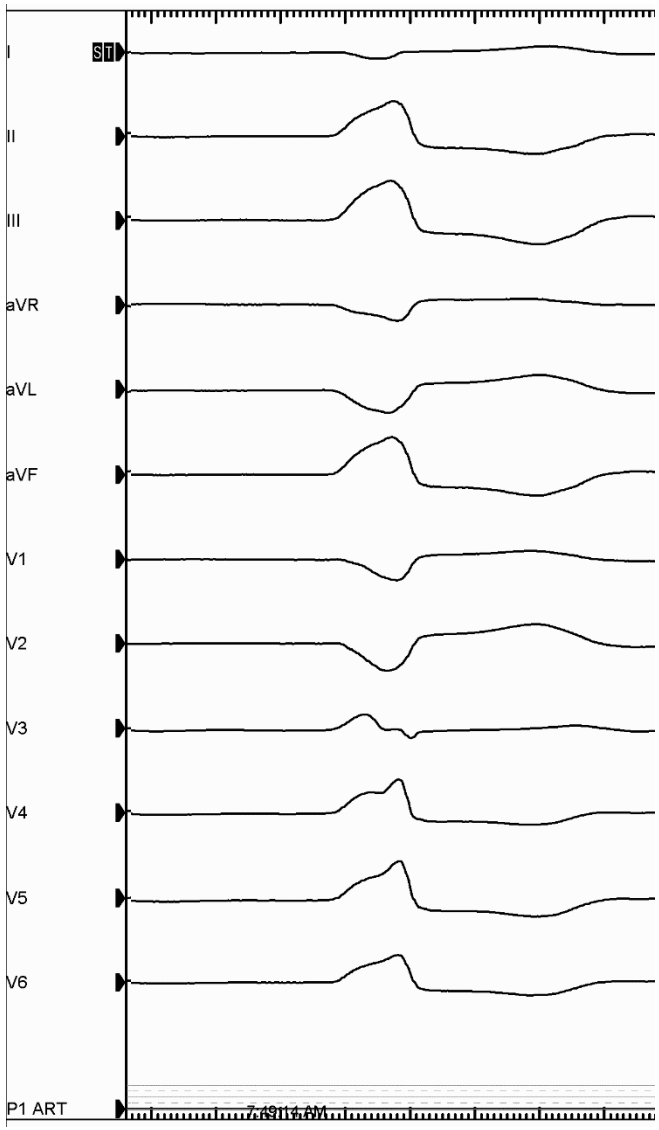




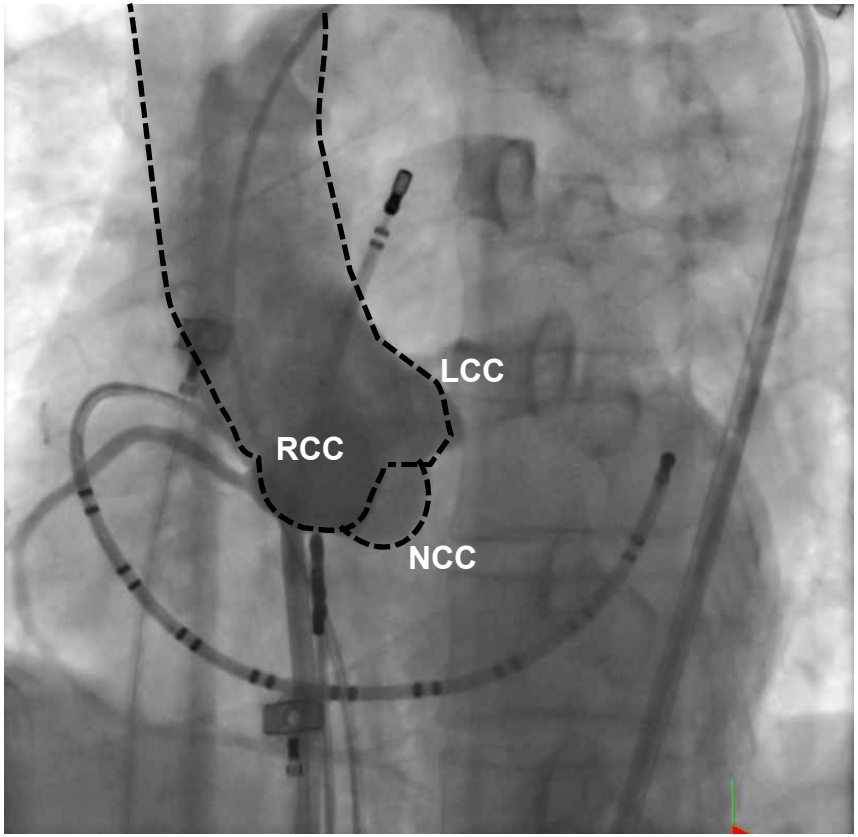


