Present your most challenging case: Rising stars and more

A difficult case of VT in non-ischemic cardiomyopathy

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HUMANITAS
MATER DOMINI

October 16 - 18
14th EDITION 2015

NO CONFLICT OF INTEREST TO DECLARE

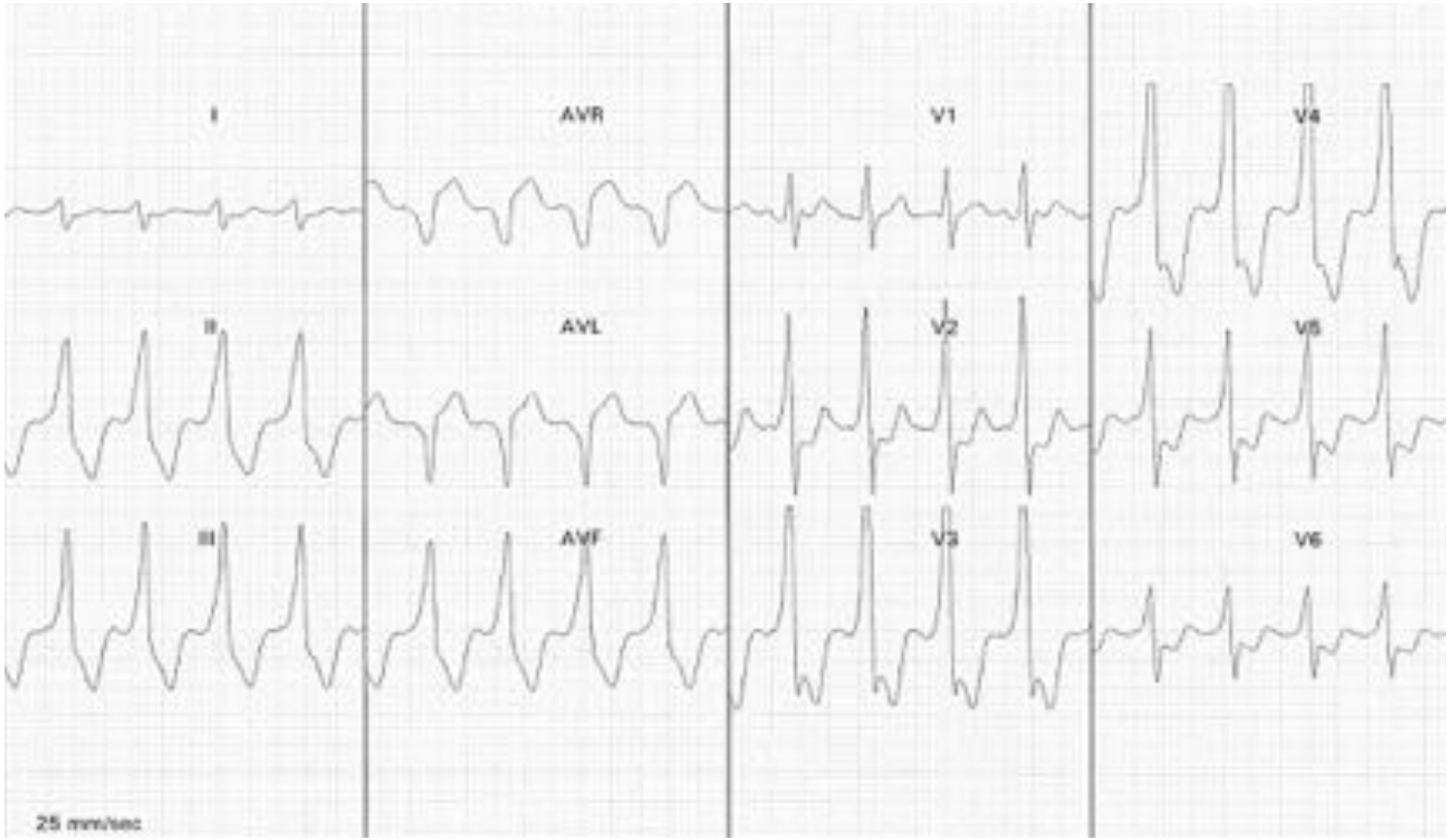
Case study

- Mr GL, 62 yrs old
- Familiar history: negative
- Cardiovascular history:
  - High blood pressure
  - 3/2008: HF symptoms; non-ischemic DCM diagnosed; ECG: LBBB; 2D-Echo: LV EF: 25%, moderate MR; appropriate tx started (β-blockers, ACE-I, diuretic)
  - 7/2008: persistence of severe LV dysfunction, biventricular ICD implant

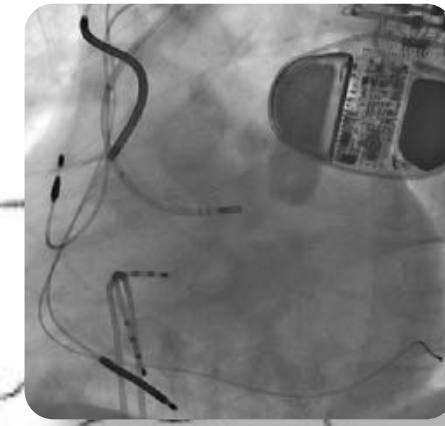
Case study

- Cardiovascular history (cont):
  - 2012: syncope with ICD intervention (shock) for rapid VT
  - 2013: AV junction ablation for recurrent paroxysmal AFib episodes with fast ventricular rate; multiple (#7) appropriate ICD shocks (VT CL: 300-360 ms)
  - 1/2014: worsened LV function (LV EF: 15-20%) and severe MR at 2D-Echo; percutaneous mitral valvuloplasty with mitral clip implant
  - 9/2014: acute HF symptoms; ECG: incessant VT (amiodarone 200 o.d.)

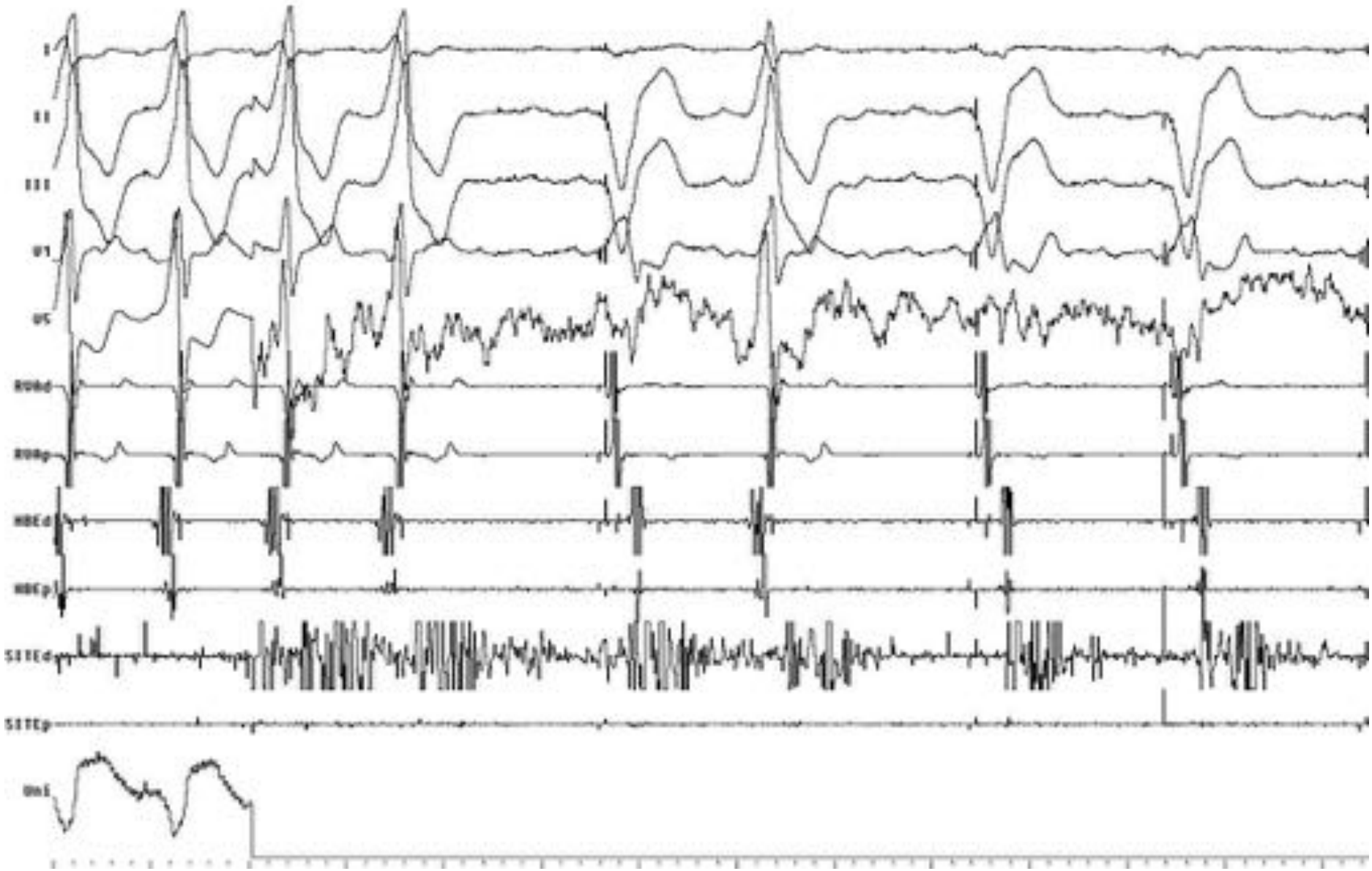
12-lead ECG (incessant VT @110 bpm)



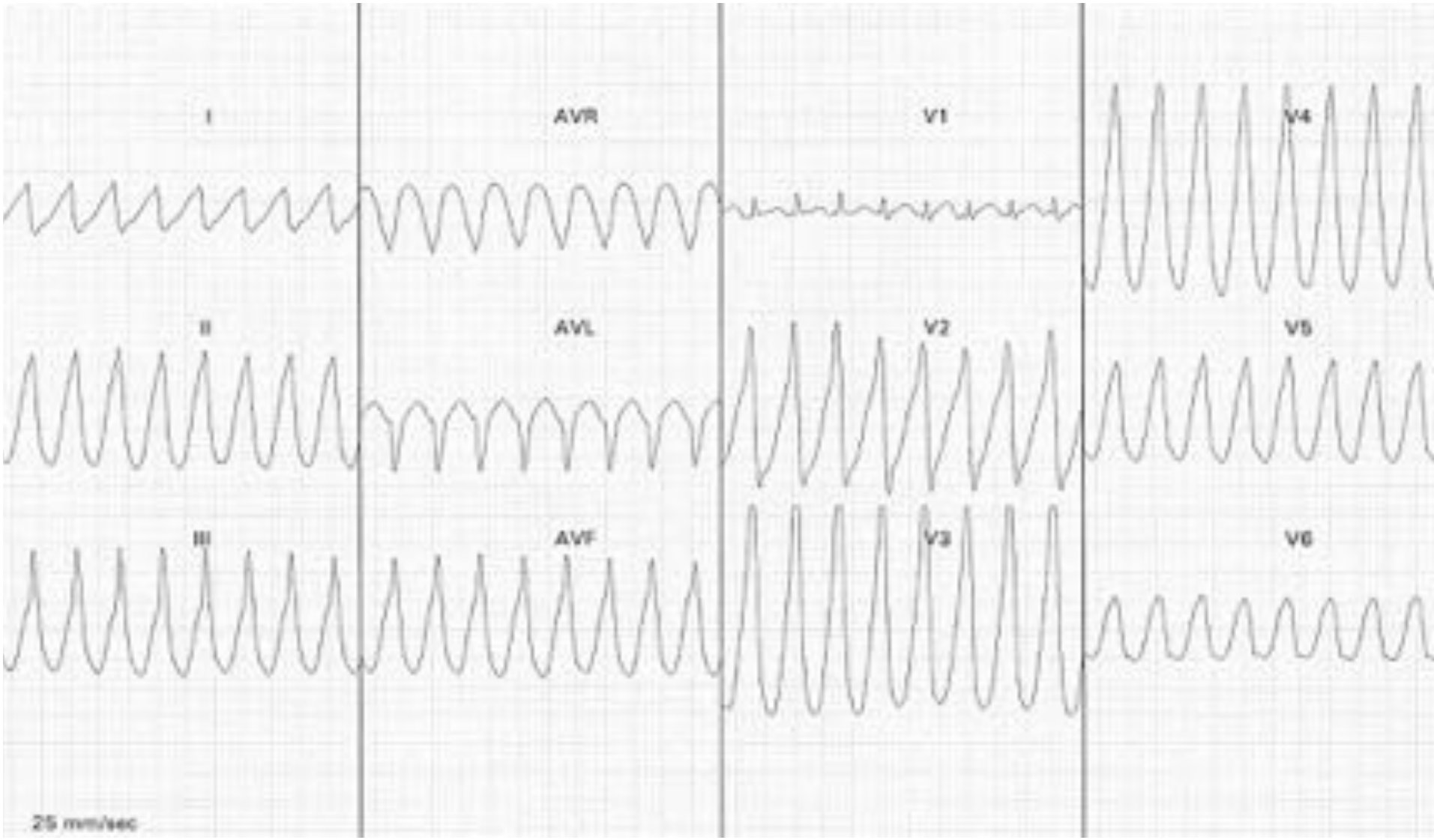
Activation mapping (left AOC)



