Crux PVC : Anatomy, Mapping and Ablation of Crux PVC

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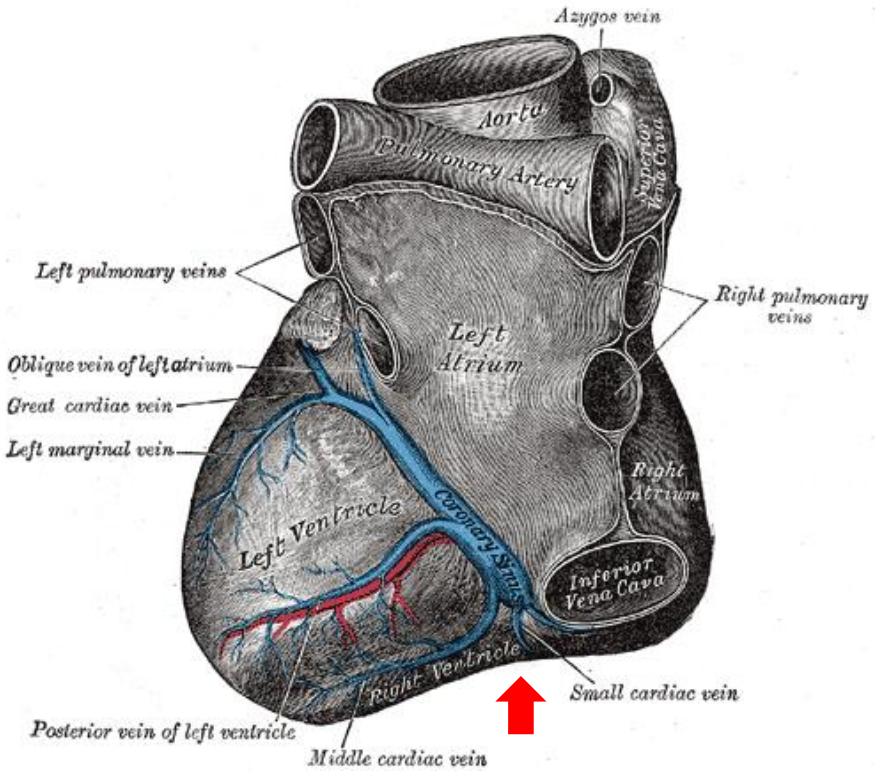
COI Disclosure

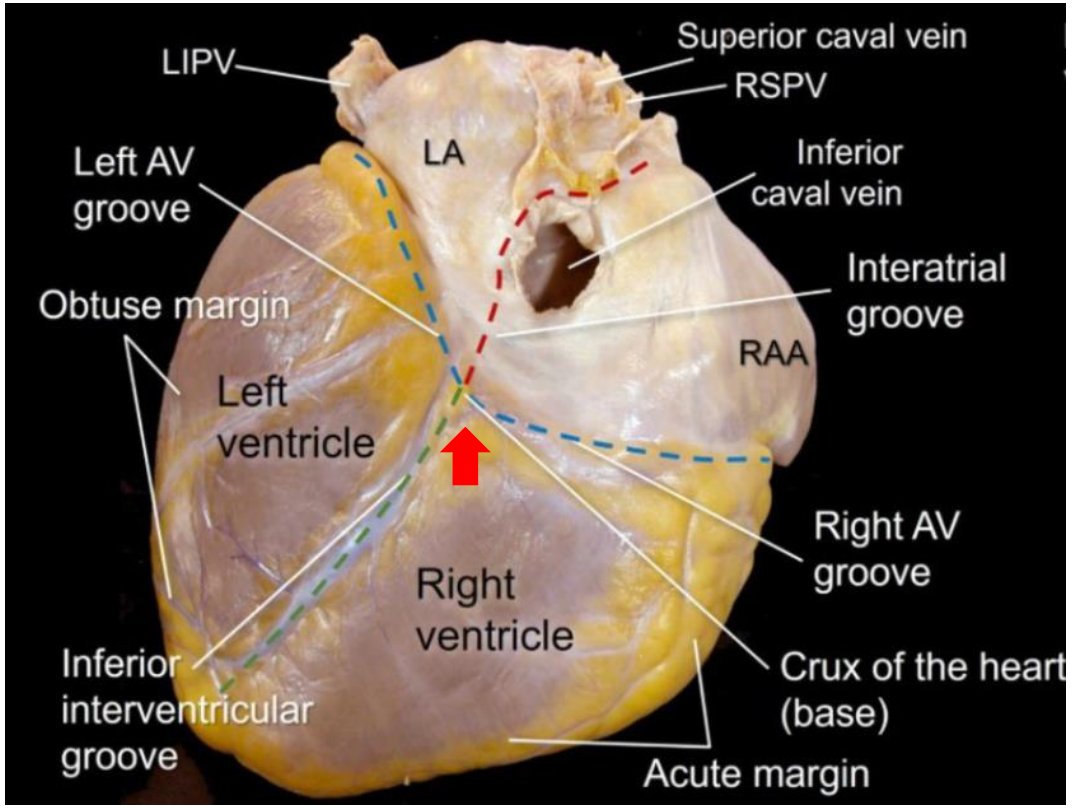
Dong-Hyeok, Kim

The authors have no financial conflicts of interest
to disclose concerning the presentation

Crux of the heart



https://en.wikipedia.org/wiki/Crux_cordis

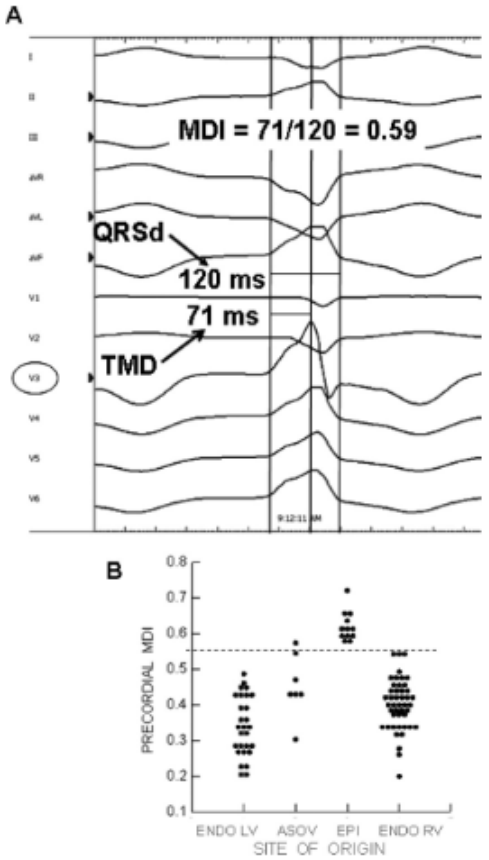


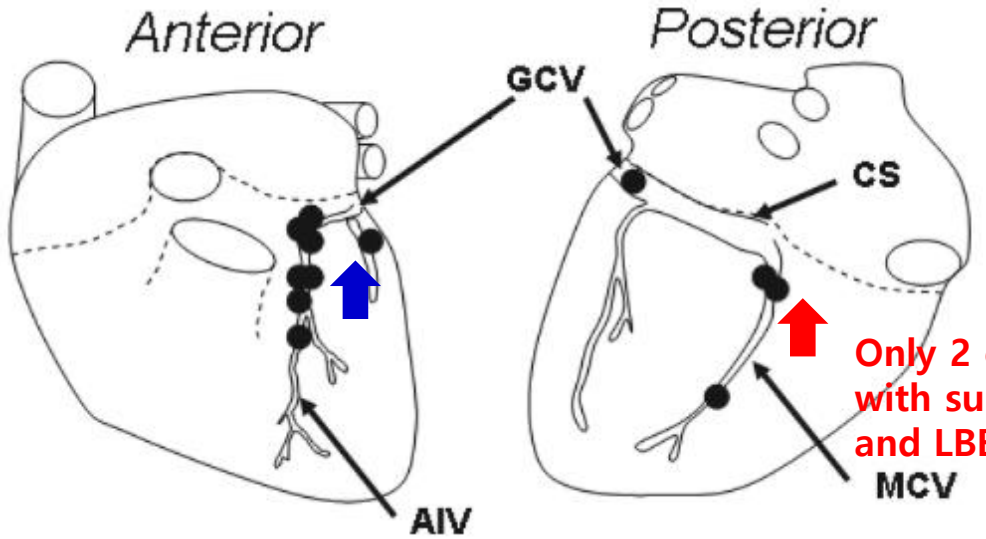
Cardiacanatomyatlas.com//Cardiac anatomy for electrophysiologist

The crux cordis or **crux of the heart** (from Latin "crux" meaning "cross") is the area on the lower back side of the heart where the coronary sulcus (the groove separating the atria from the ventricles) and the posterior interventricular sulcus (the groove separating the left from the right ventricle) meet.

First reported Crux VT

: Idiopathic Epicardial Left Ventricular Tachycardia Originating Remote From the Sinus of Valsalva (common PVC site on RVOT or LVOT)





Only 2 cases (1.4%) with superior and left axis, and LBBB pattern

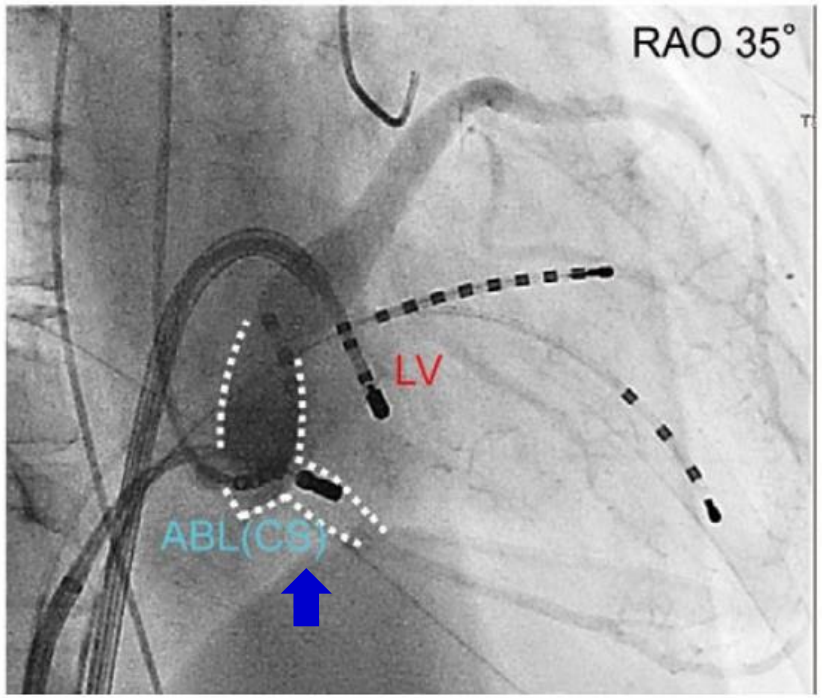
Of all 138 idiopathic cases, 12 cases is the epicardial VT.