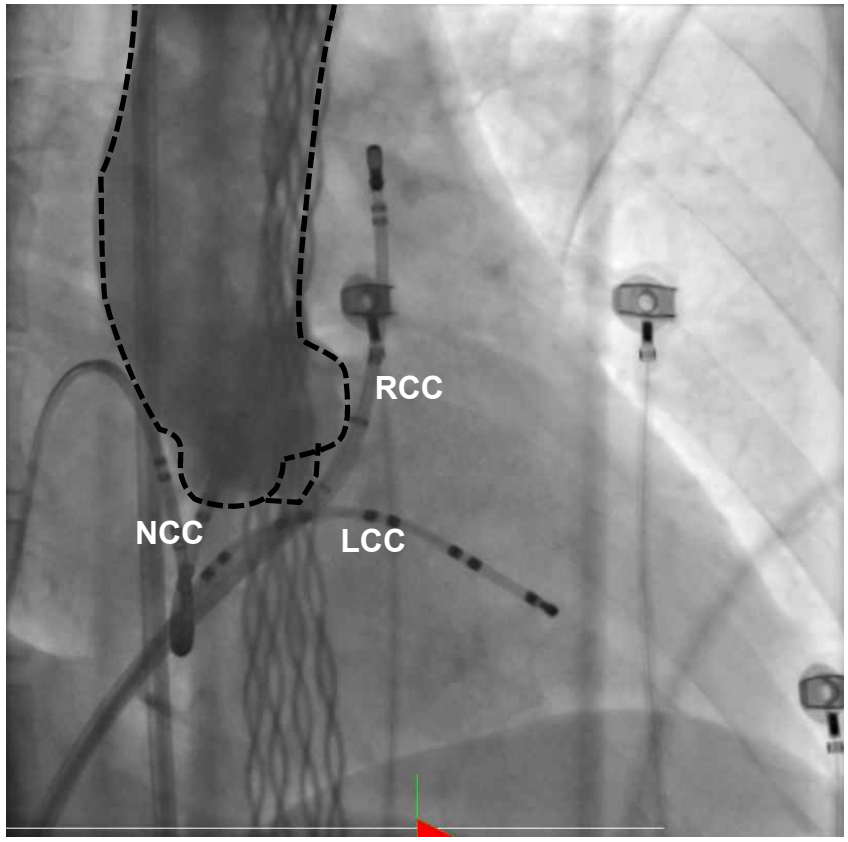
After RF
: upto 50W at RVOT posteroseptum : PVCs (+)