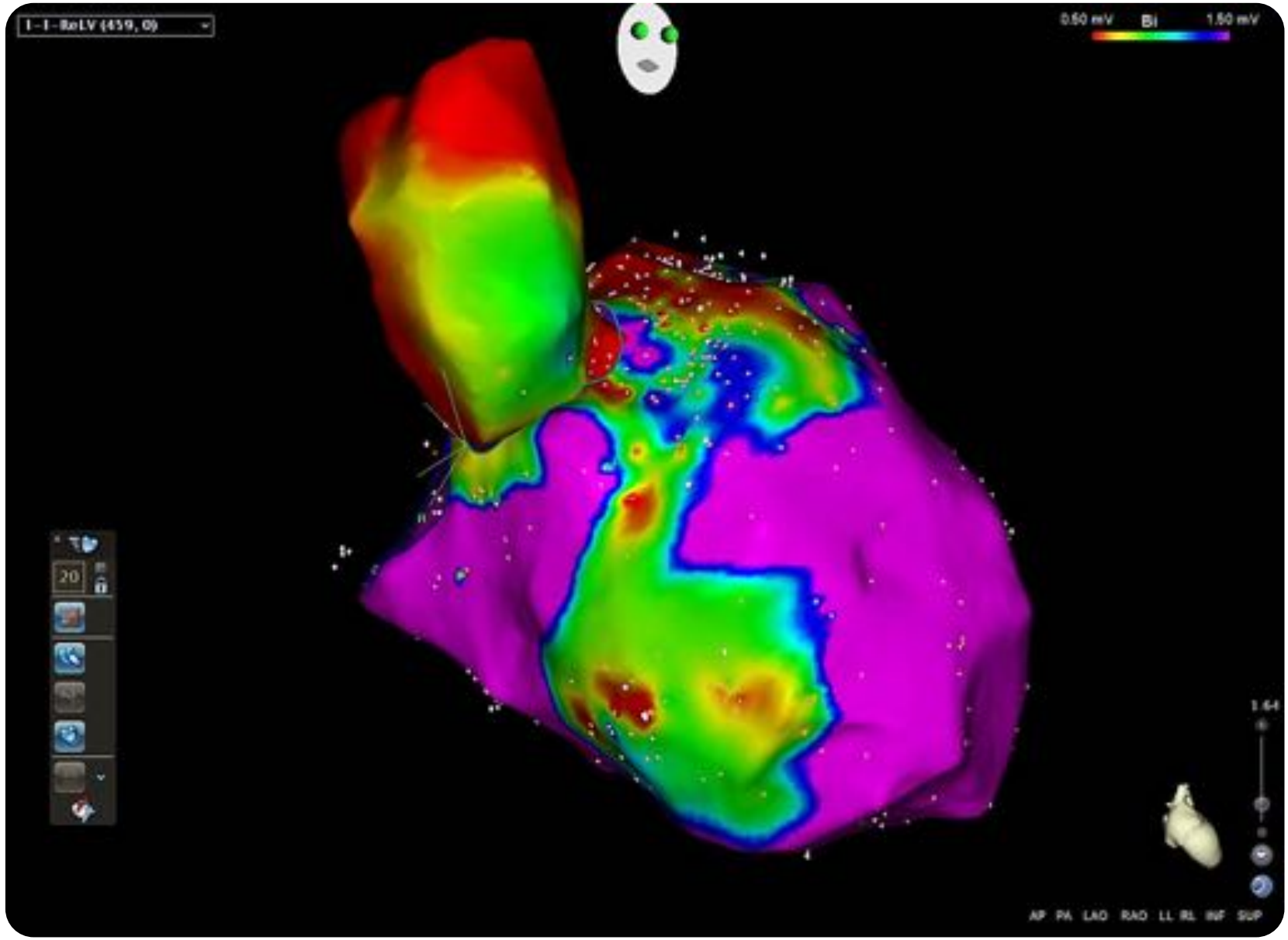
Irrigated-tip RF ablation



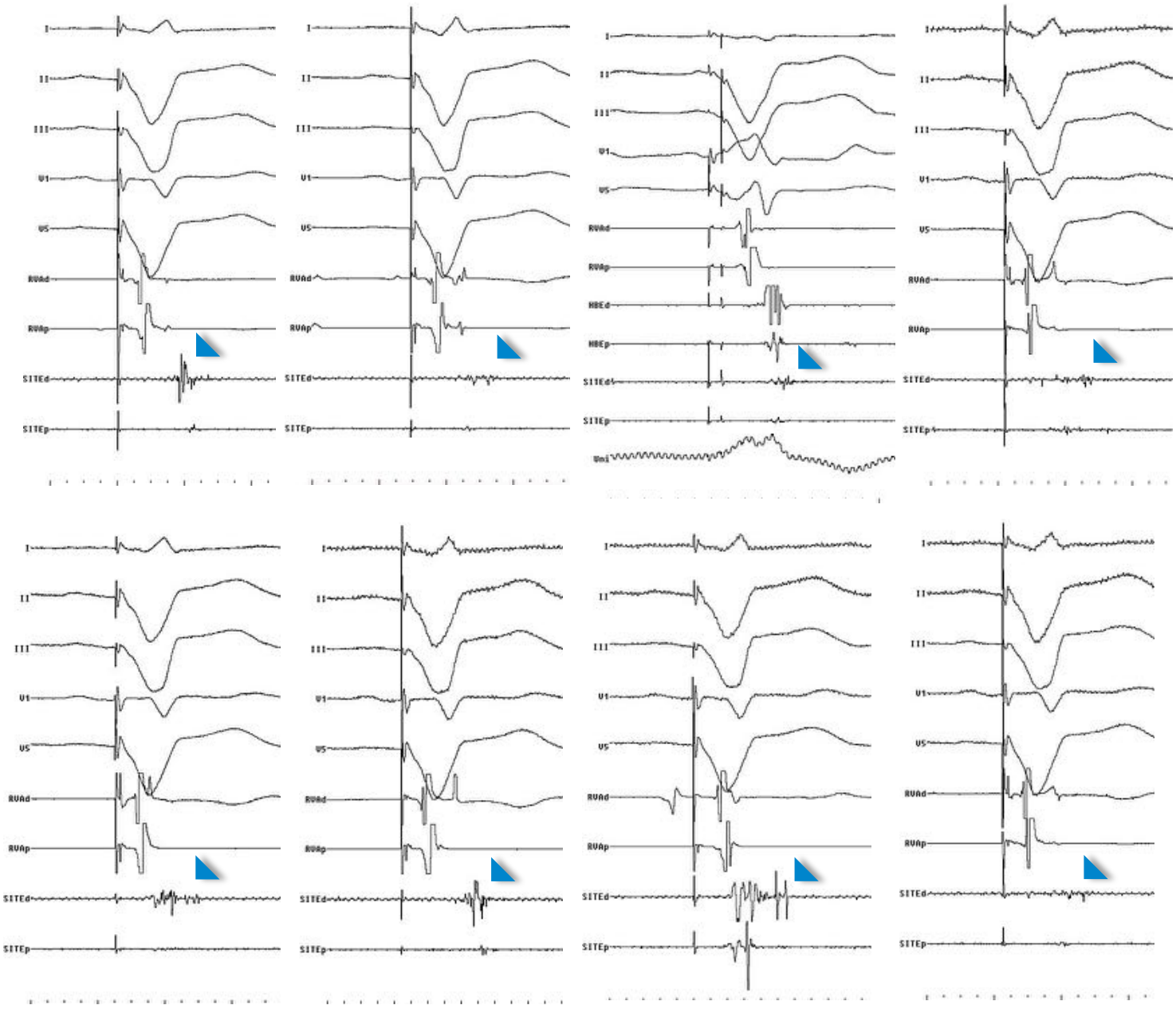
VT #2 induced by PVS (CL: 295 ms; not tolerated)

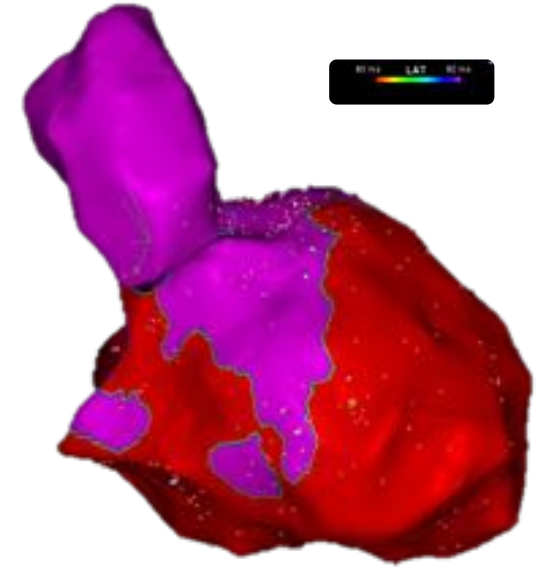


Substrate mapping (bipolar voltage)

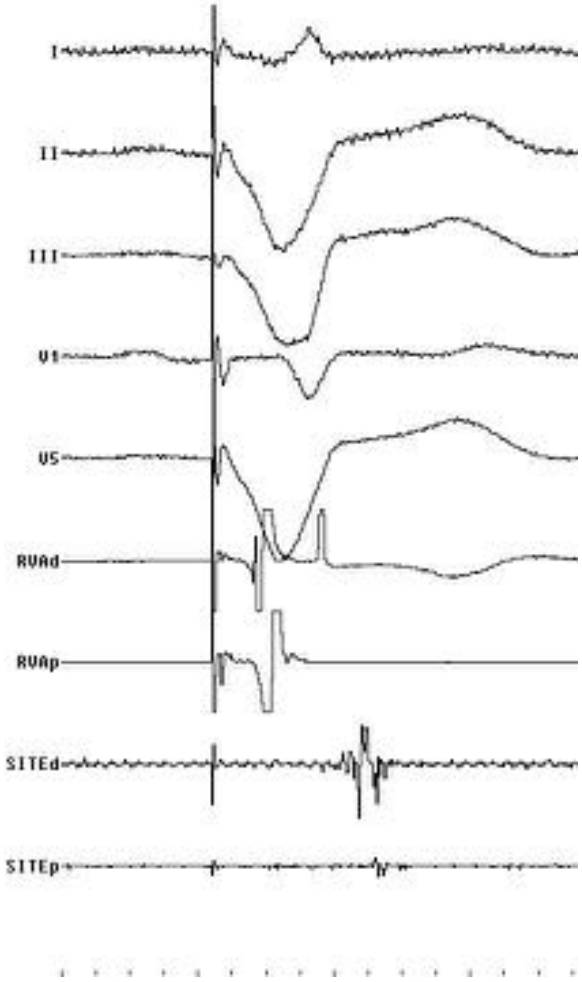


Substrate mapping (late potentials)