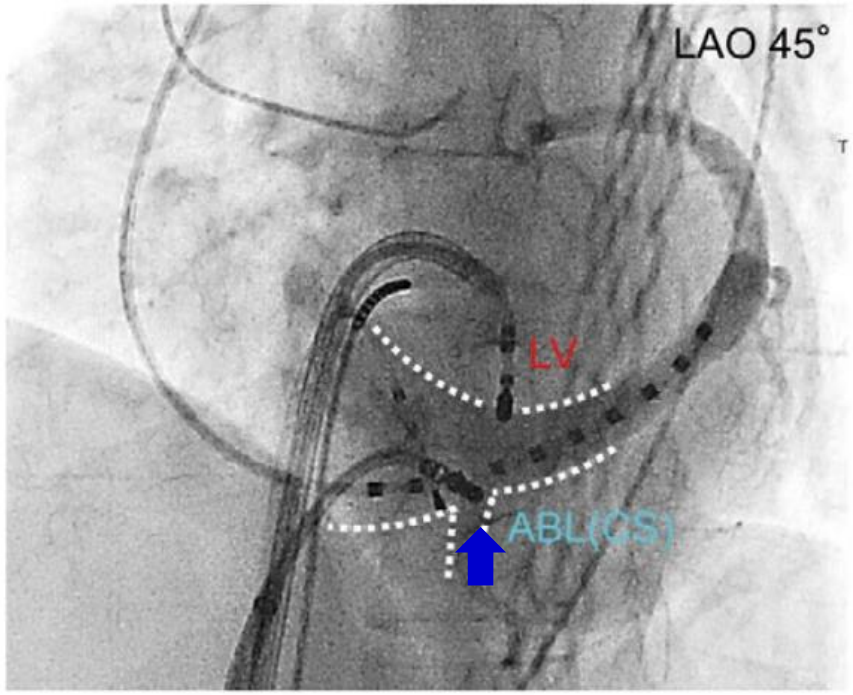
MDI (maximum deflection index)
= MDT/QRSd = 71/120 = 0.59 > 0.55

Circulation. 2006;113:1659–1666.

Idiopathic Ventricular Arrhythmia Originating From the Cardiac Crux

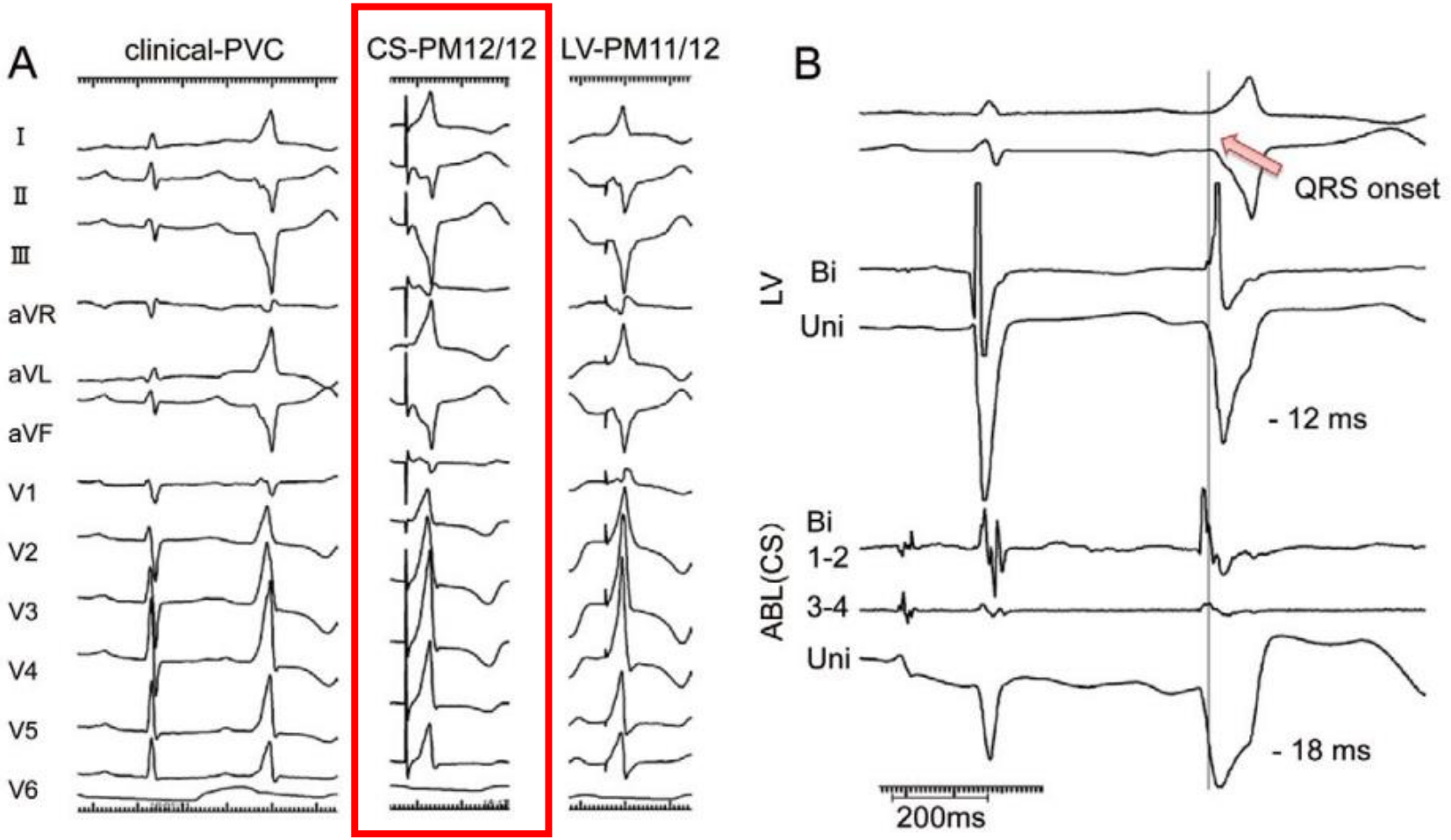
in coronary sinus (CS) and middle cardiac vein (MCV)





Cir Arrhythm Electrophysiol. 2014;7:1152-1158.
Circ J 2017; 81: 1807–1815.

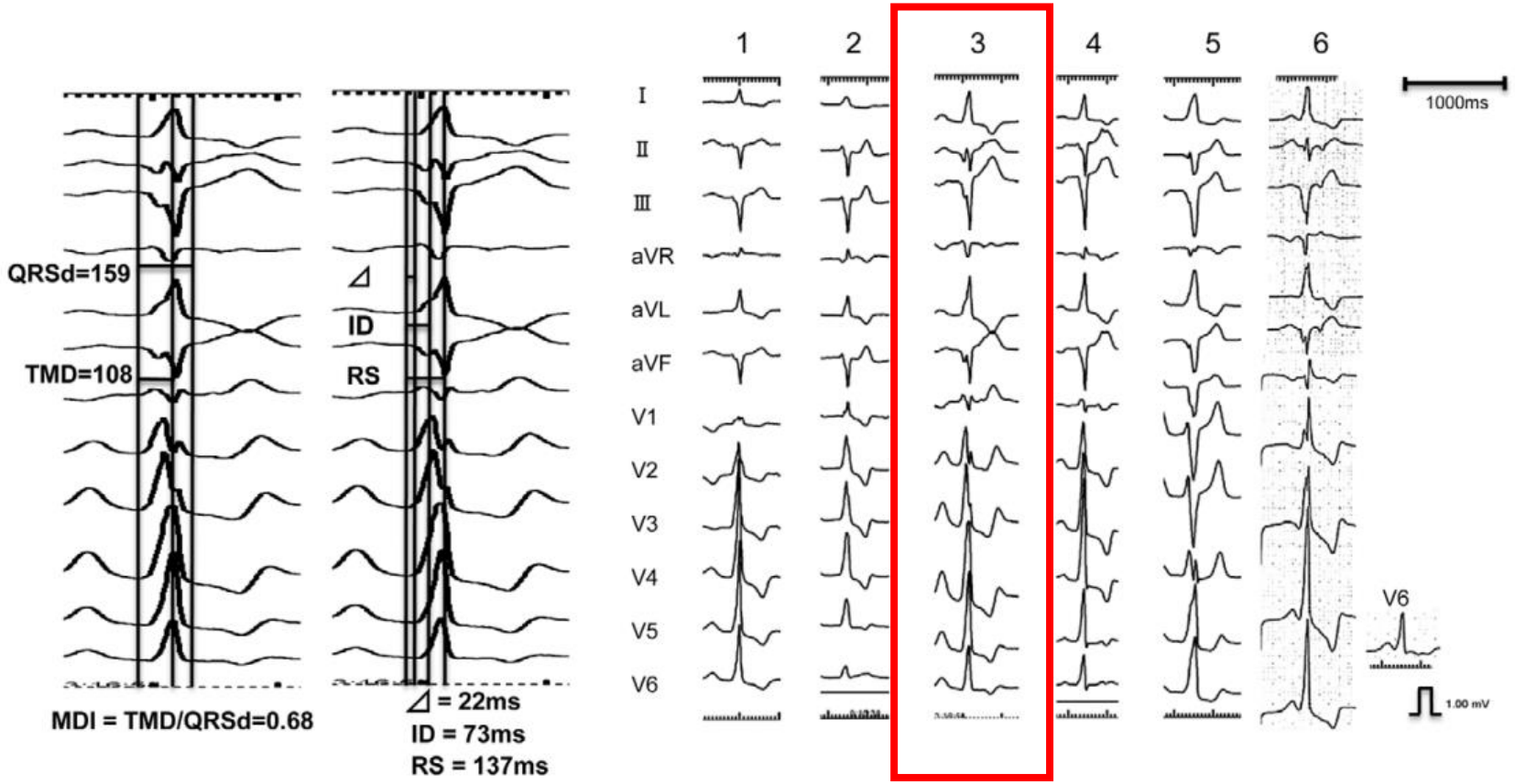
Idiopathic Ventricular Arrhythmia Originating From the Cardiac Crux in CS



Left and superior axis,
and QR pattern in III and aVF

Cir Arrhythm Electrophysiol. 2014;7:1152-1158.
Circ J 2017; 81: 1807–1815.