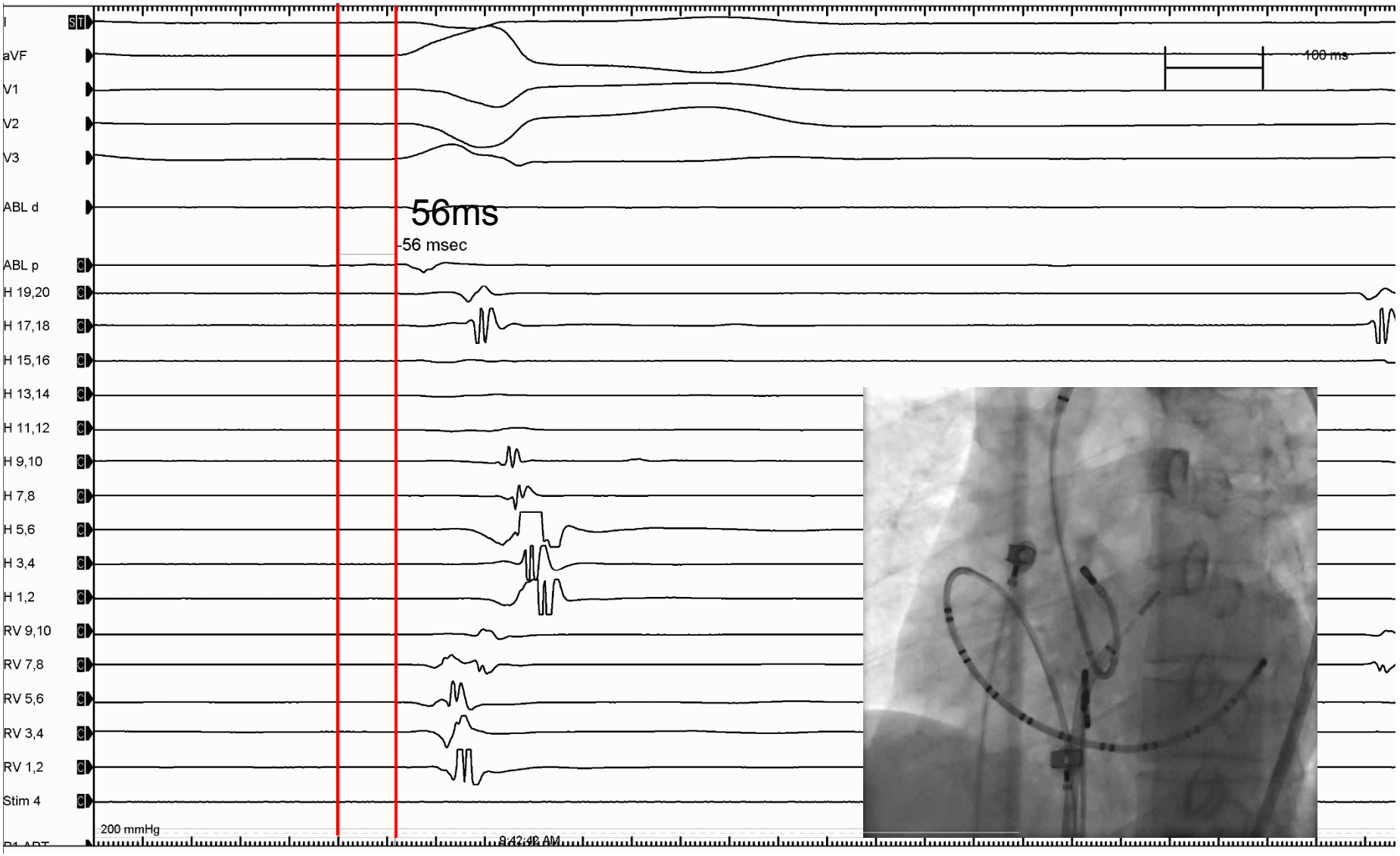


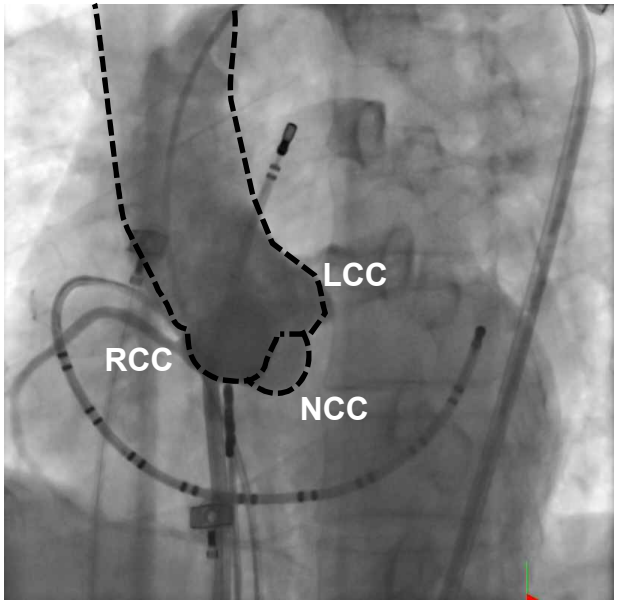
Aortogram

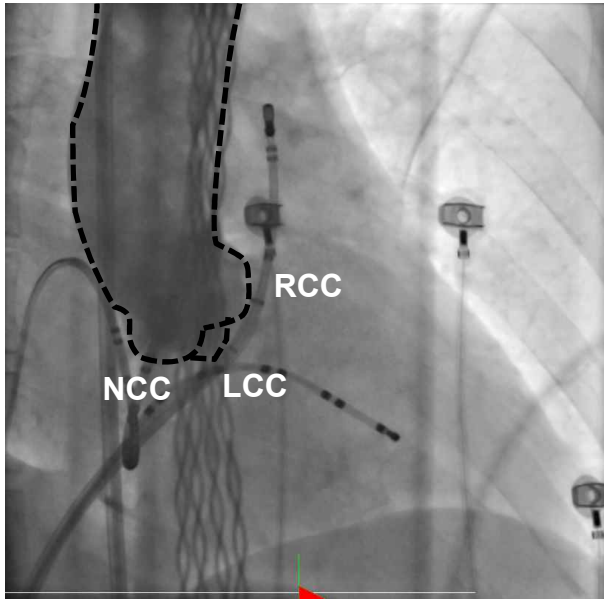