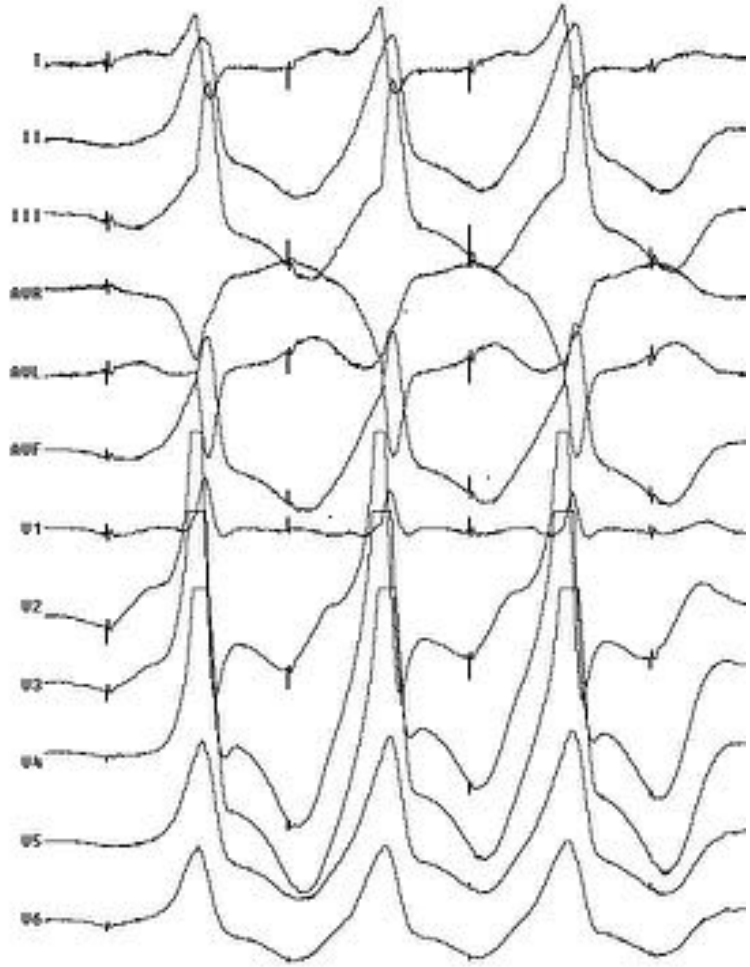




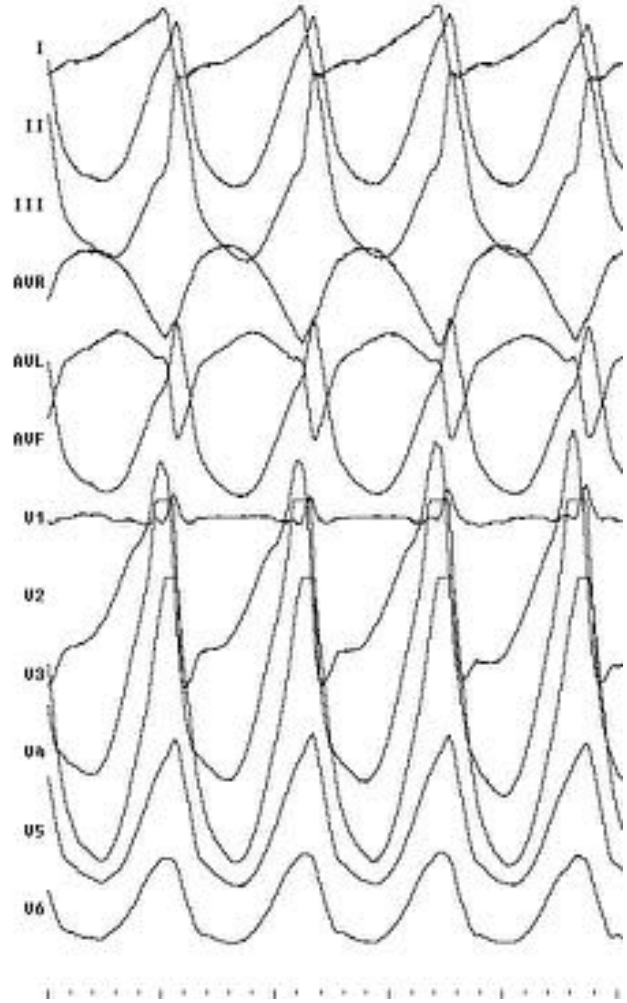
LPs (LV OT)



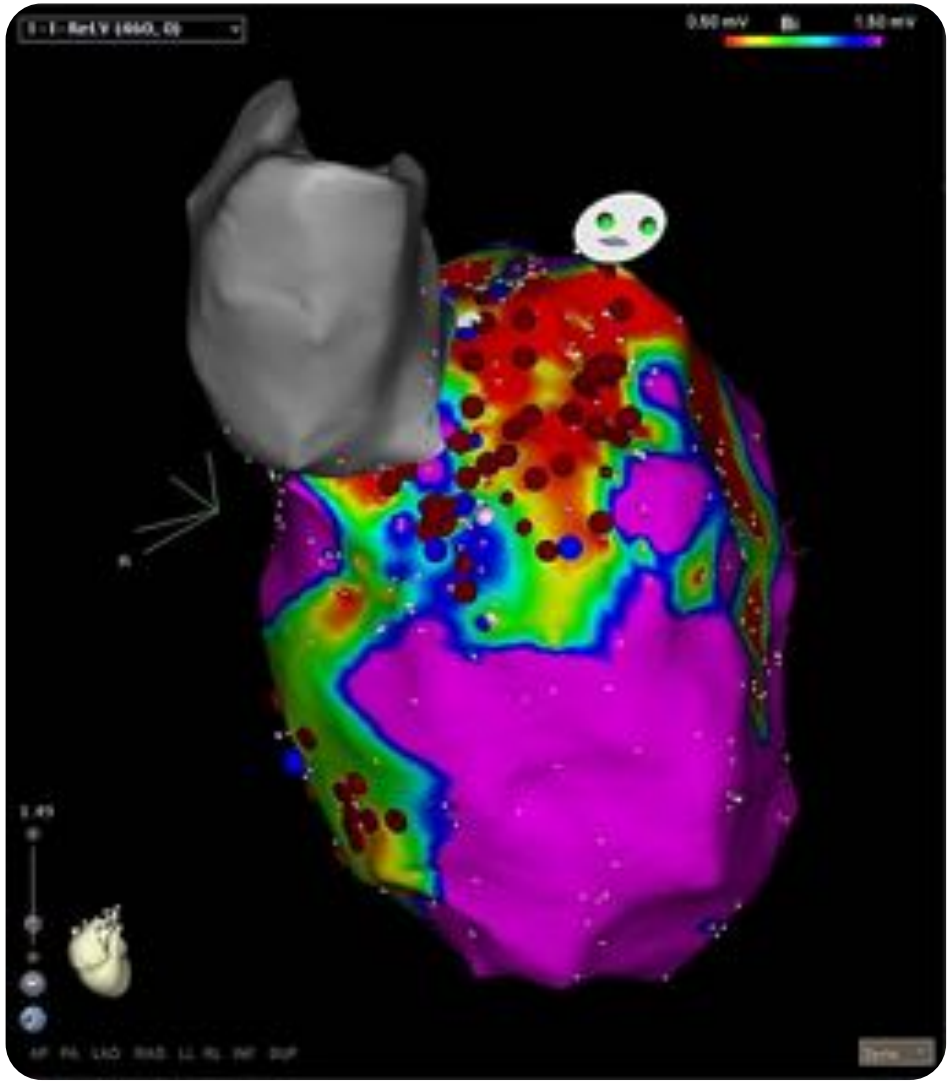
Pace-map (LV OT)