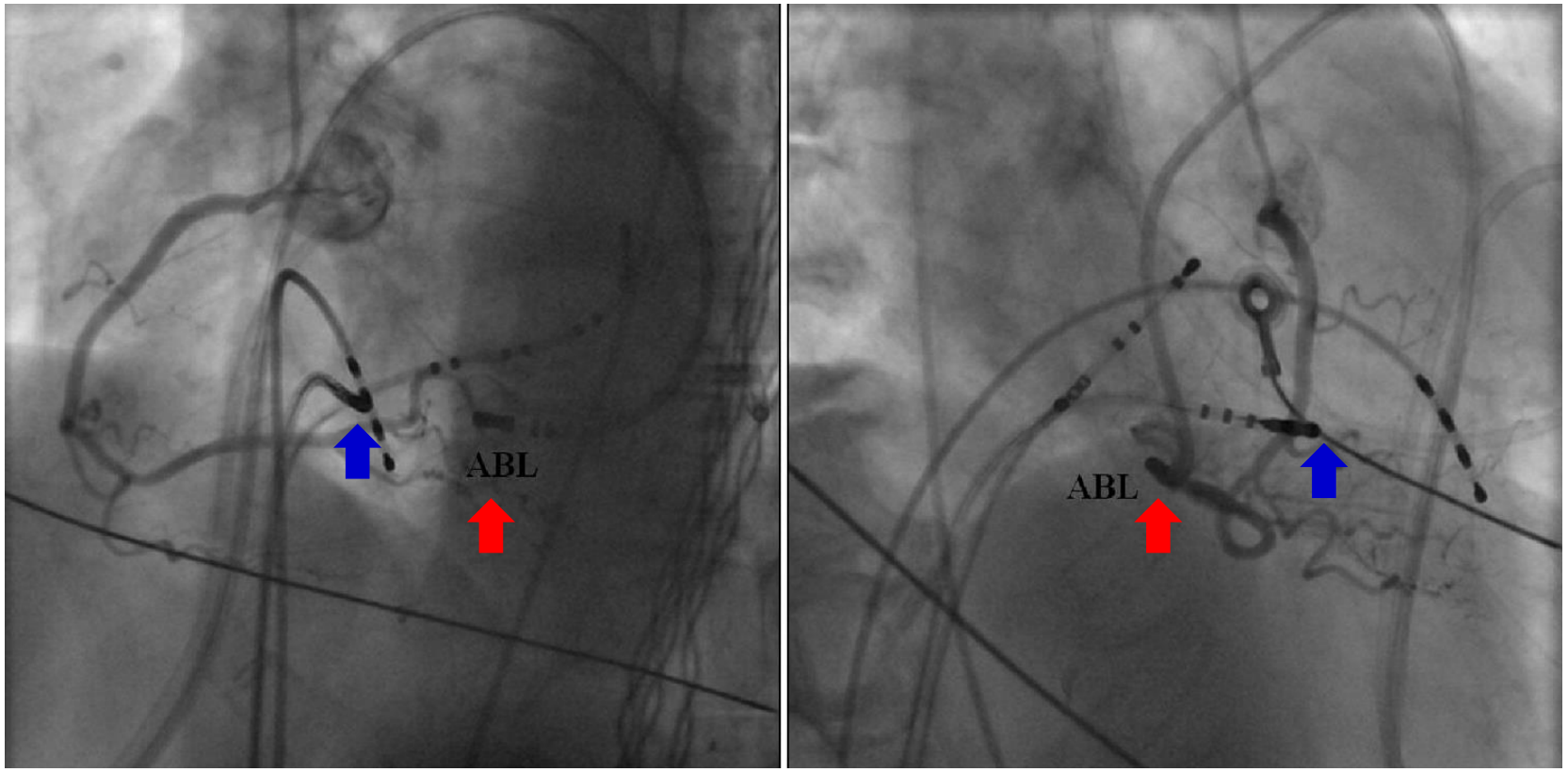
Idiopathic Ventricular Arrhythmia Originating From the Cardiac Crux, epicardial approach



MDI (maximum deflection index)
= MDT/QRSd = 108/159 = 0.68 > 0.55

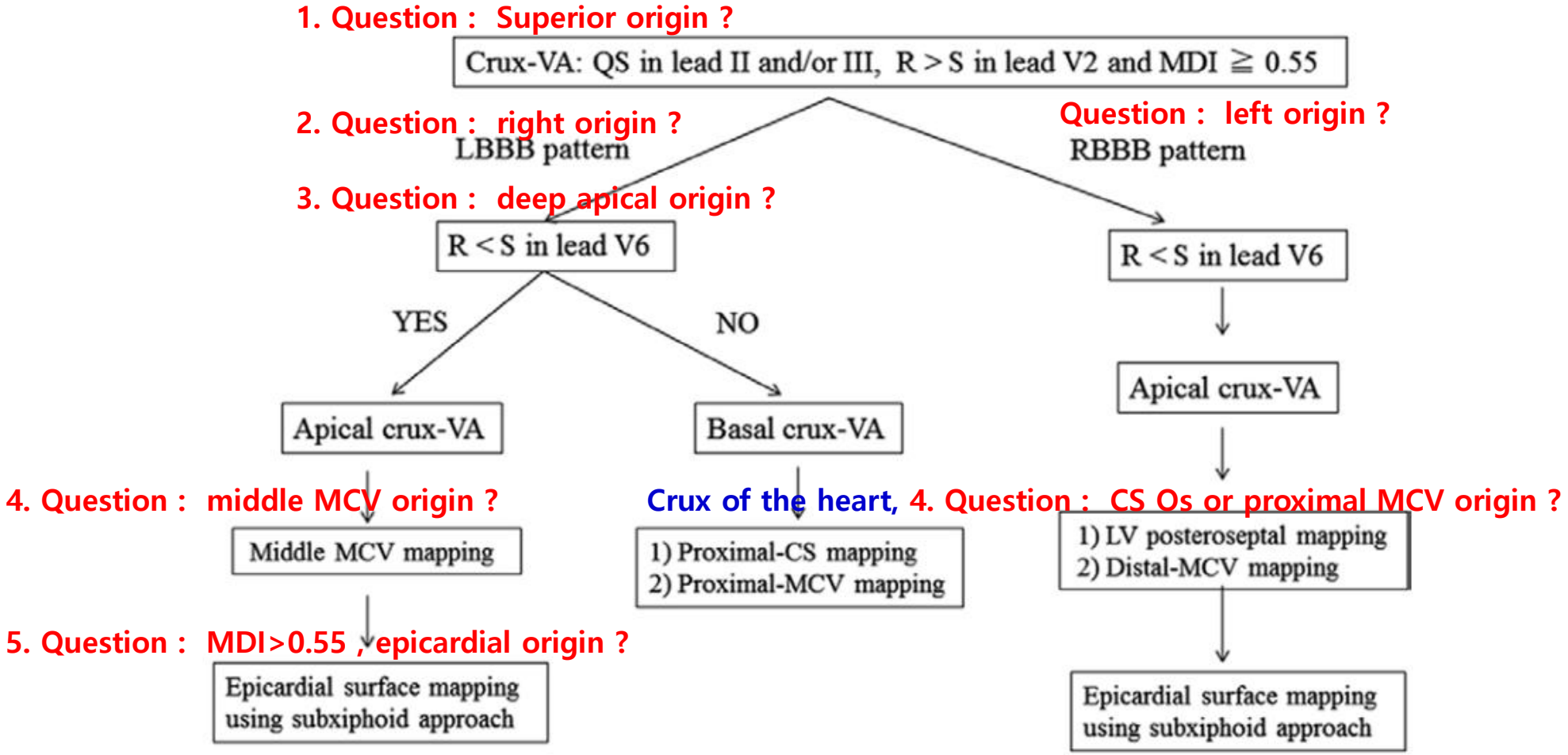
Cir Arrhythm Electrophysiol. 2014;7:1152-1158.
Circ J 2017; 81: 1807–1815.

Idiopathic focal epicardial ventricular tachycardia originating from the crux of the heart, 4 cases of all 340 VT patients, 1.17%



Heart Rhythm 2009; 6: 44–50.

Mapping and ablation algorithm for Crux ventricular arrhythmia (VA)



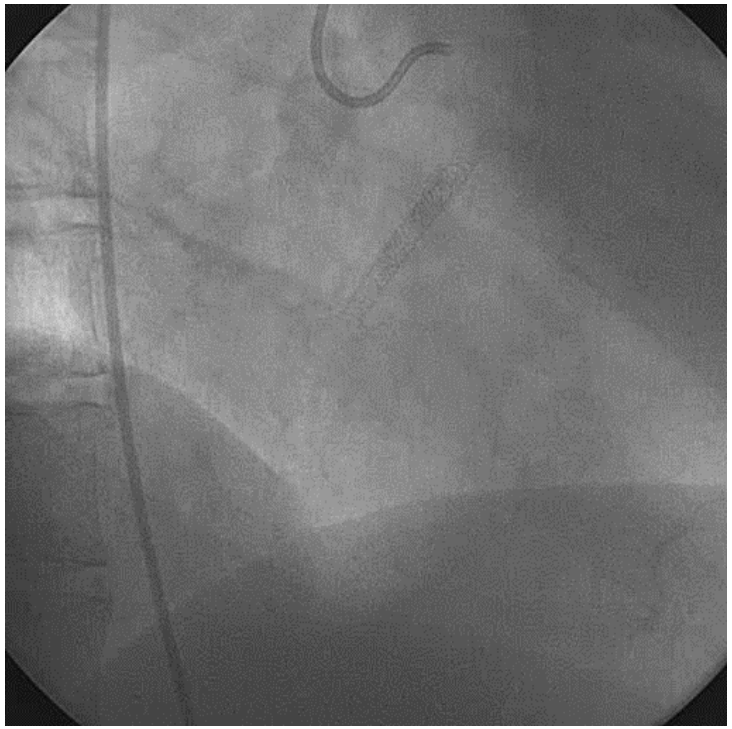
Cir Arrhythm Electrophysiol. 2014;7:1152-1158.

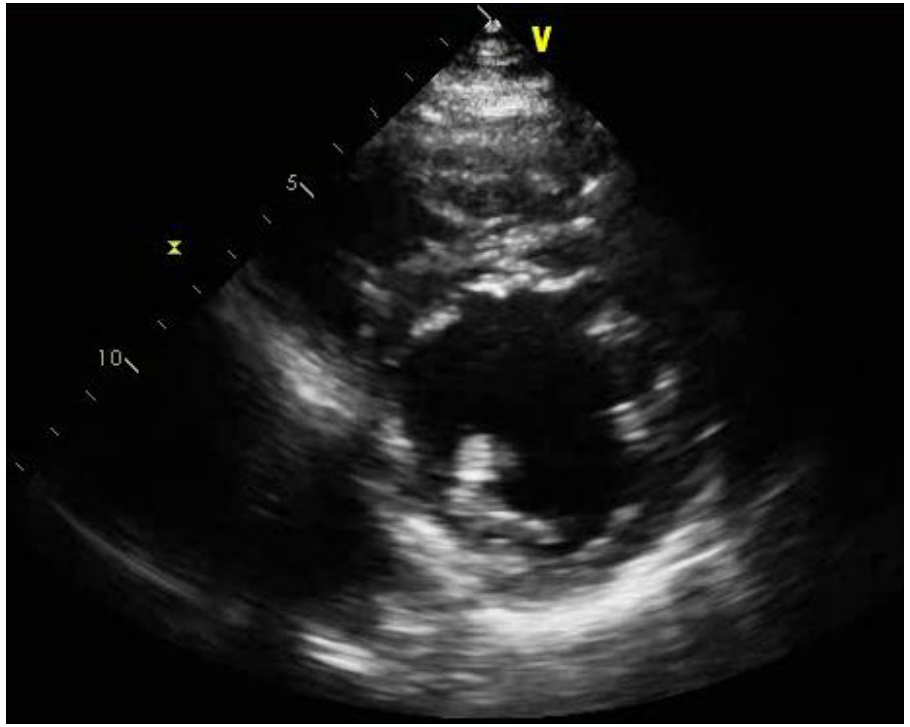
Case, M/53

- Coronary artery :
  - May, 2001. – CAG and PTCA with stent insertion at p-m RCA
  - July, 2012. – Chest pain → f/u CAG → ISR at RCA → Cutting balloon procedure was done.
- Tachycardia :
  - July, 2012. – ER visit with palpitations → terminated by IV adenosine → AAD
- Re-visit for frequent palpitations and chest discomfort, aggravated pain, aggravated frequency with 5~6 times in a day.
- Admission and sustained VT was detected.