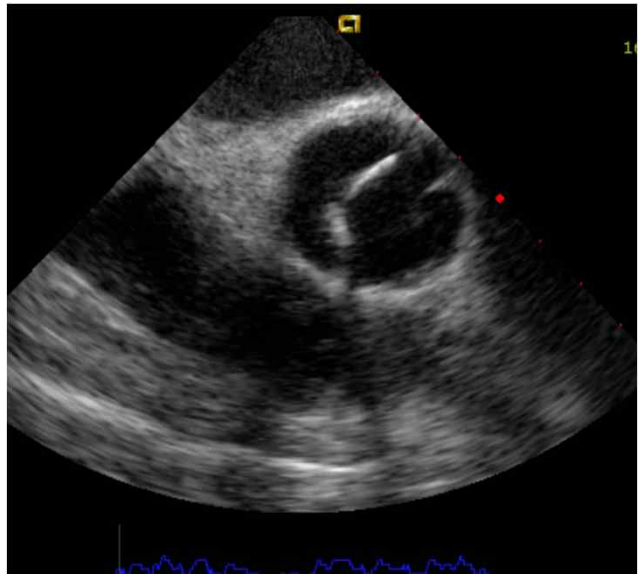


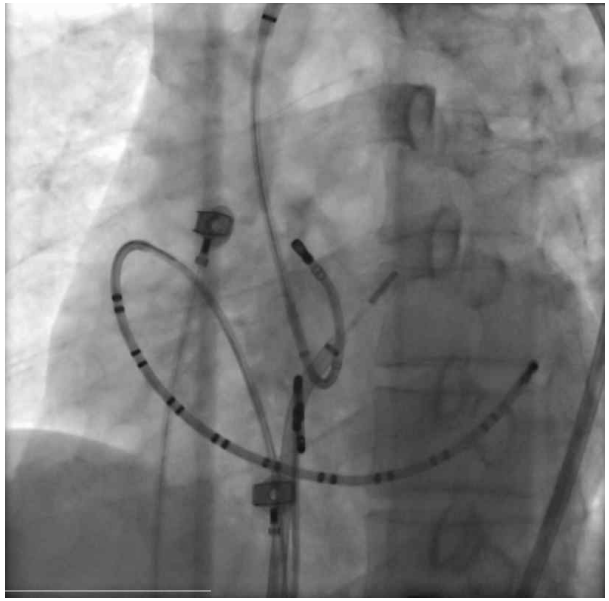
Map (LCC-RCC commissure)