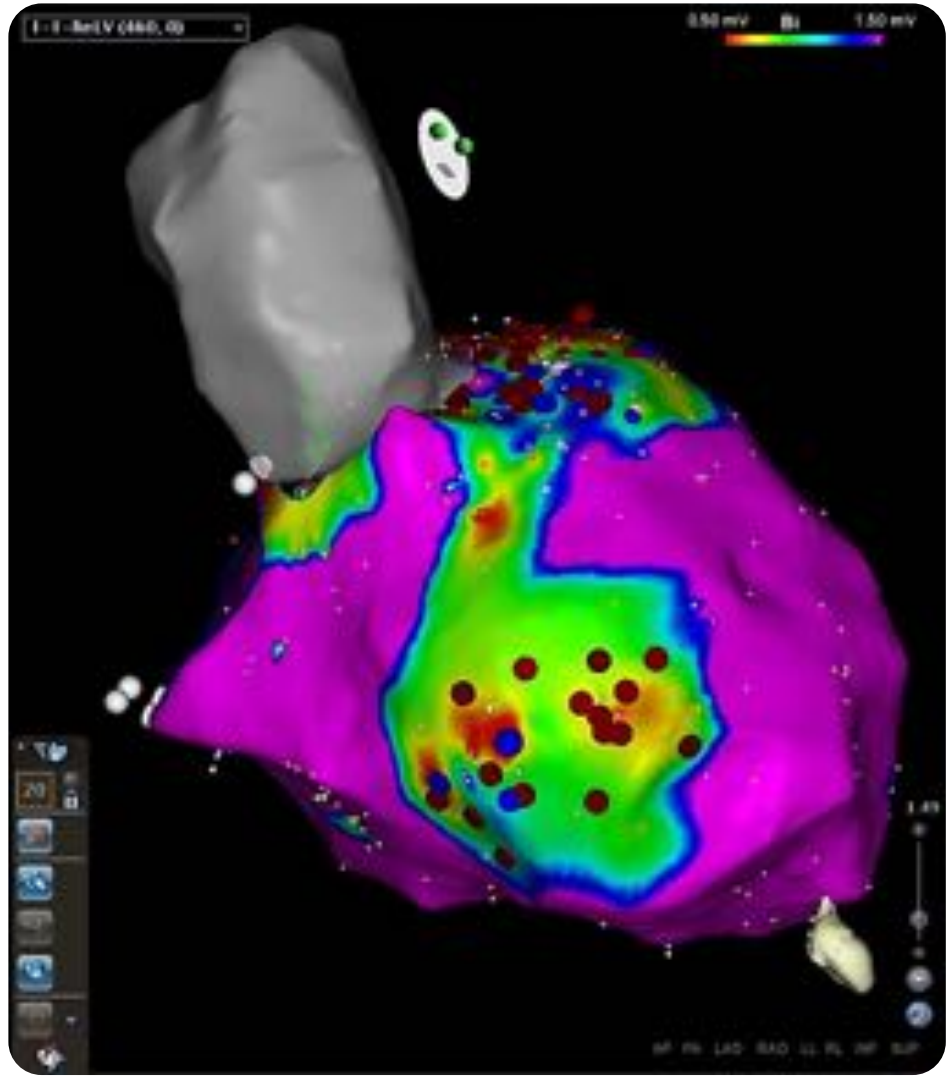


VT #2

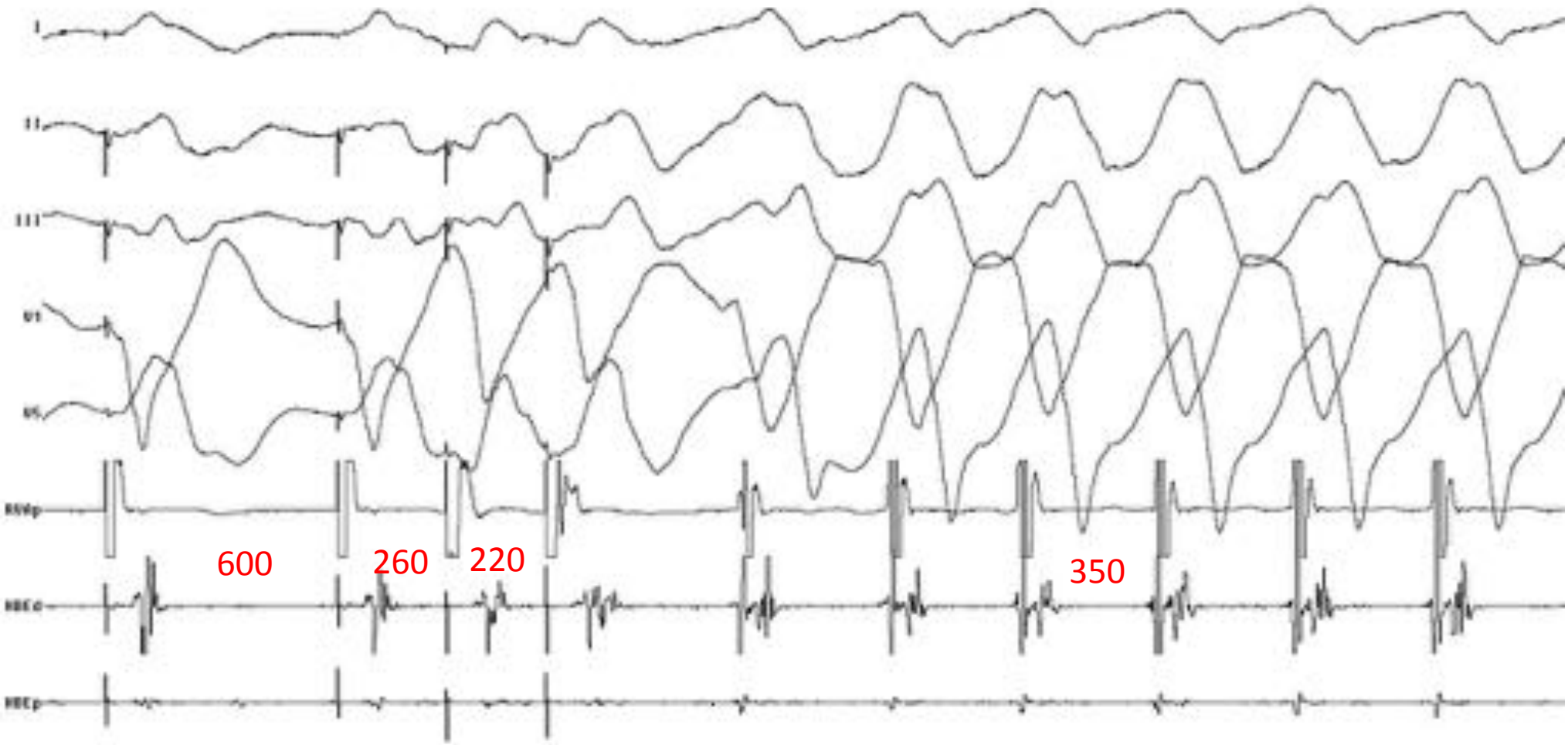


Irrigated-tip RF ablation

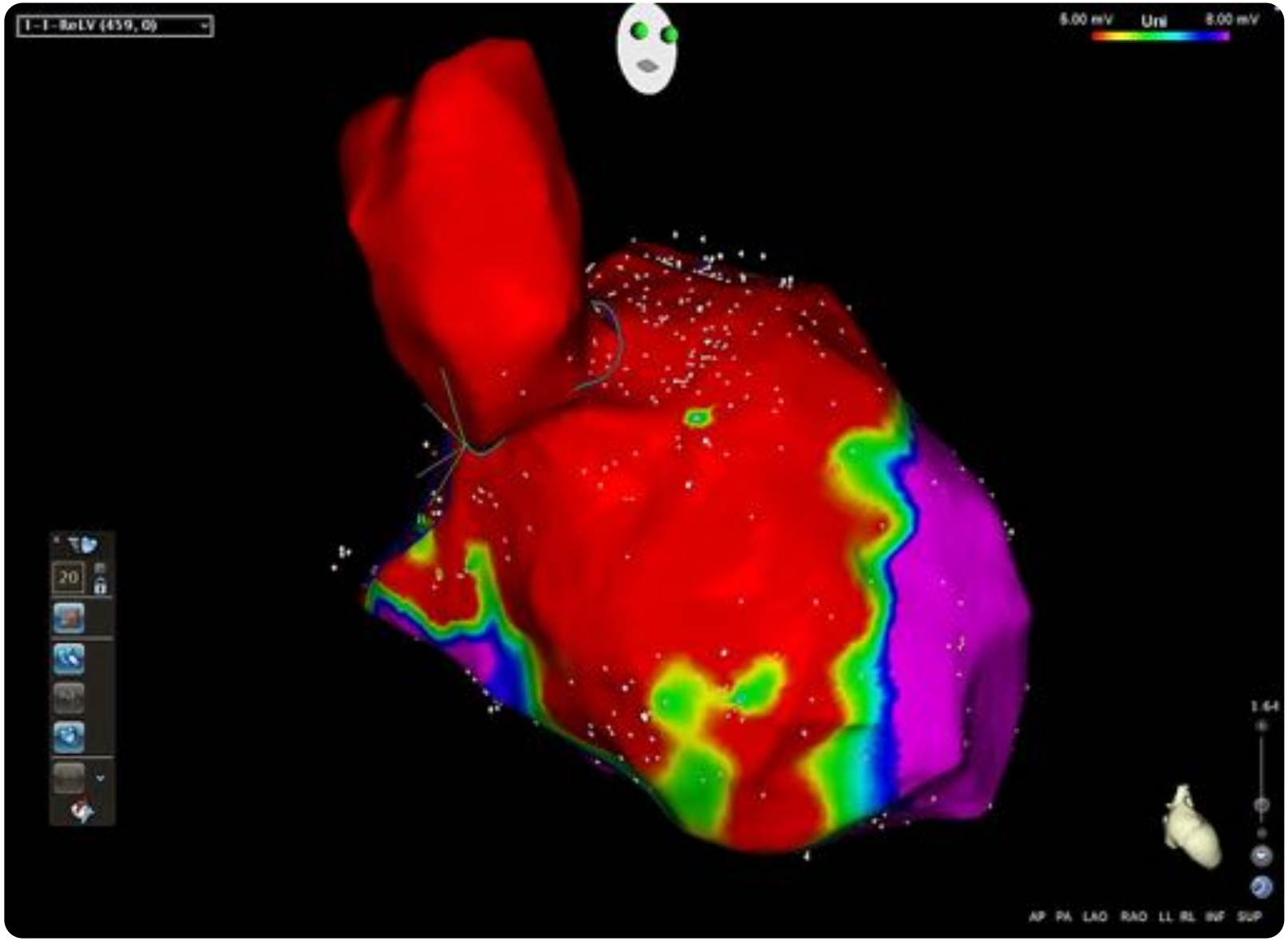




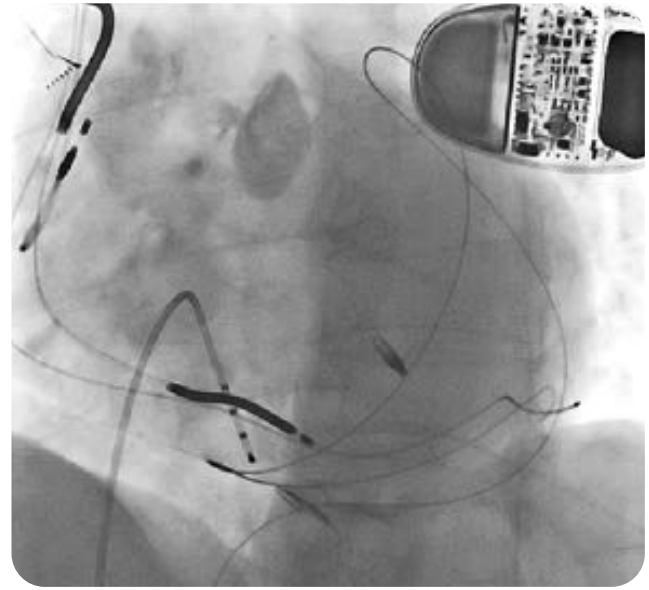
PVS after RF ablation

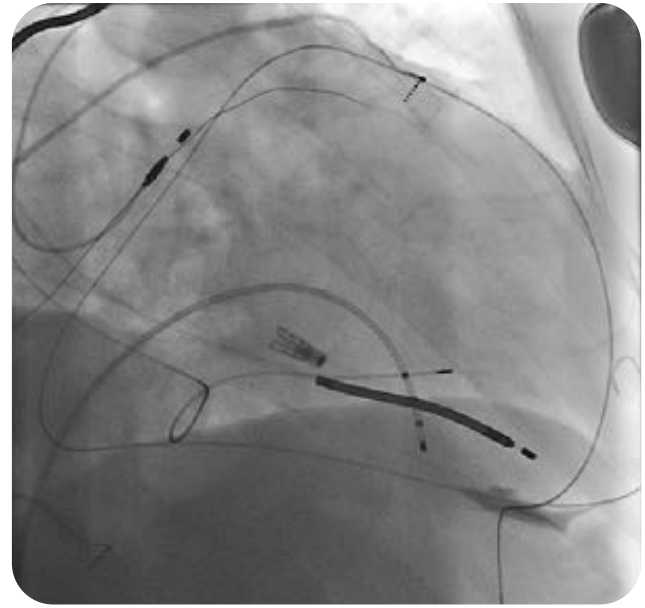


Substrate mapping (unipolar voltage)