Courtesy of Dr. Junbeom, Park,

CAG follow-up, TTE, and cardiac MRI



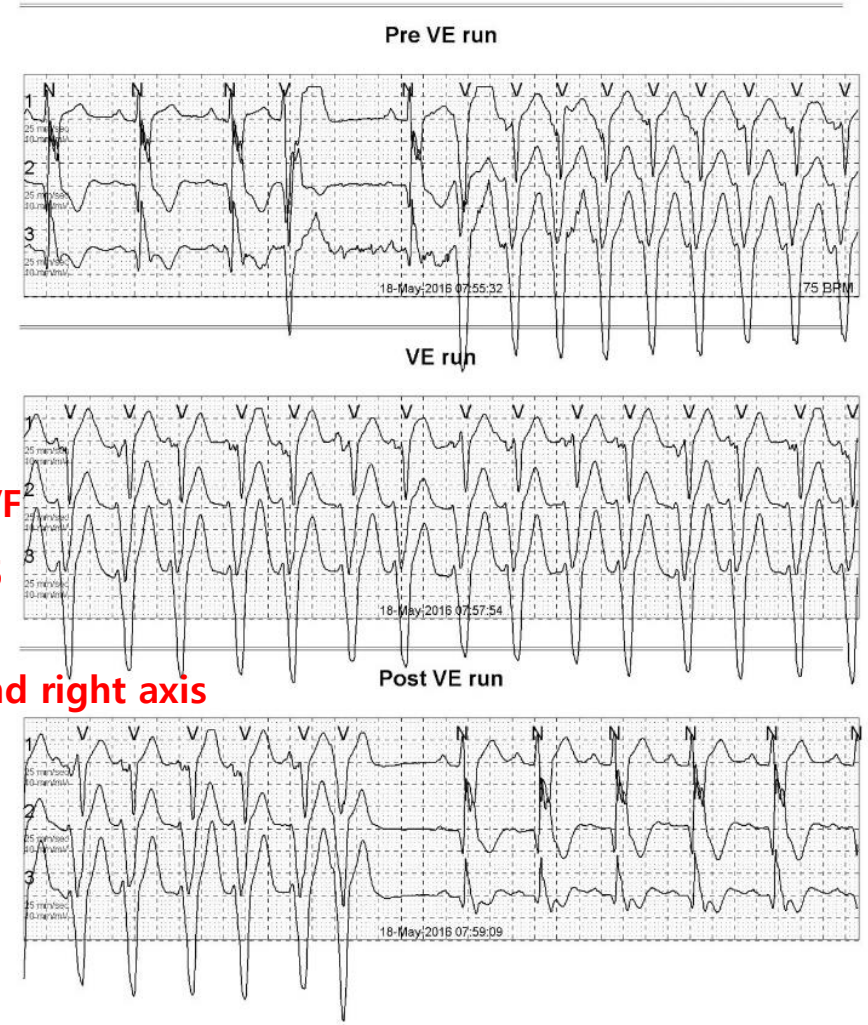


LVEF 40%, RWMA : RCA territory

LGE on posterior, septal, basal area

Courtesy of Dr. Junbeom, Park,

VT on Holter

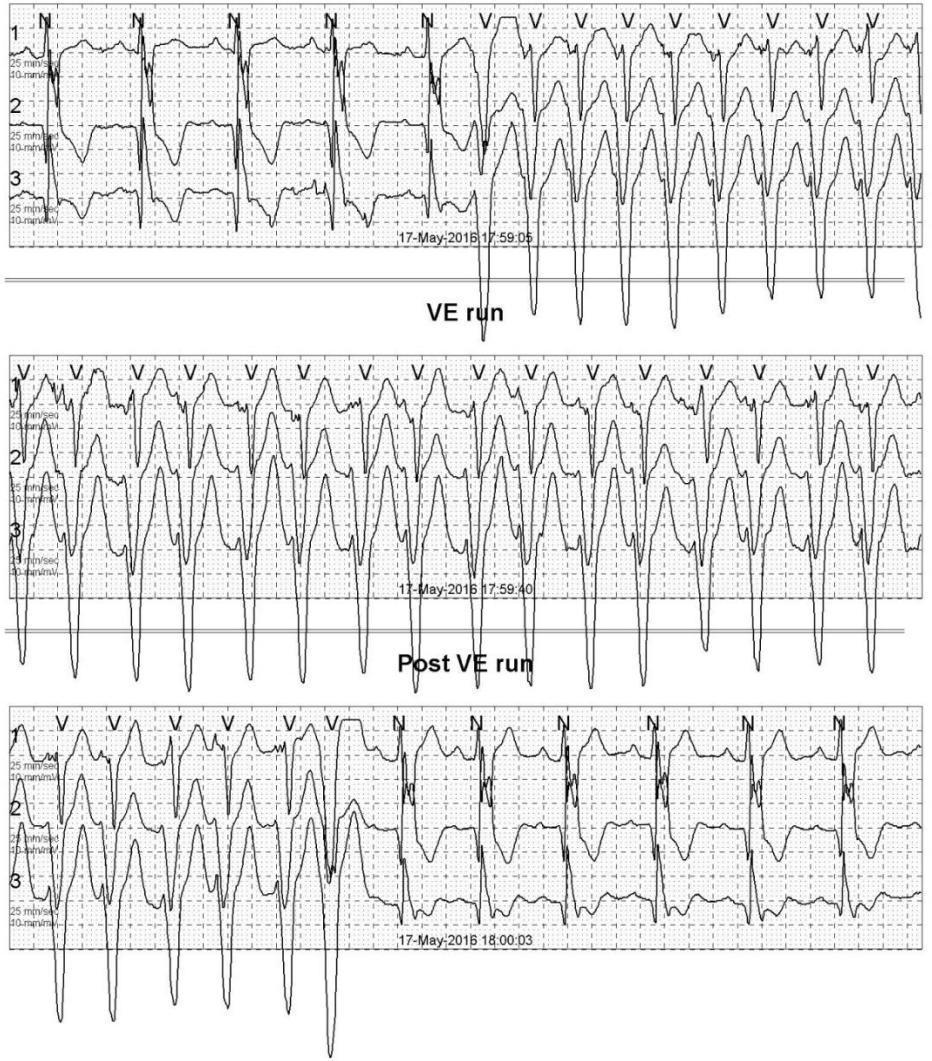


I

aVF

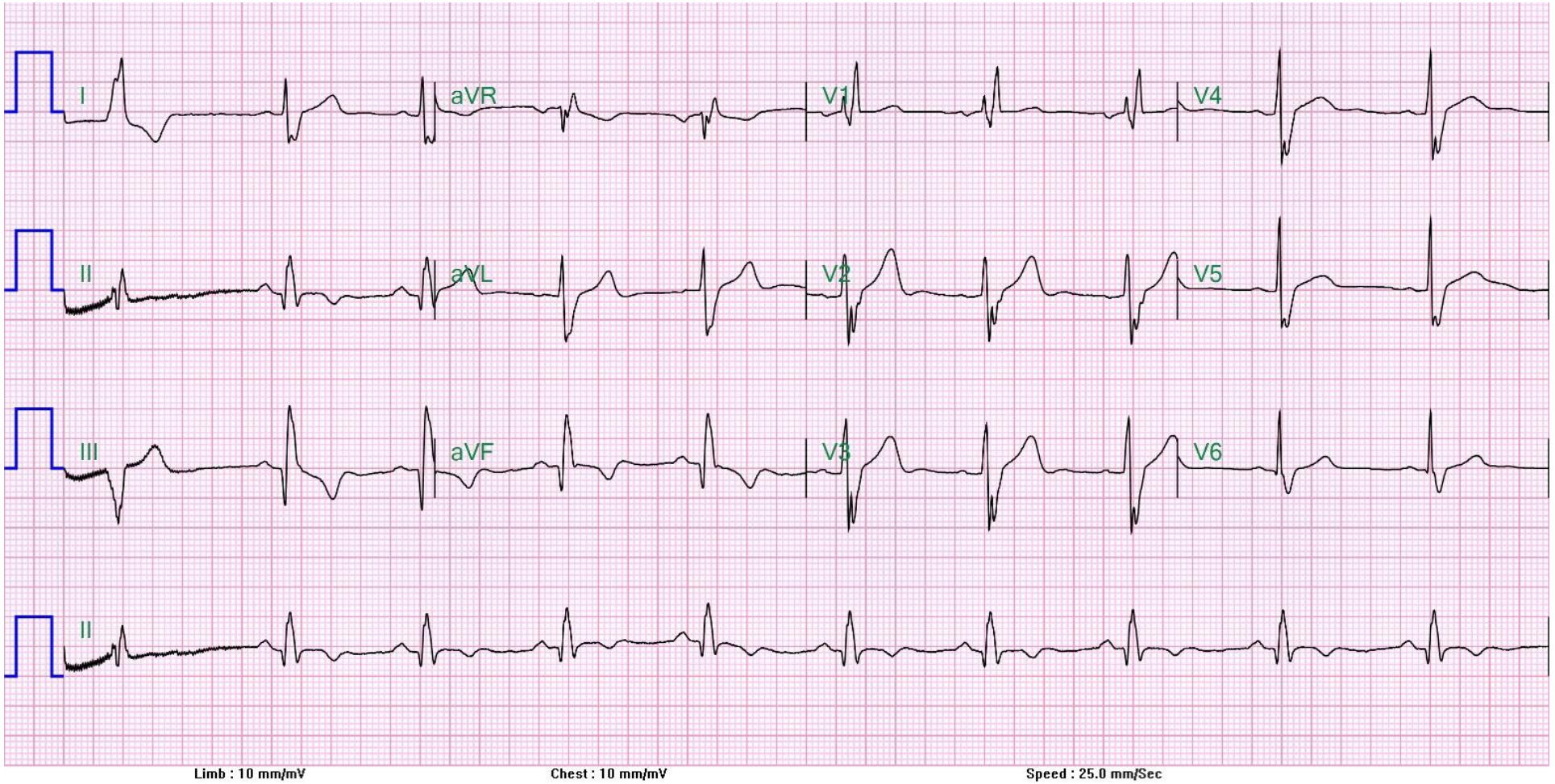
V5

Superior and right axis



Courtesy of Dr. Junbeom, Park,

Baseline 12 leads ECG with RBBB



Courtesy of Dr. Junbeom, Park,