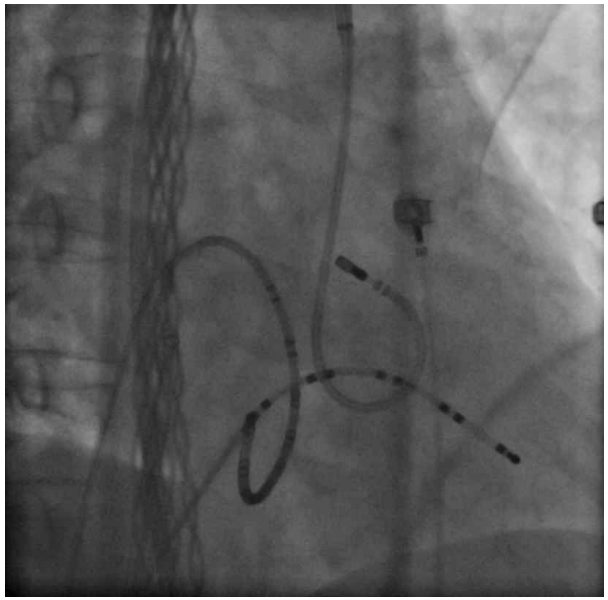


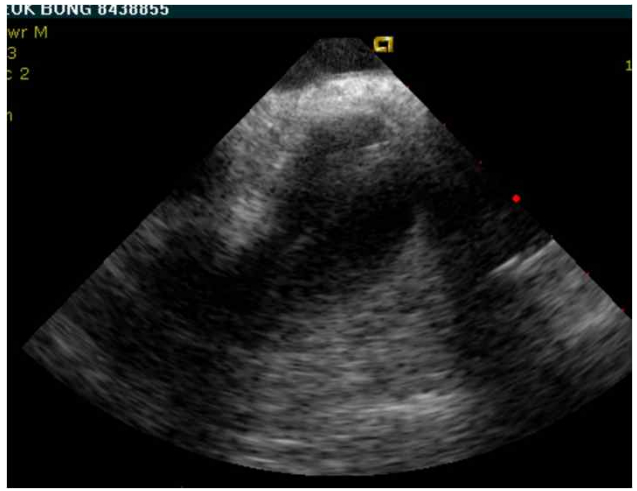

LCC
RCC
NCC


RCC
NCC
LCC

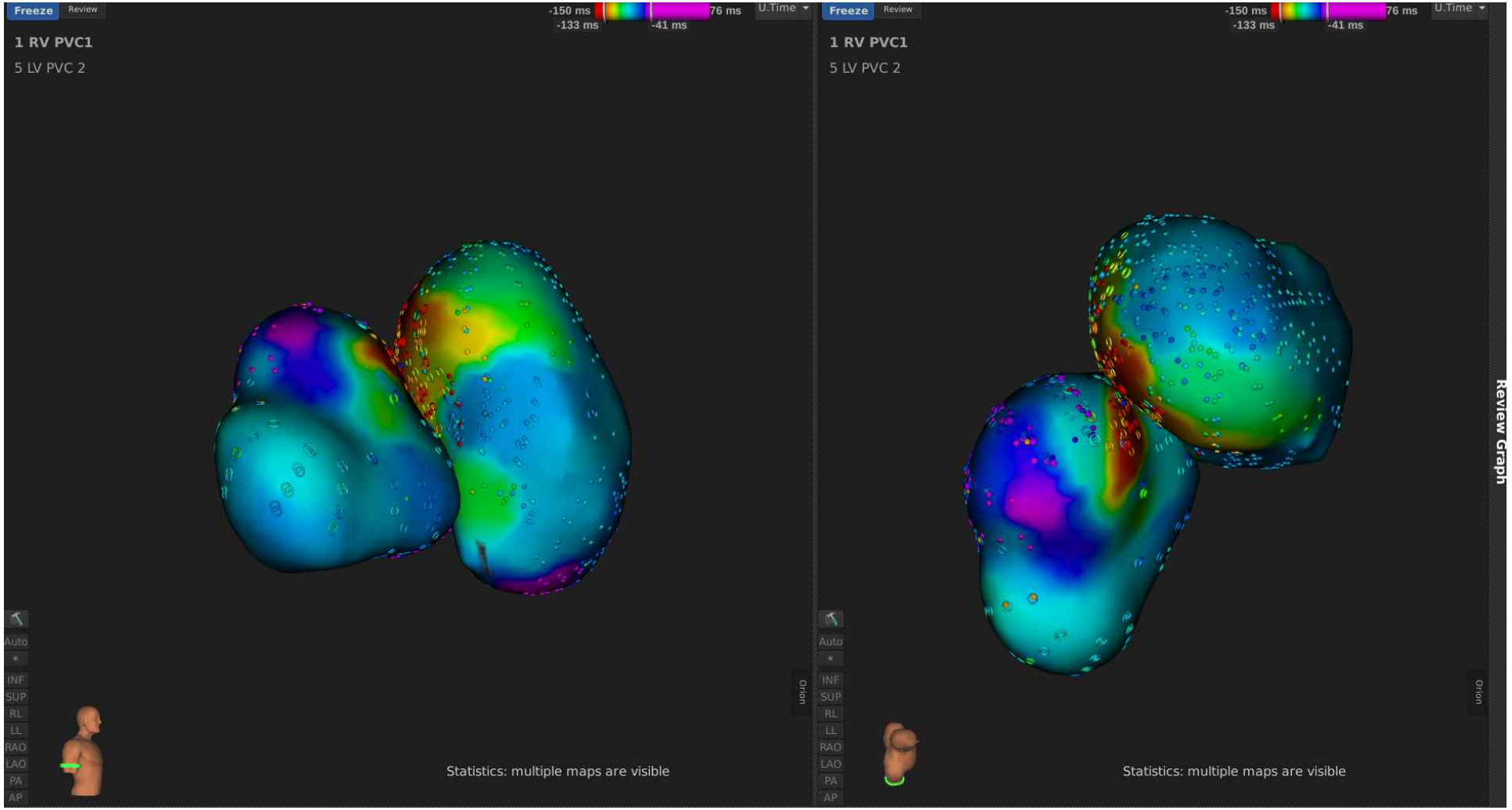




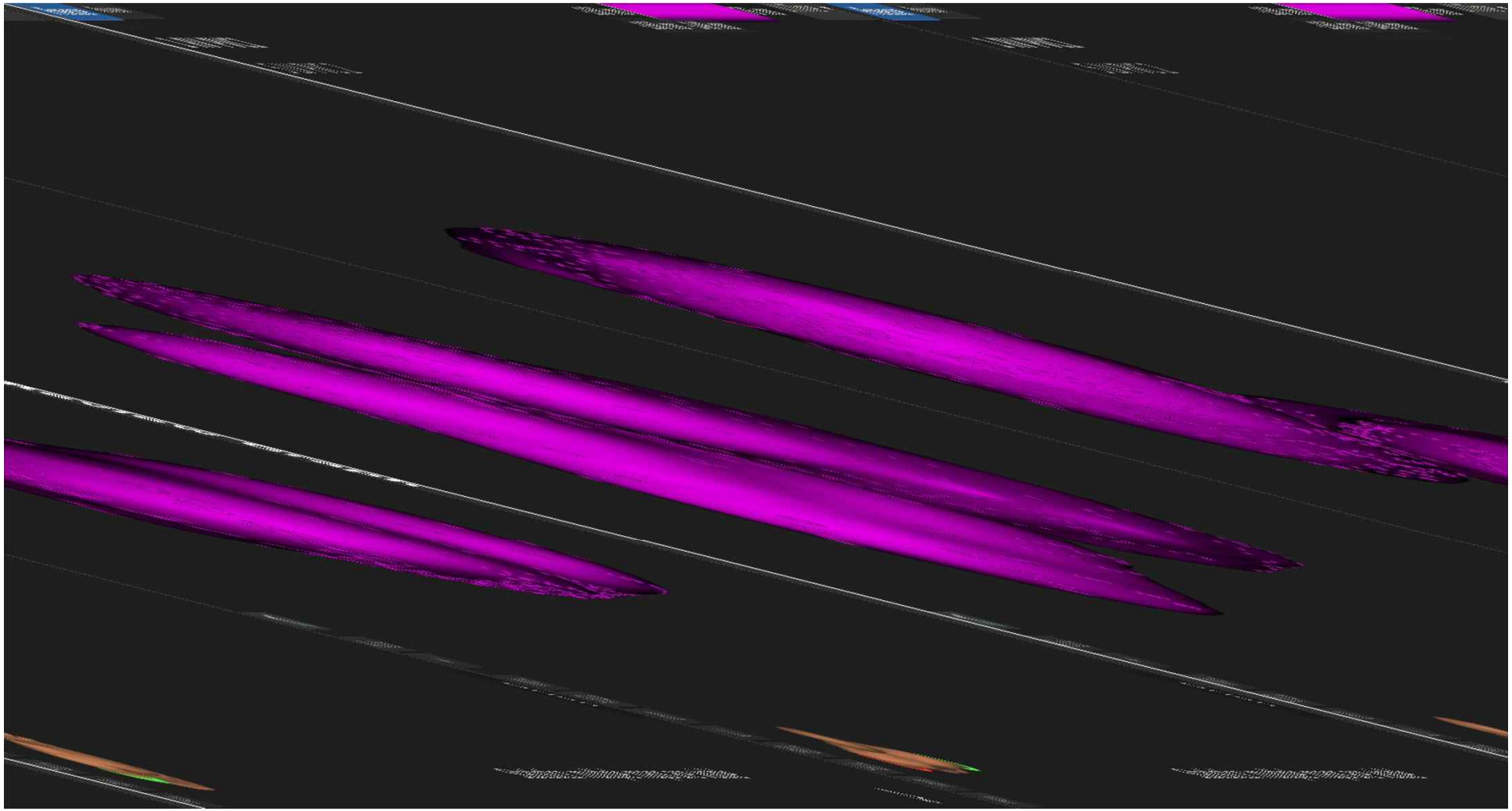




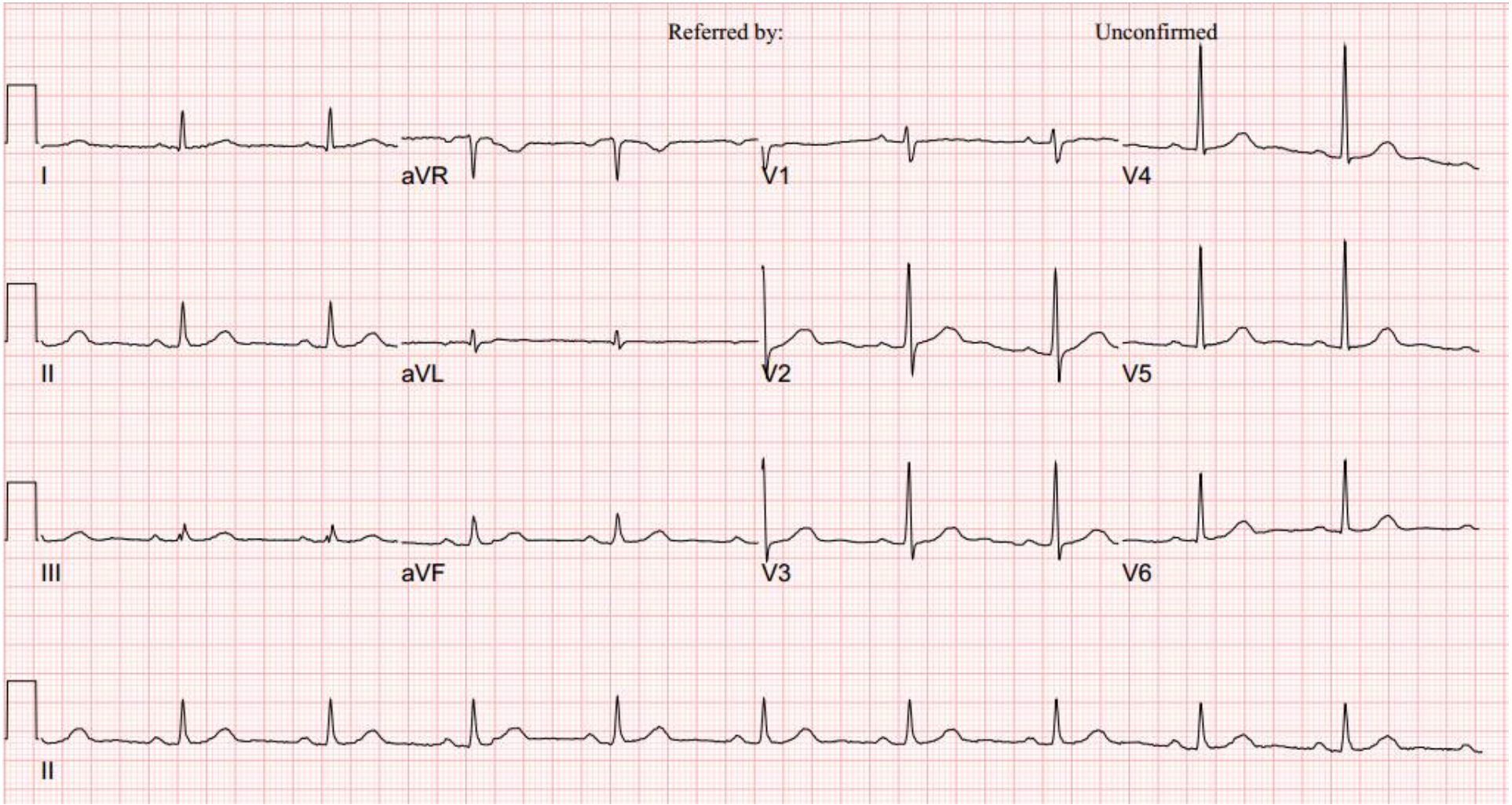
RVOT, LVOT activation map



RVOT, LVOT propagation map



After RFCA


Referred by:
Unconfirmed
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

Summary

- Understanding the anatomy is the key
- Be aware of the differences between Cusps
  - Catheter tip direction & position, comparing with aortogram
  - EGM - NCC: bigger A, RCC: bigger V small A, LCC: fragmented V
- Utilize unipolar mapping
- ICE is useful
- Limitations of pacing mapping in cusp VT

Thank you for your attention!