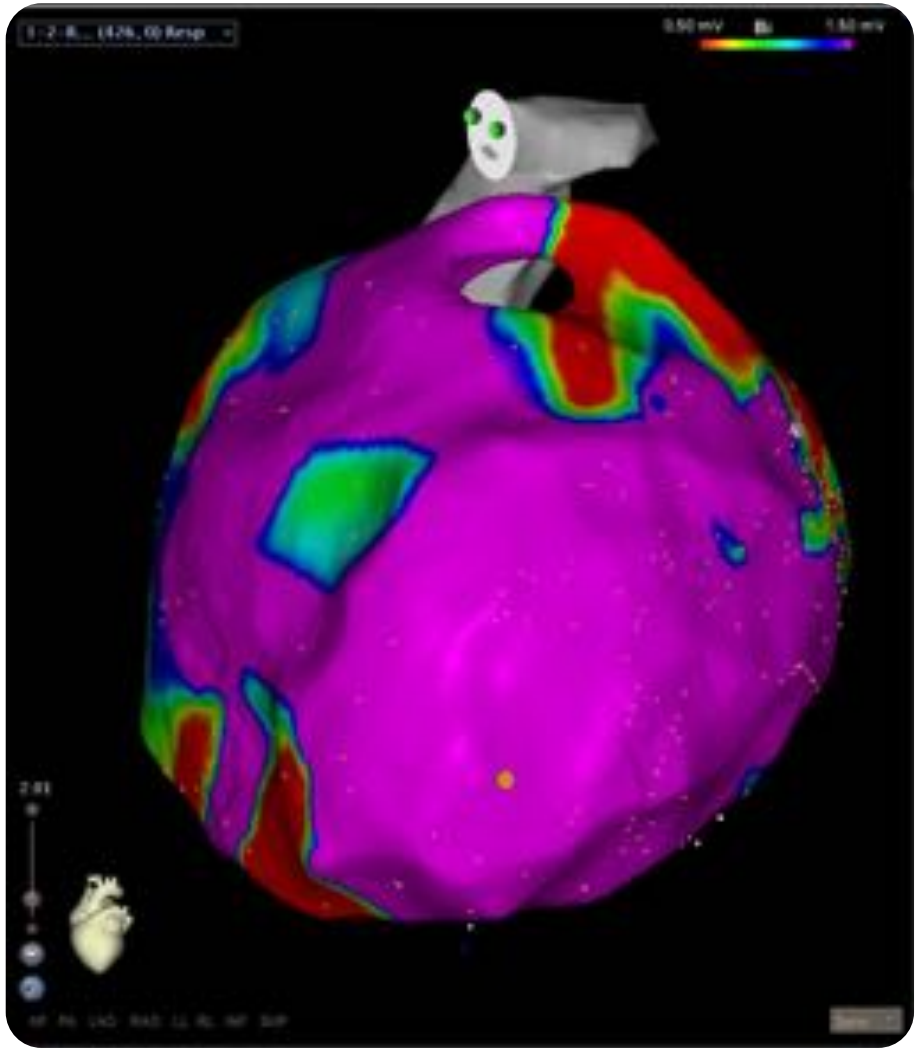


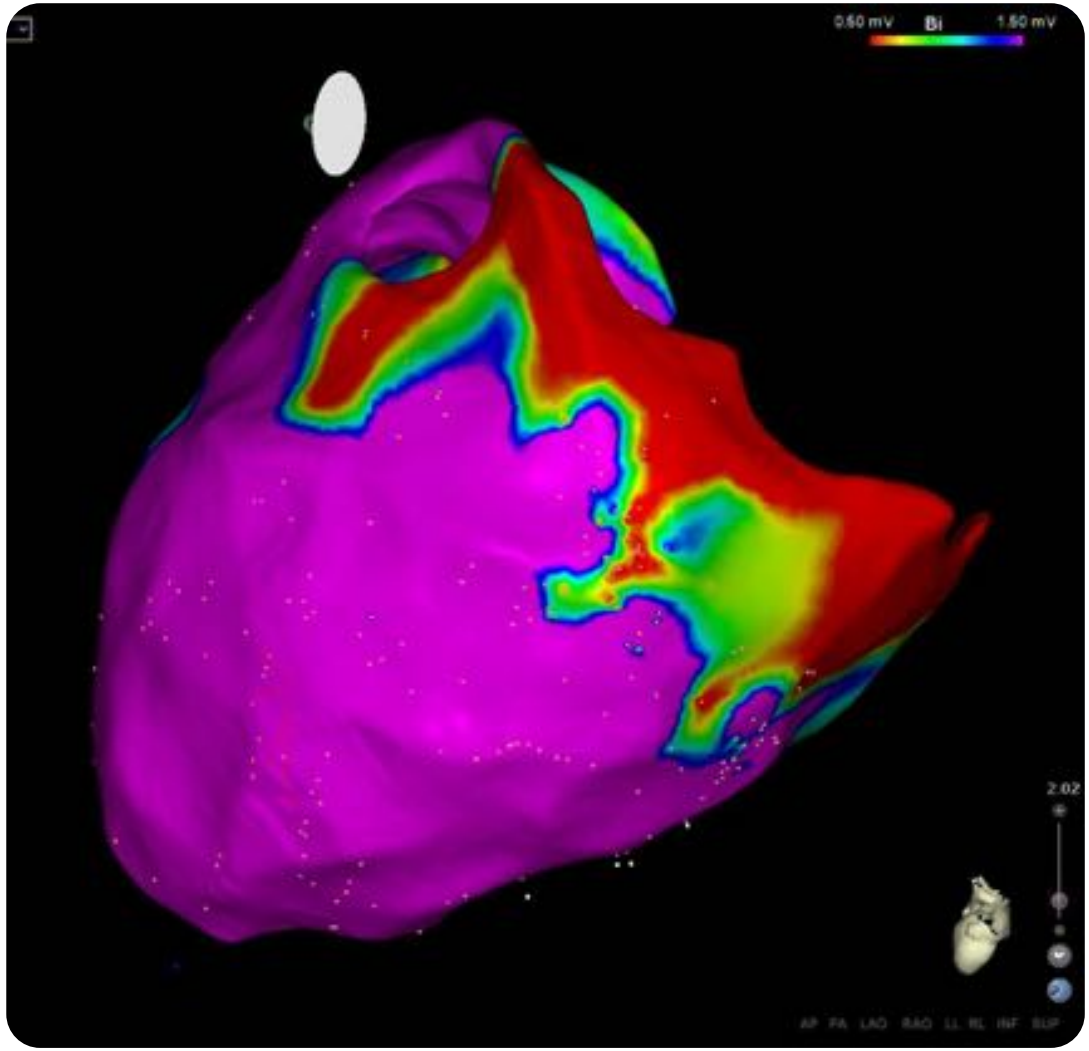
Pericardial access (subxyphoid)



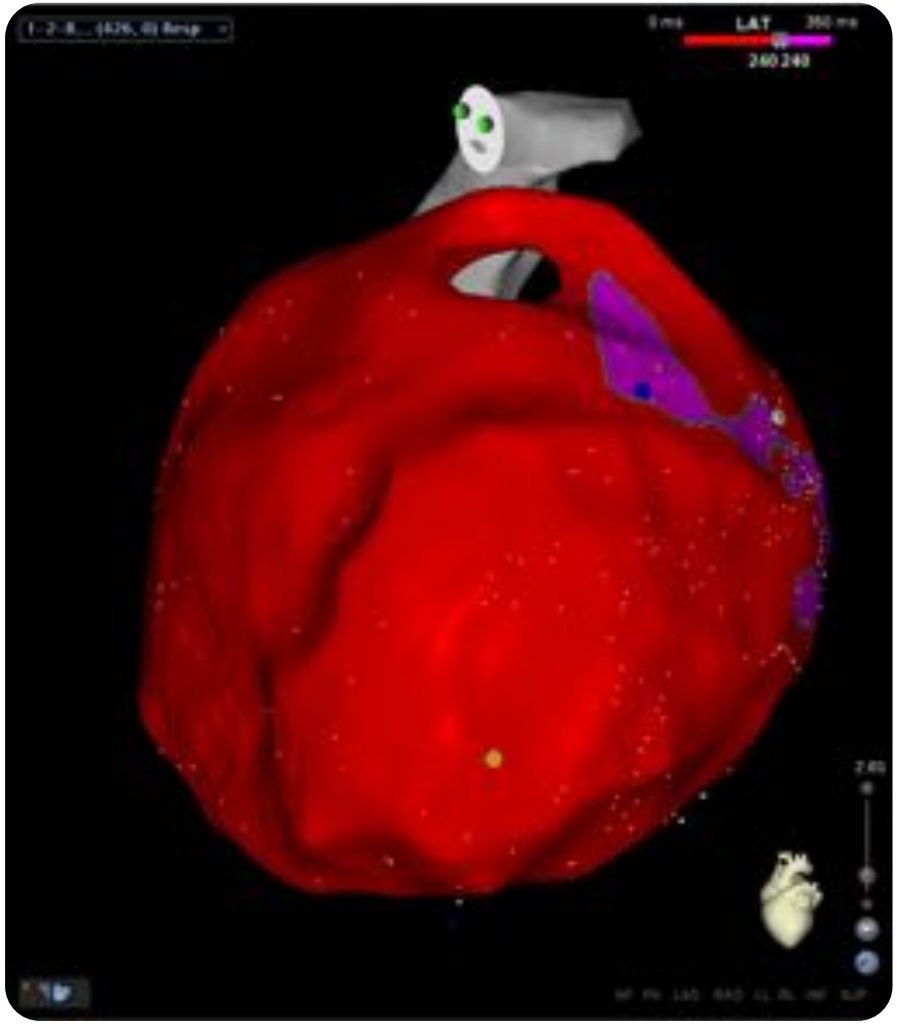


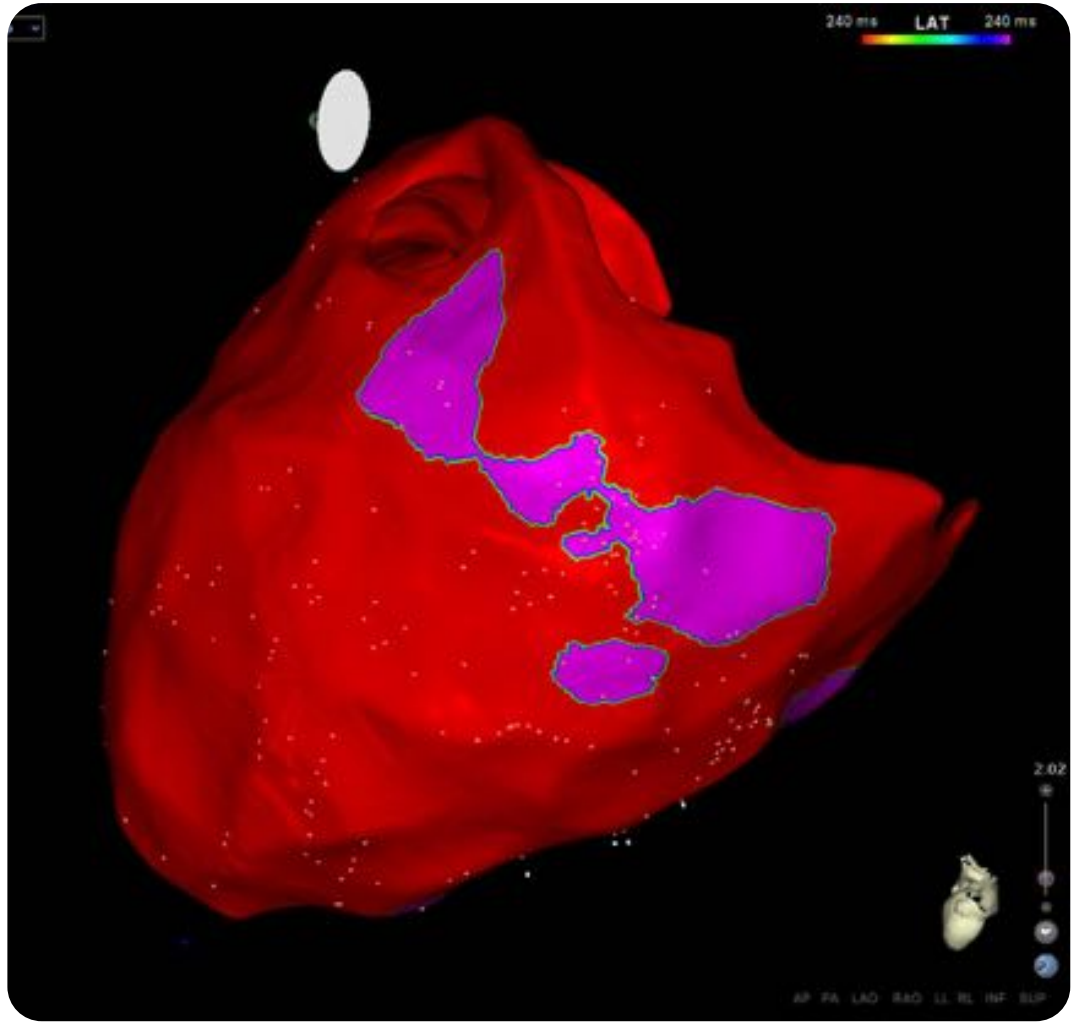
Epicardial substrate mapping (bipolar voltage)





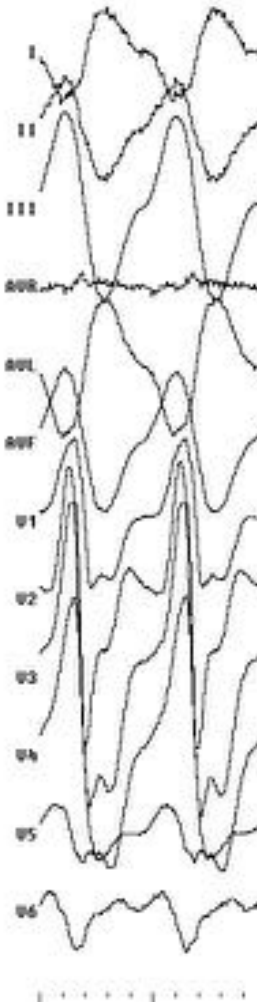
Substrate mapping (late potentials)