EPS and VT induction

Courtesy of Dr. Junbeom, Park,

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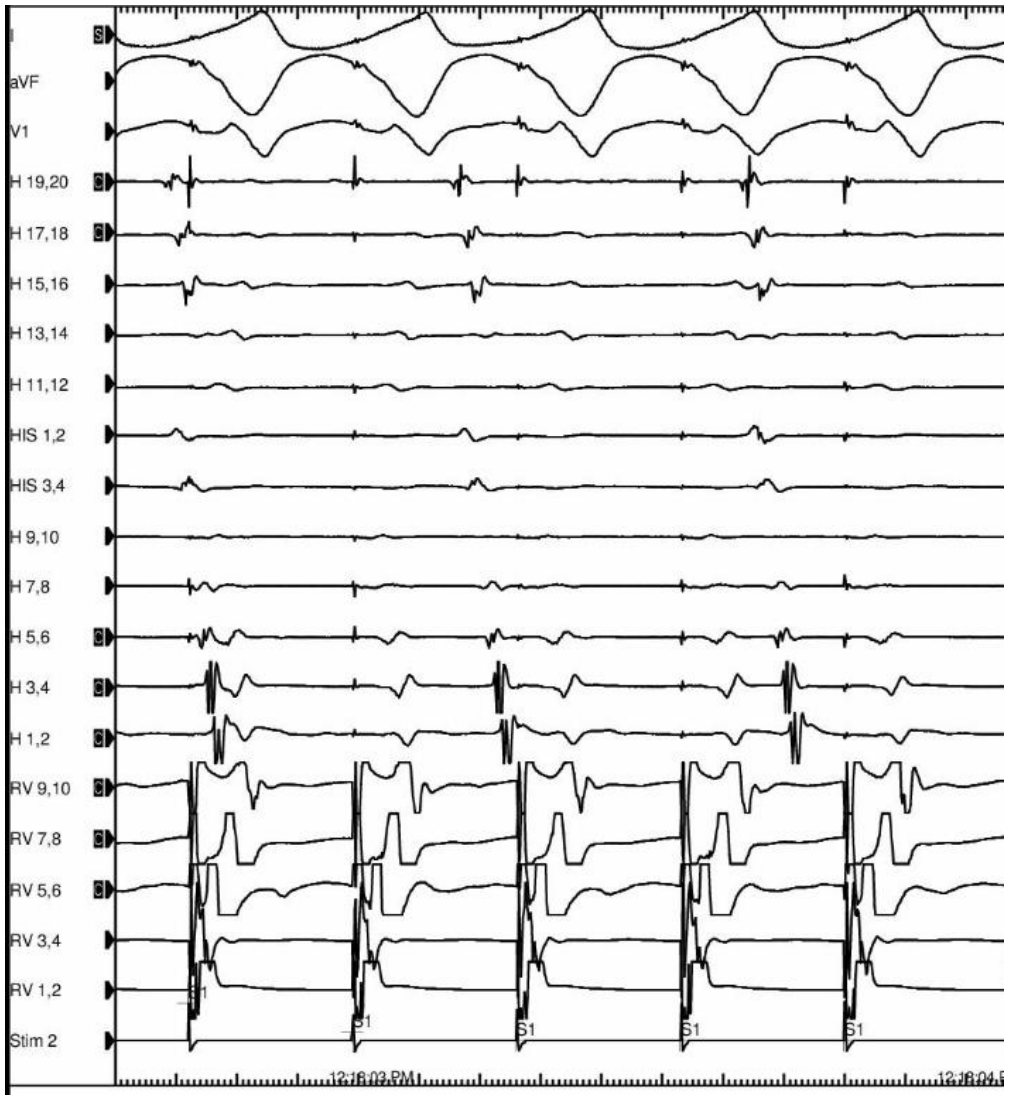
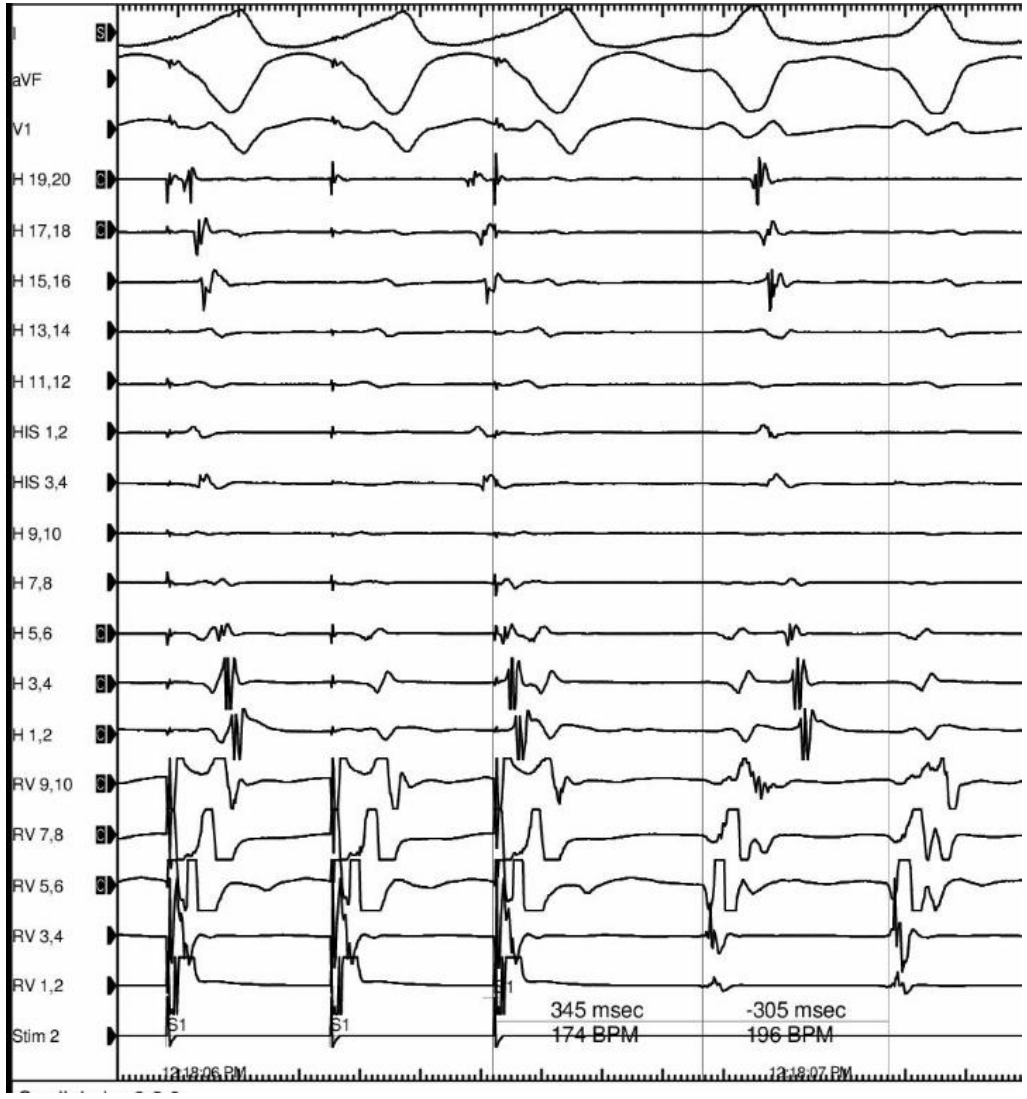
Entrainment of RV posterior, septal, and basal area (PPI-TCL= 345 – 305 = 40ms)





Courtesy of Dr. Junbeom, Park,

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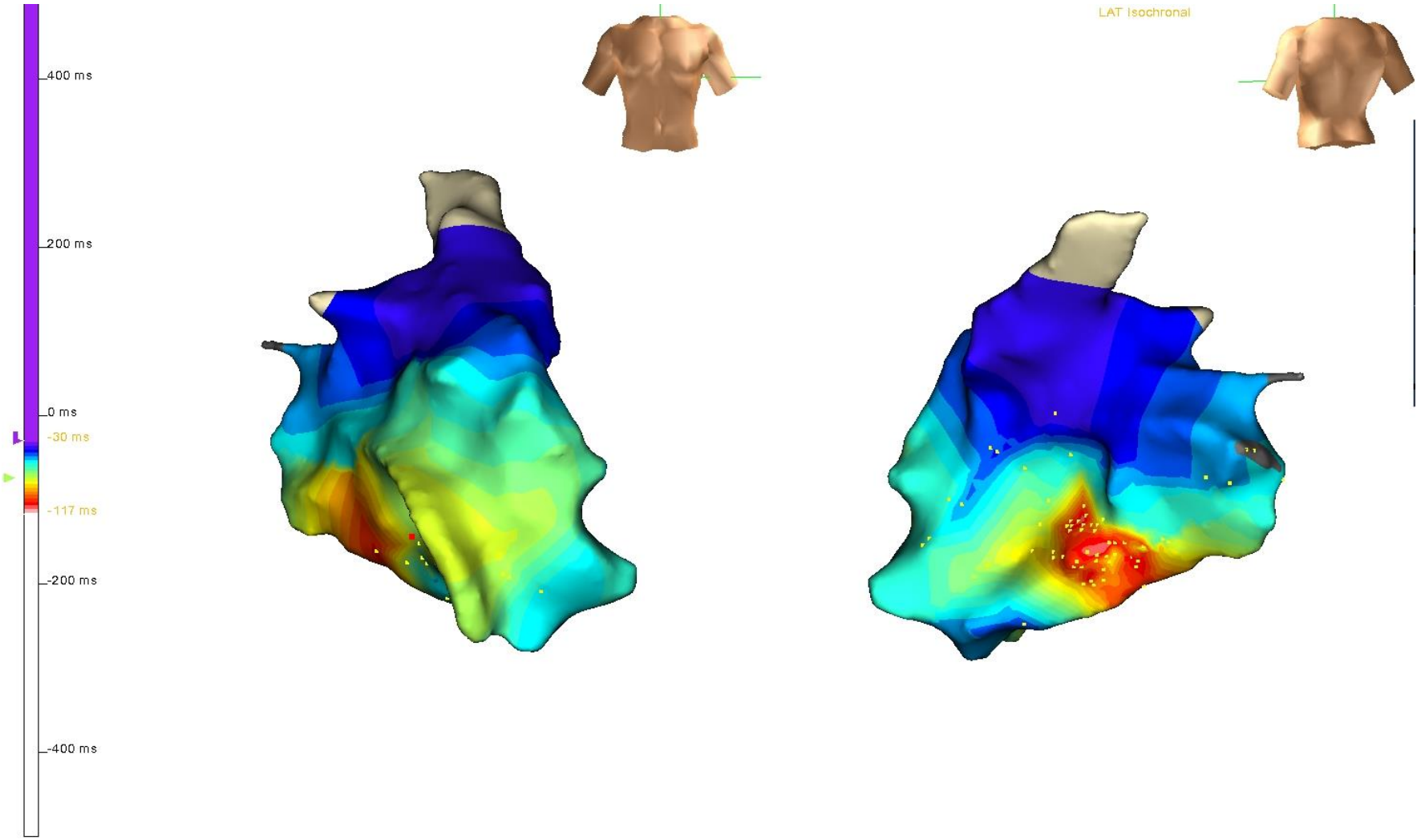
RV activation mapping



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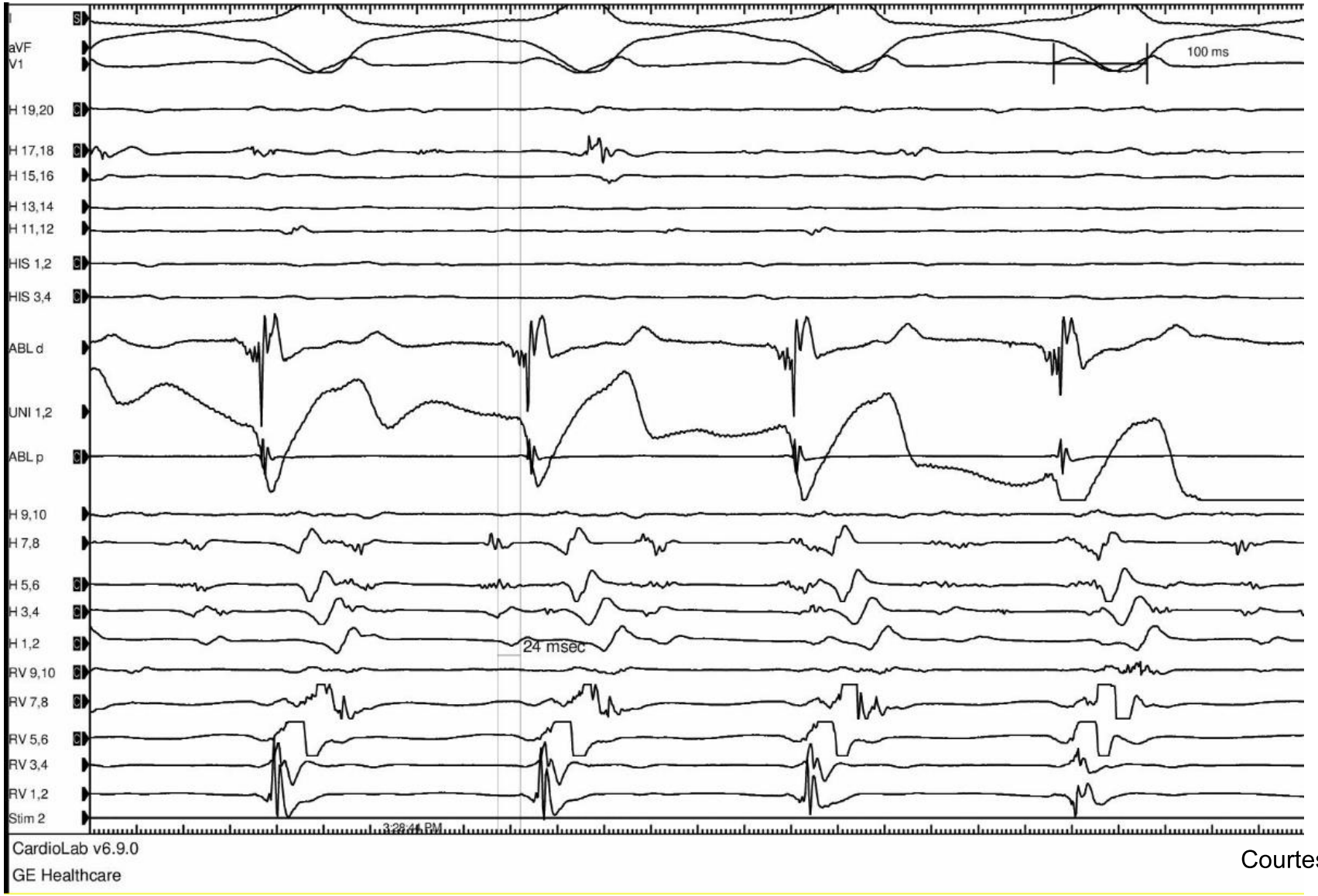
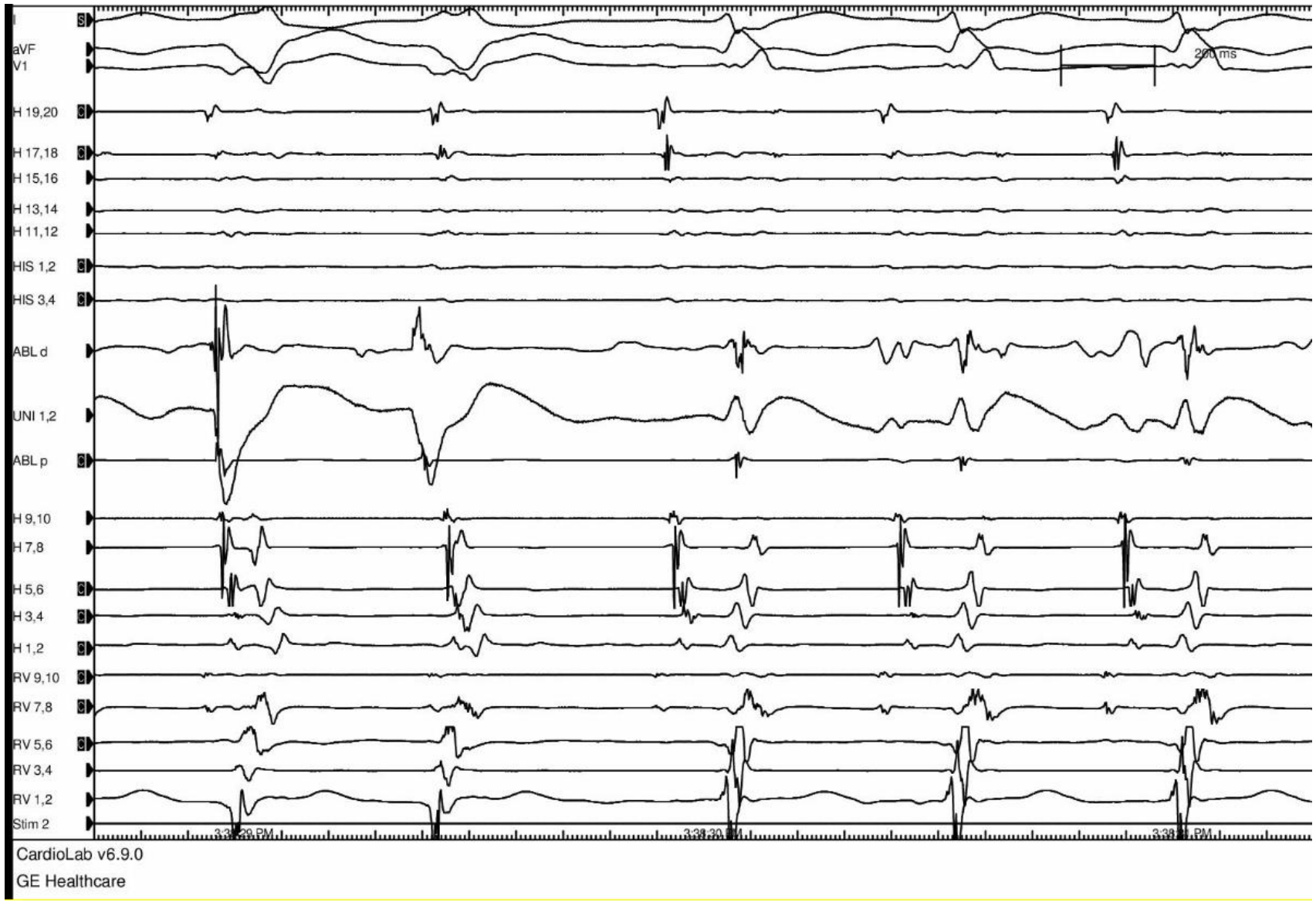
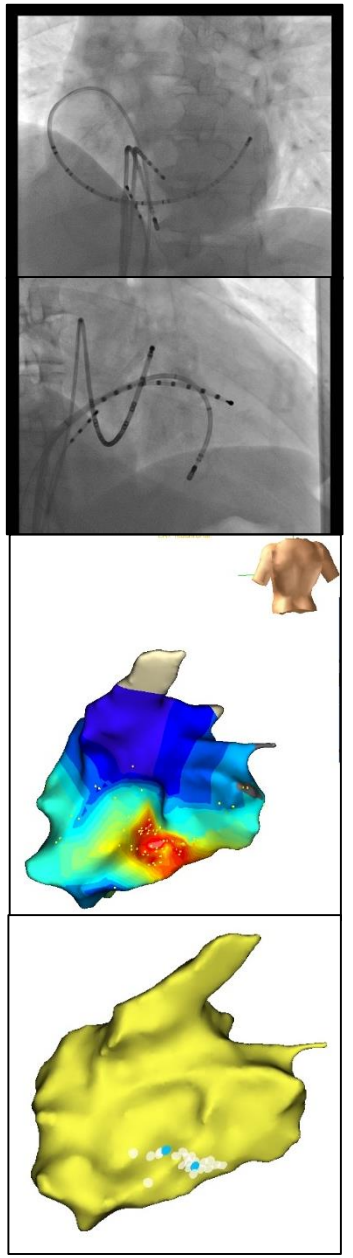
Mapping with 24ms earlier / fragmented Potential / Unipolar



Courtesy of Dr. Junbeom, Park,

RFA at RV basal, posterior, septal area, and VT termination



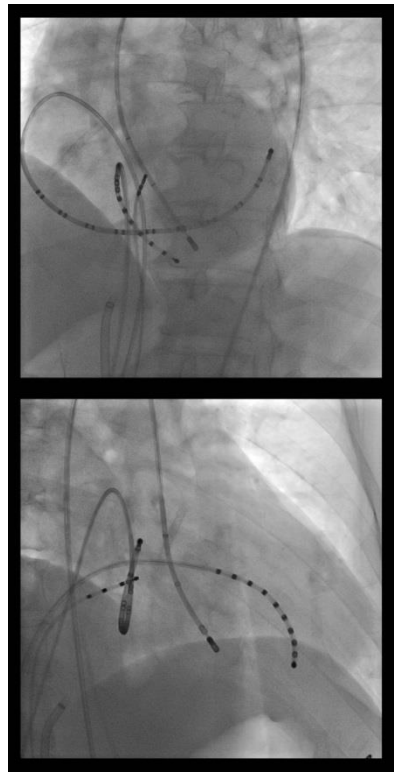


Courtesy of Dr. Junbeom, Park,

However, VT Re-induction by RV pacing with isoproterenol 5μg

Courtesy of Dr. Junbeom, Park,

LV mapping (47 ms earlier and fragmented potential)