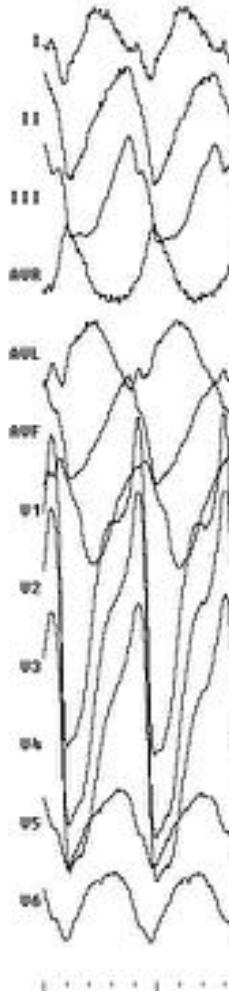


VT morphologies

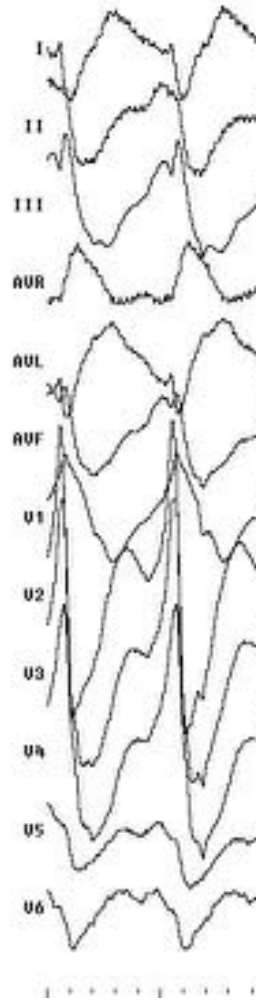
#1, CL 500 ms



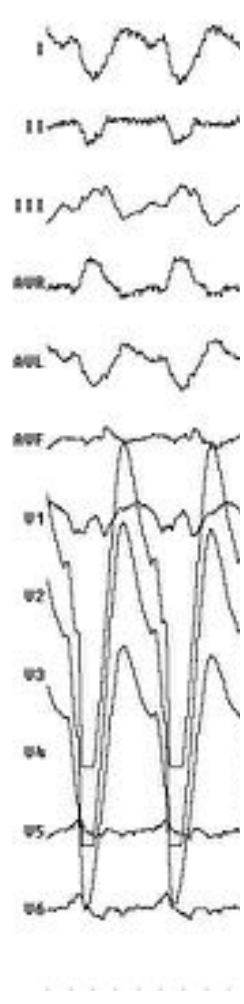
#2, CL 385 ms



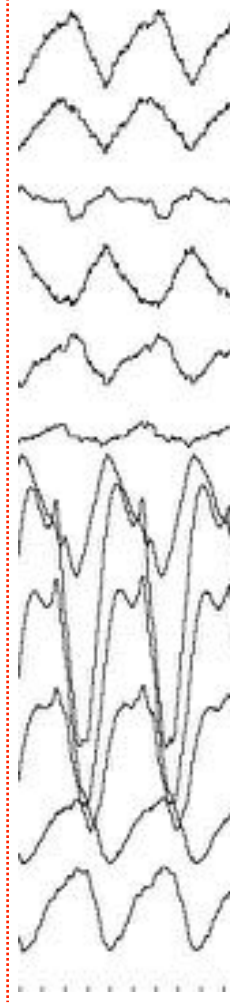
#3, CL 470 ms



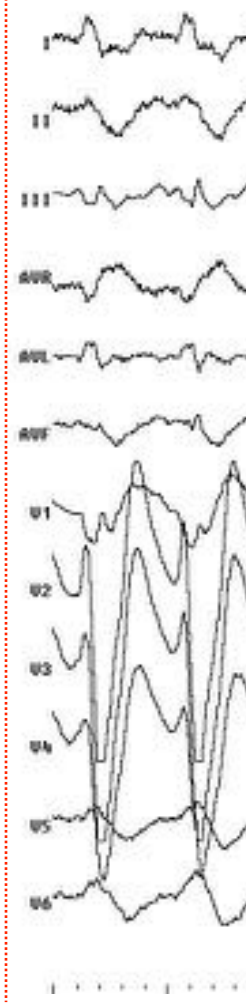
#4, CL 390 ms