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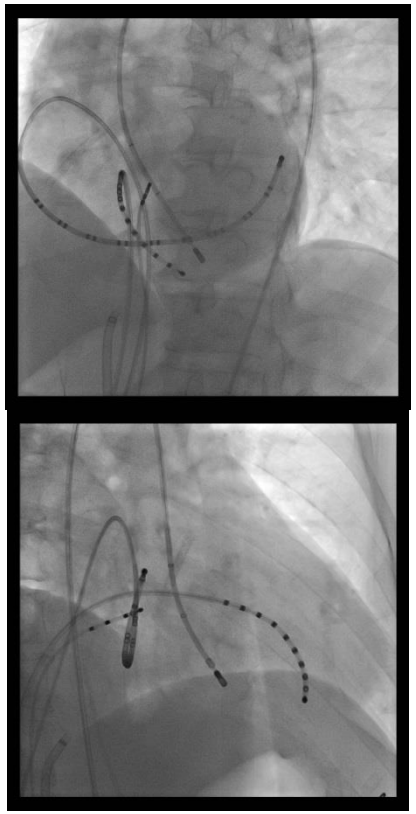
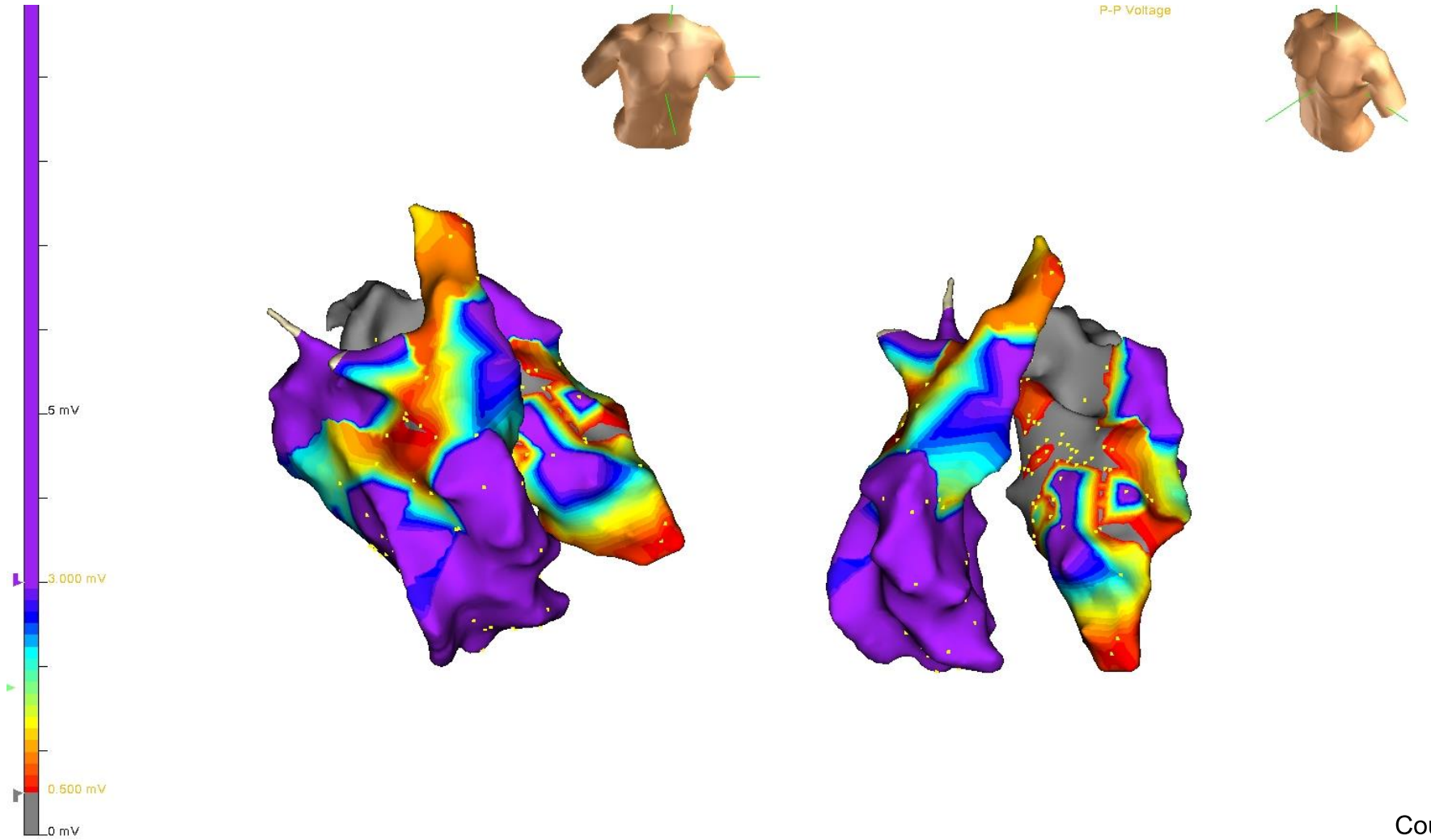
RFA on LV and VT termination → but, VT induction, again



Courtesy of Dr. Junbeom, Park,

LV Voltage mapping (low voltage area ≤ 0.5mV)



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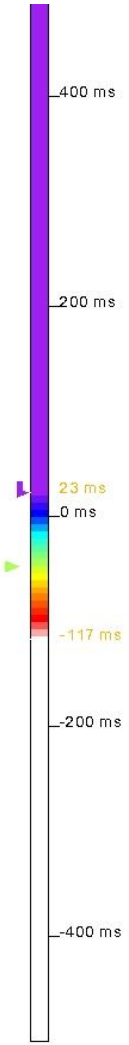
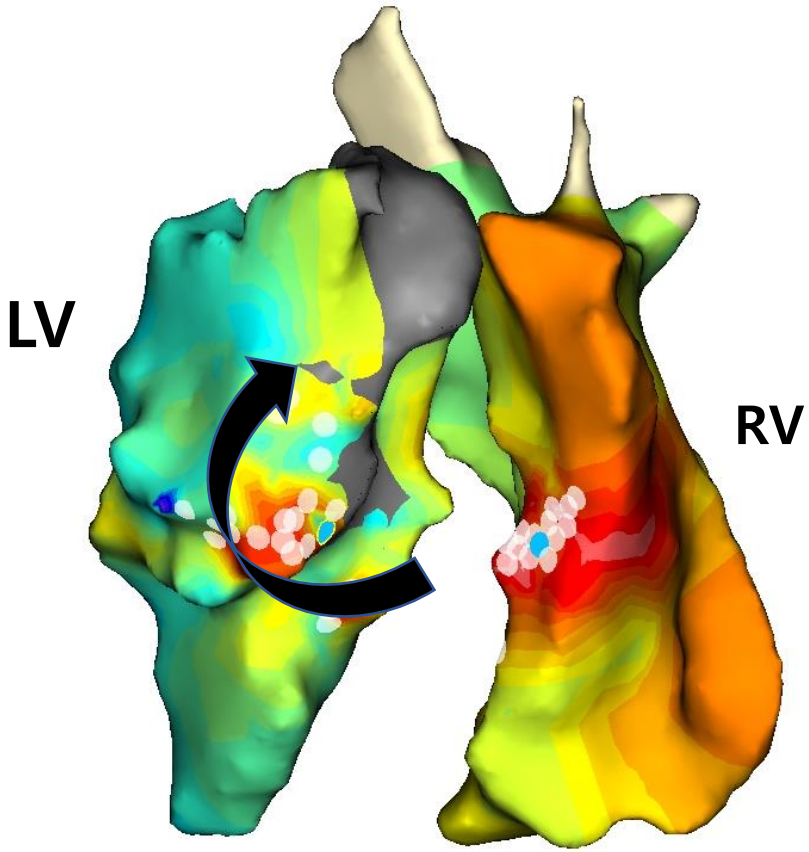
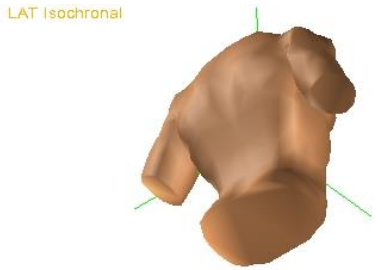
Additional RFA between low voltage area on the LV