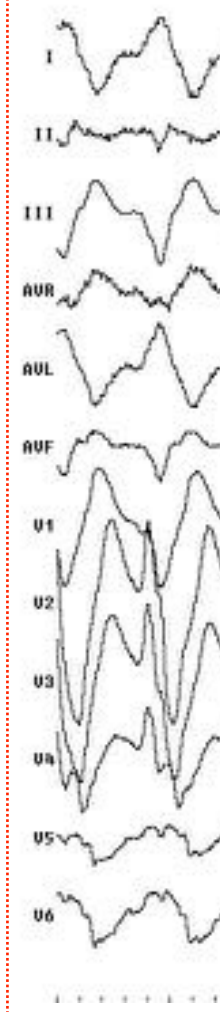
#5, CL 385 ms



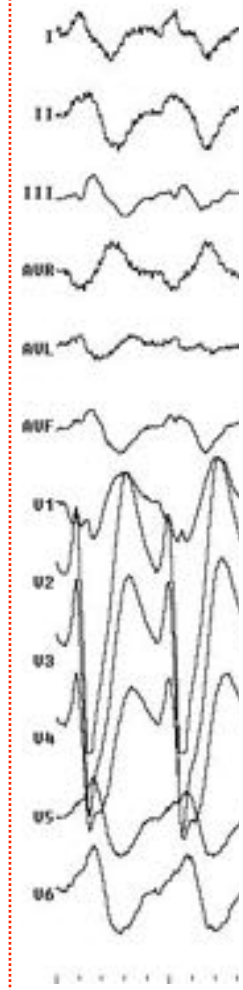
#6, CL 420 ms



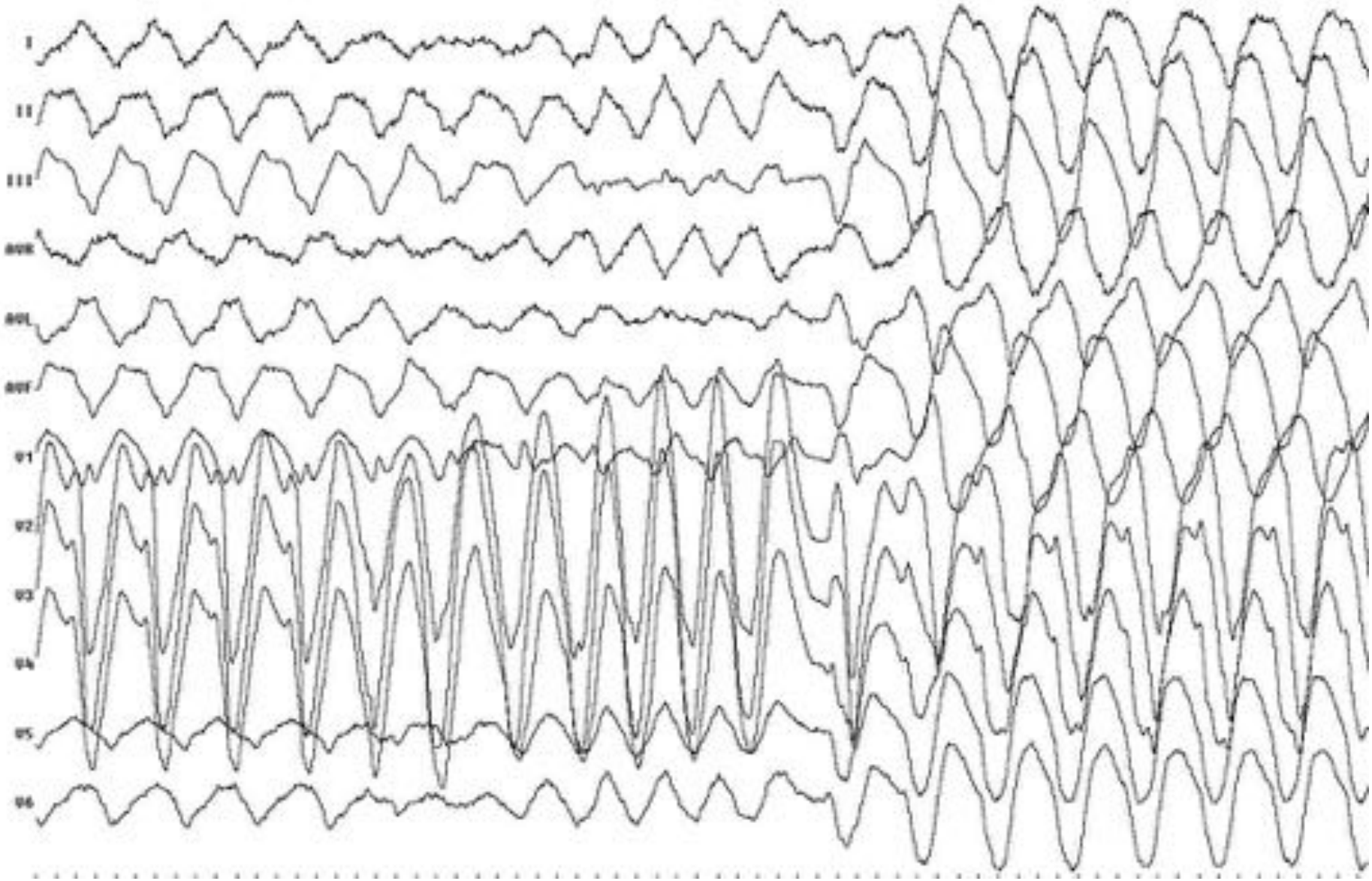
#7, CL 365 ms



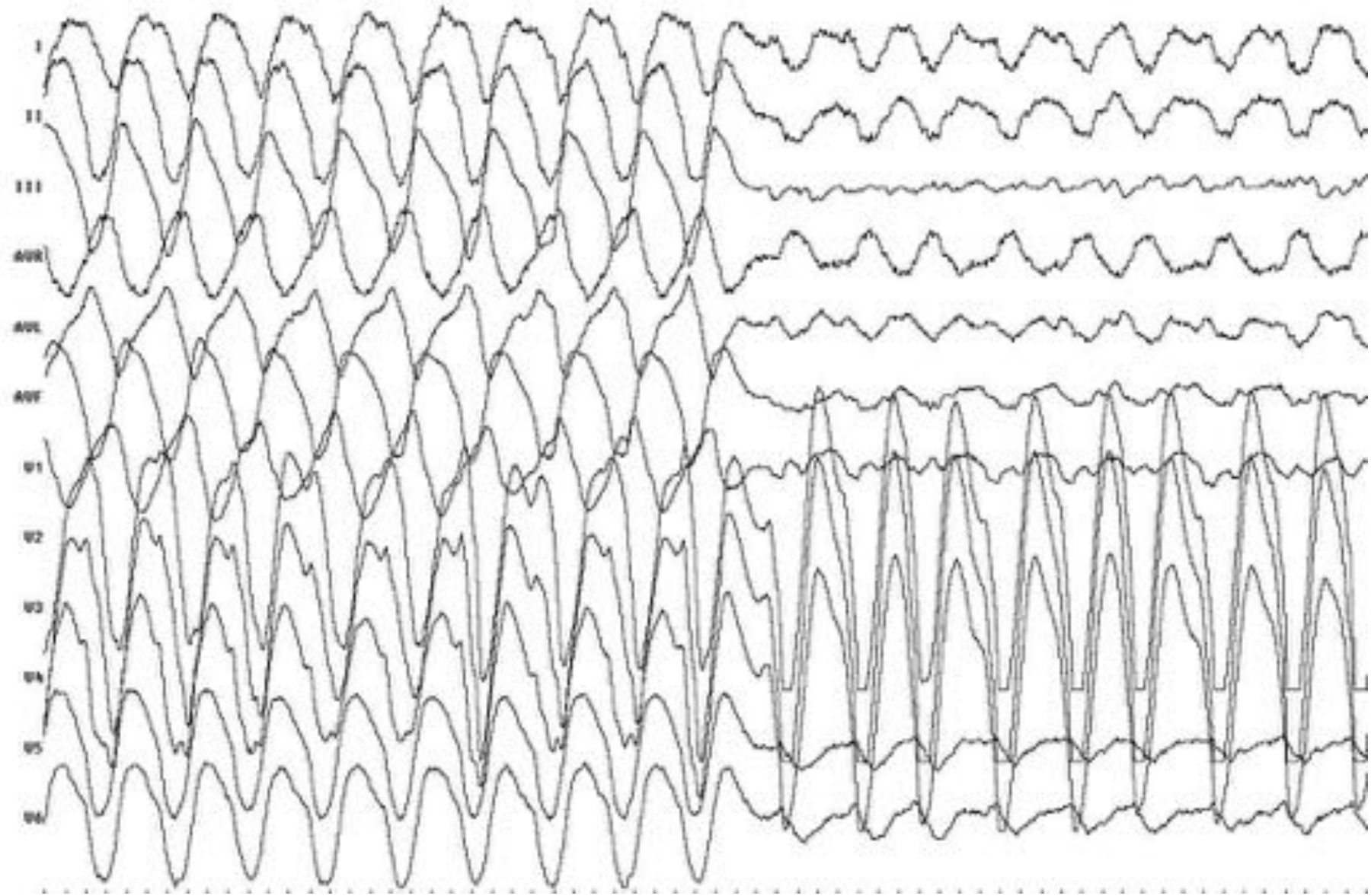
#8, CL 395 ms



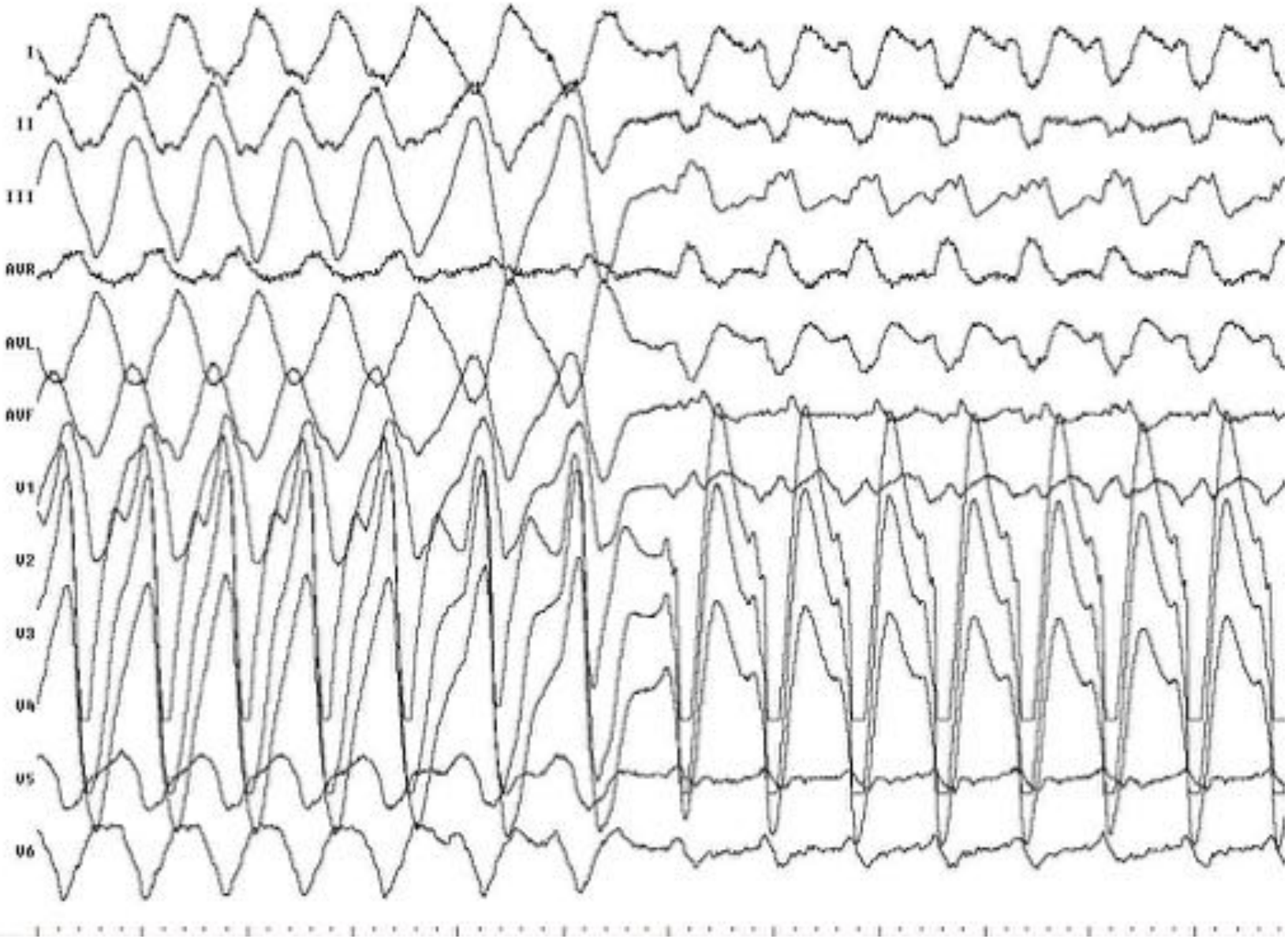
Pleiomorphic VT



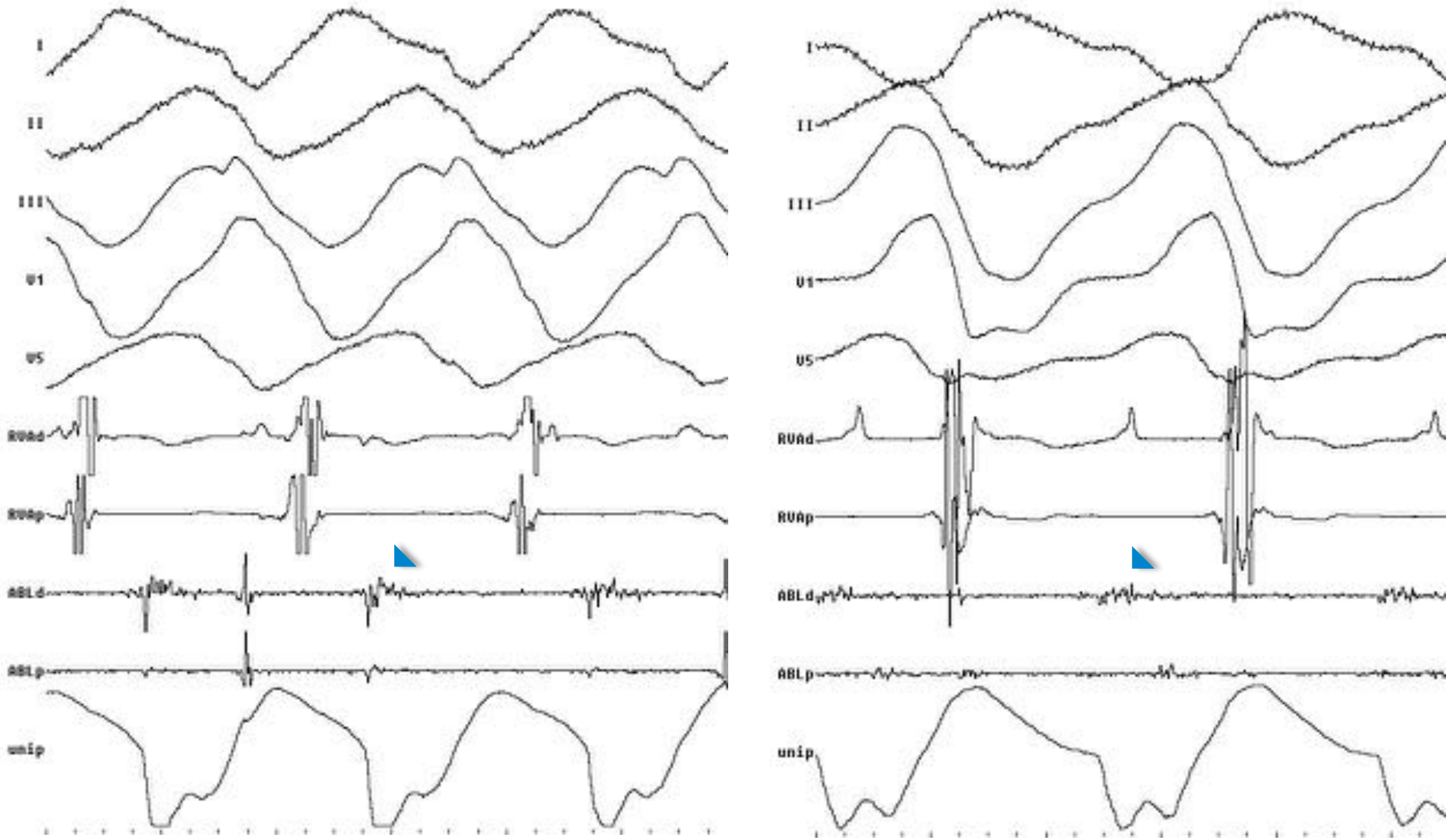