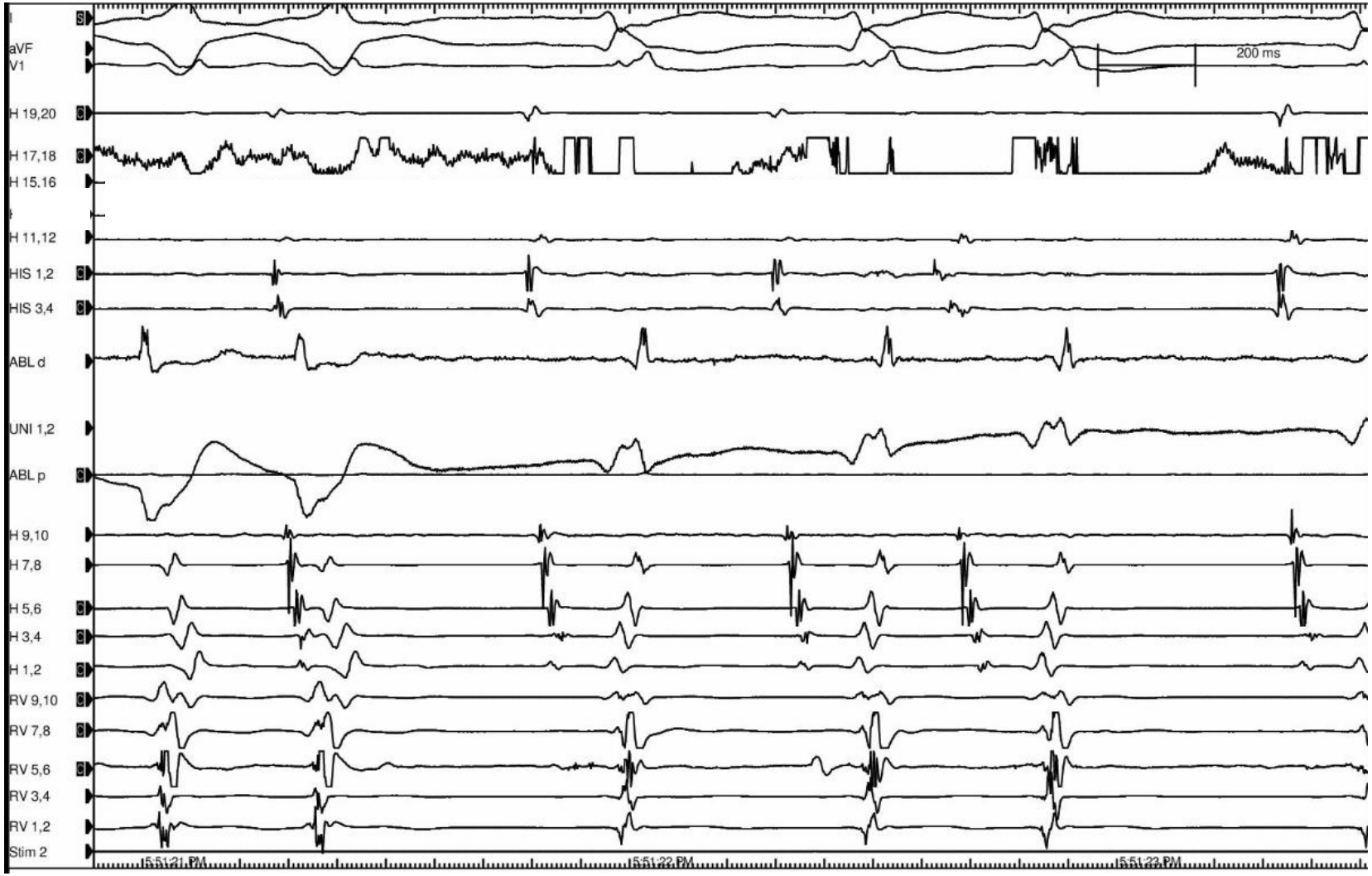


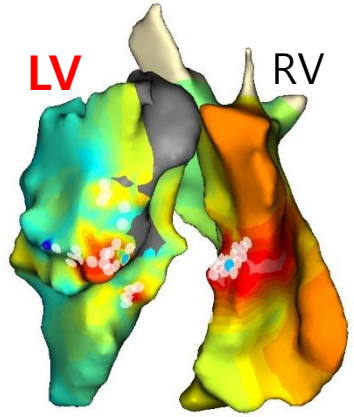


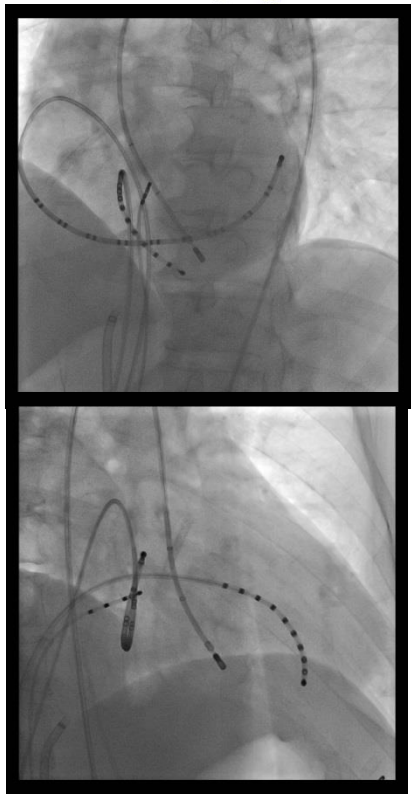


Courtesy of Dr. Junbeom, Park,

VT was terminated during RFA at the LV basal, posterior, and septal area







Courtesy of Dr. Junbeom, Park,

No induction by isoproterenol 5μg

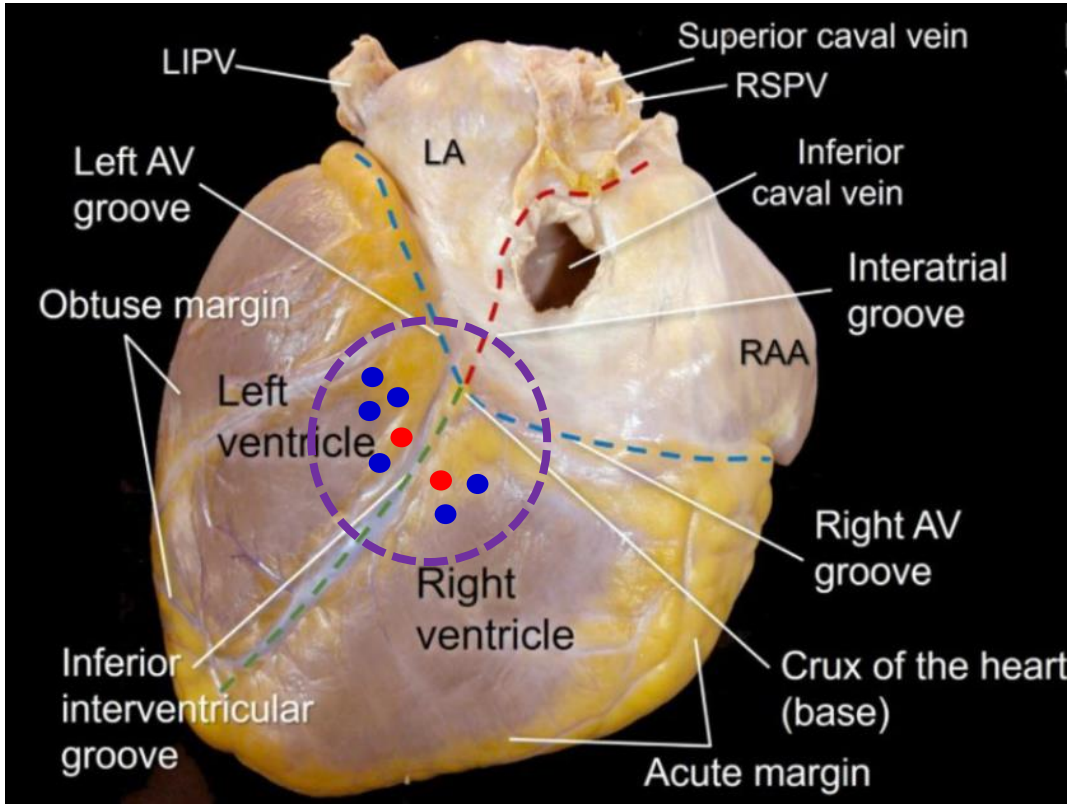
Courtesy of Dr. Junbeom, Park,

Today topic is Idiopathic (primary) Crux PVC/VT. However, the case is the Ischemic (secondary) Crux VT

In this case,
epicardial approach is not needed.

Why
1) MDI > 0.55 is not clear.
2) ischemic origin ; more endocardial than epicardial injury ?

3) My experience of epicardial approach is not enough…

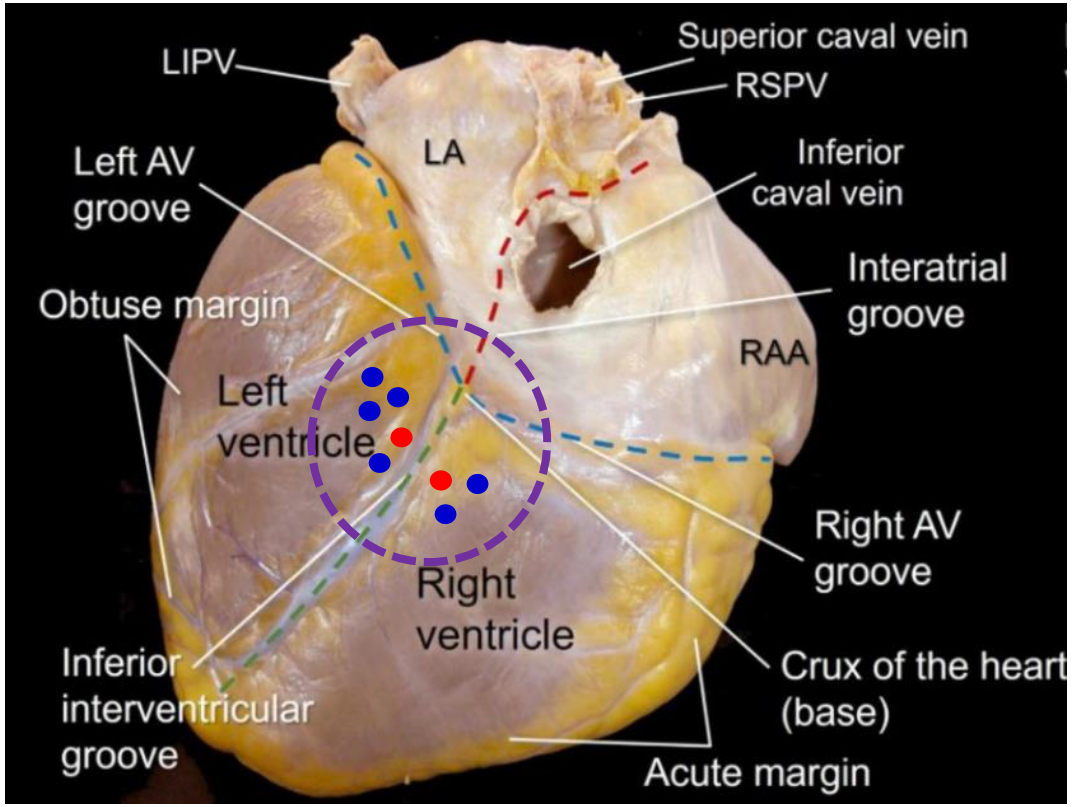


Courtesy of Dr. Junbeom, Park,

Today topic is Idiopathic (primary) Crux PVC/VT. However, this is the case of Ischemic (secondary) Crux VT → Clinical follow up

Holter at post RFA 1 month
→ Non-sustained VT (5 beats)

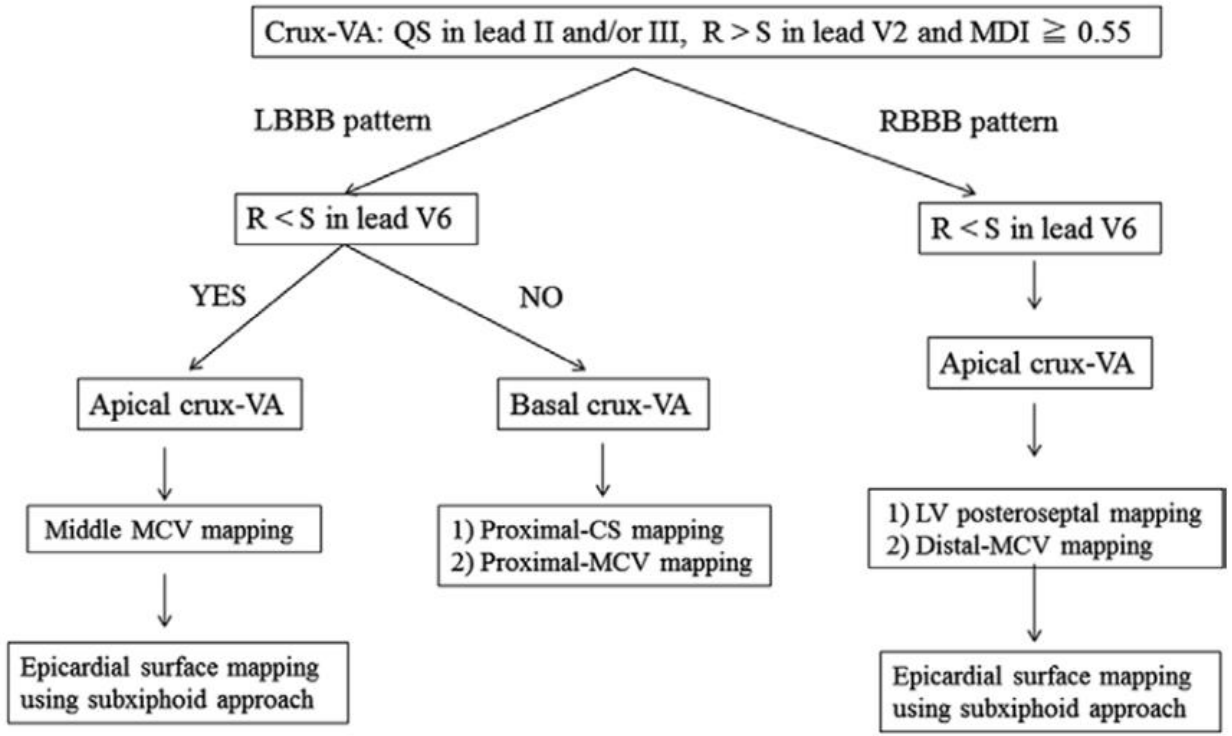
Next step or plan
→ AAD with Amiodarone ?
→ ICD ?
→ Or nothing and observation in OPD (o)



Courtesy of Dr. Junbeom, Park,

Summary

1. PVC/VT from Crux of the heart has the very rare incidence (1.17~1.4%), compared to common RVOT/LVOT PVC/VT.
2. Full understanding of the Crux anatomy is required.
   (e.g., CS, MCV with venogram, cardiac MRI, etc.)
3. Mapping and ablation can be done step by step with following algorithm.



Thank you
for yours attentions !

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