Pleiomorphic VT



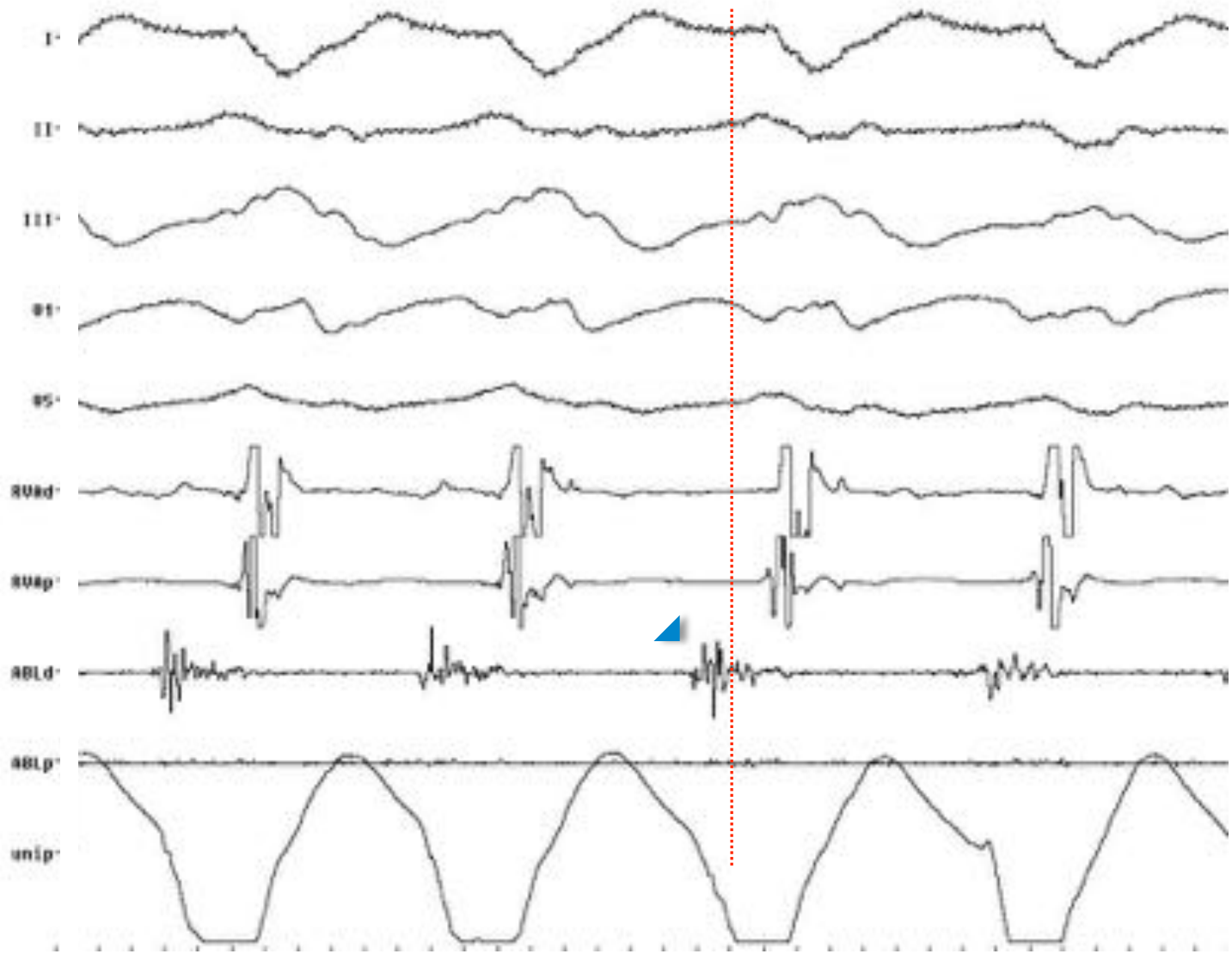
Pleiomorphic VT



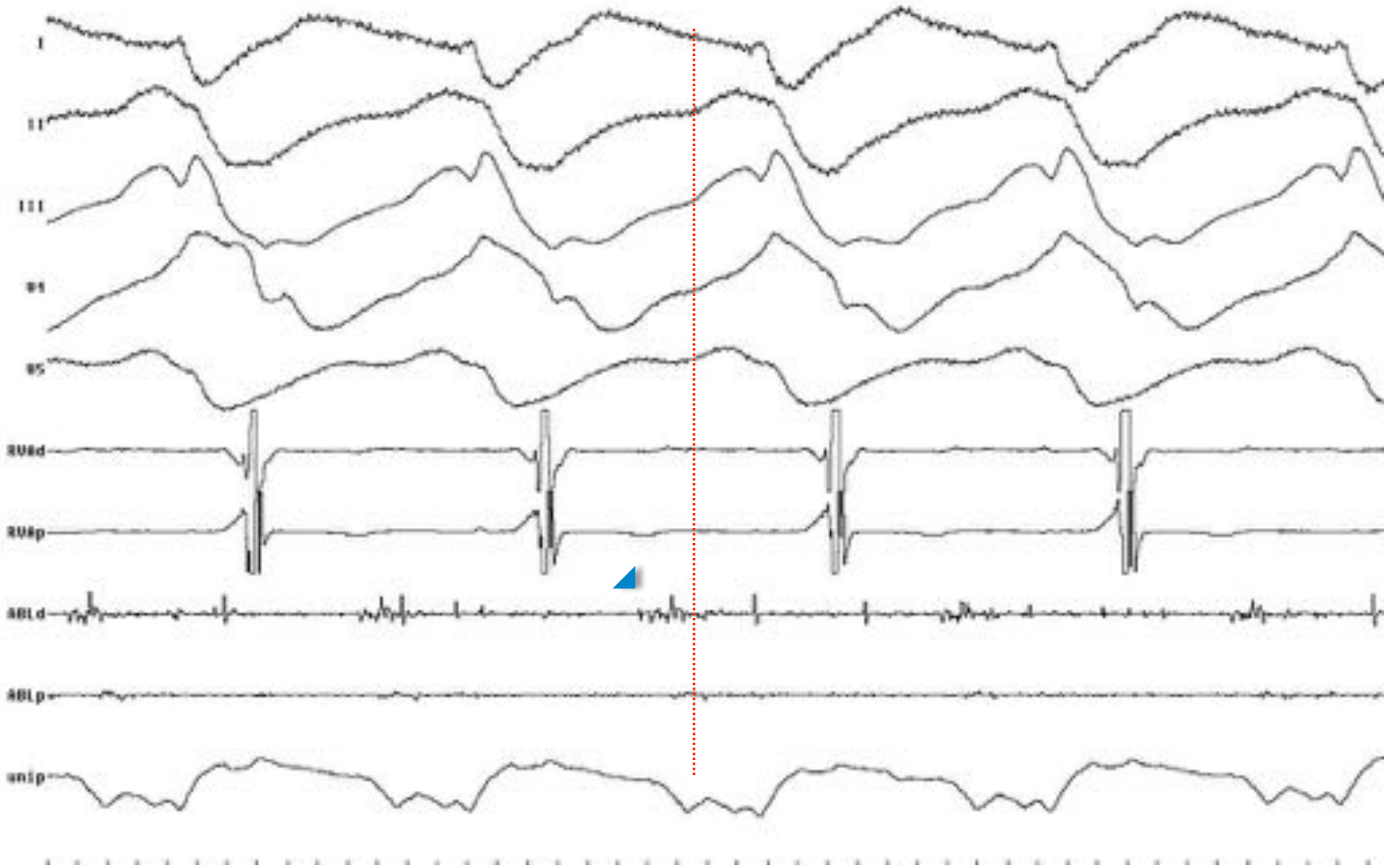
Activation mapping (epicardium)



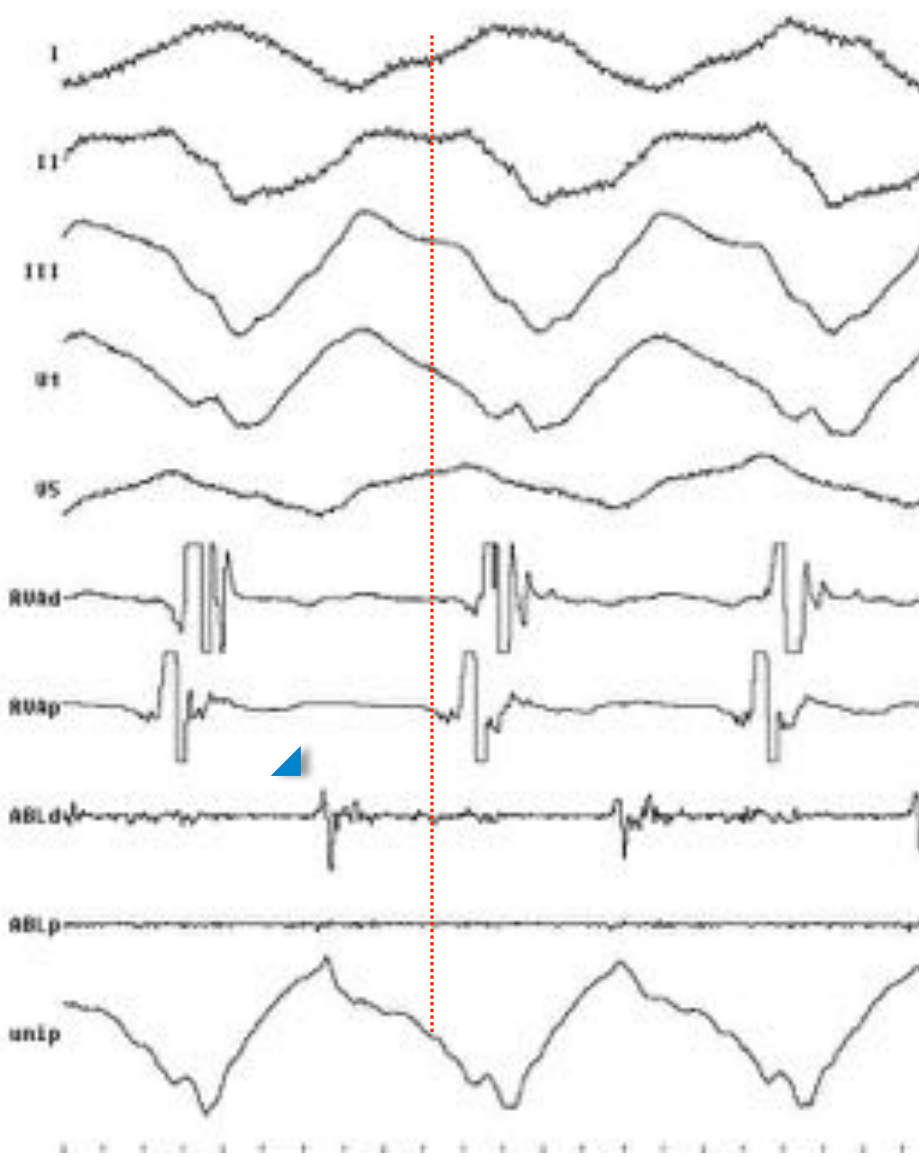
Activation mapping (endocardium)



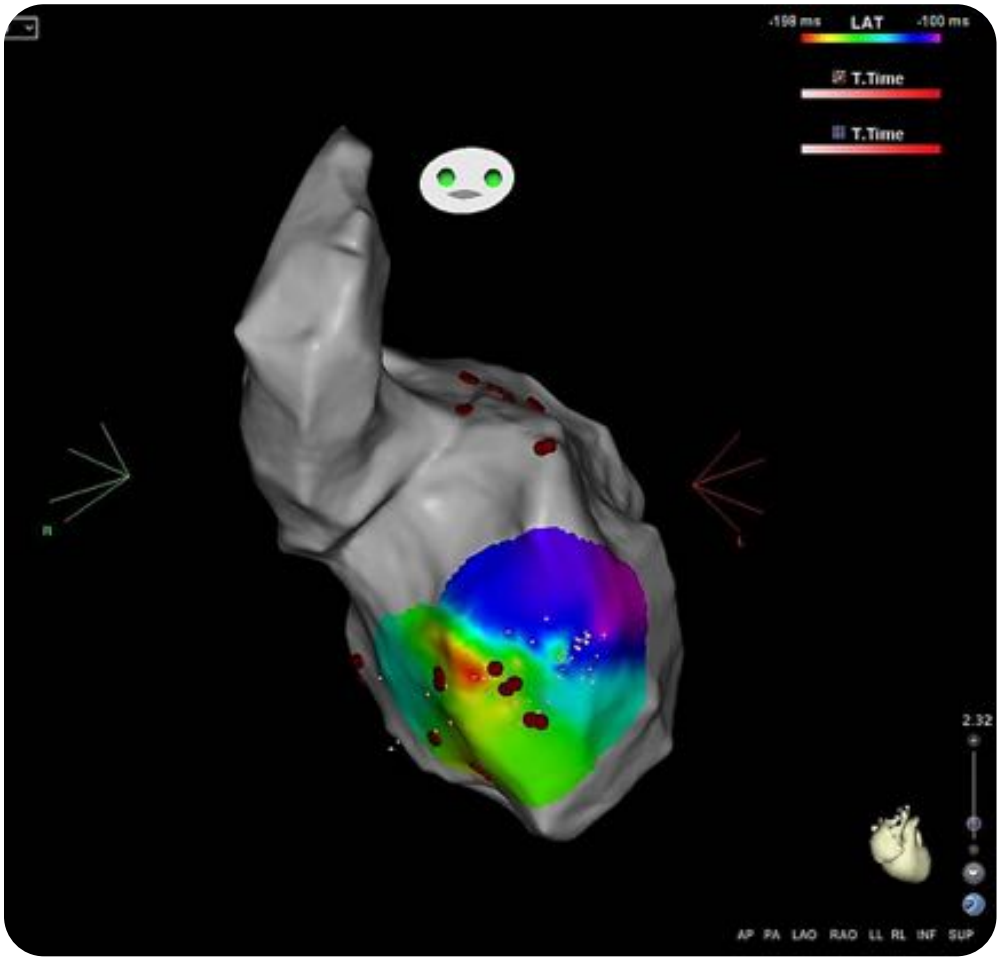
Activation mapping (endocardium)

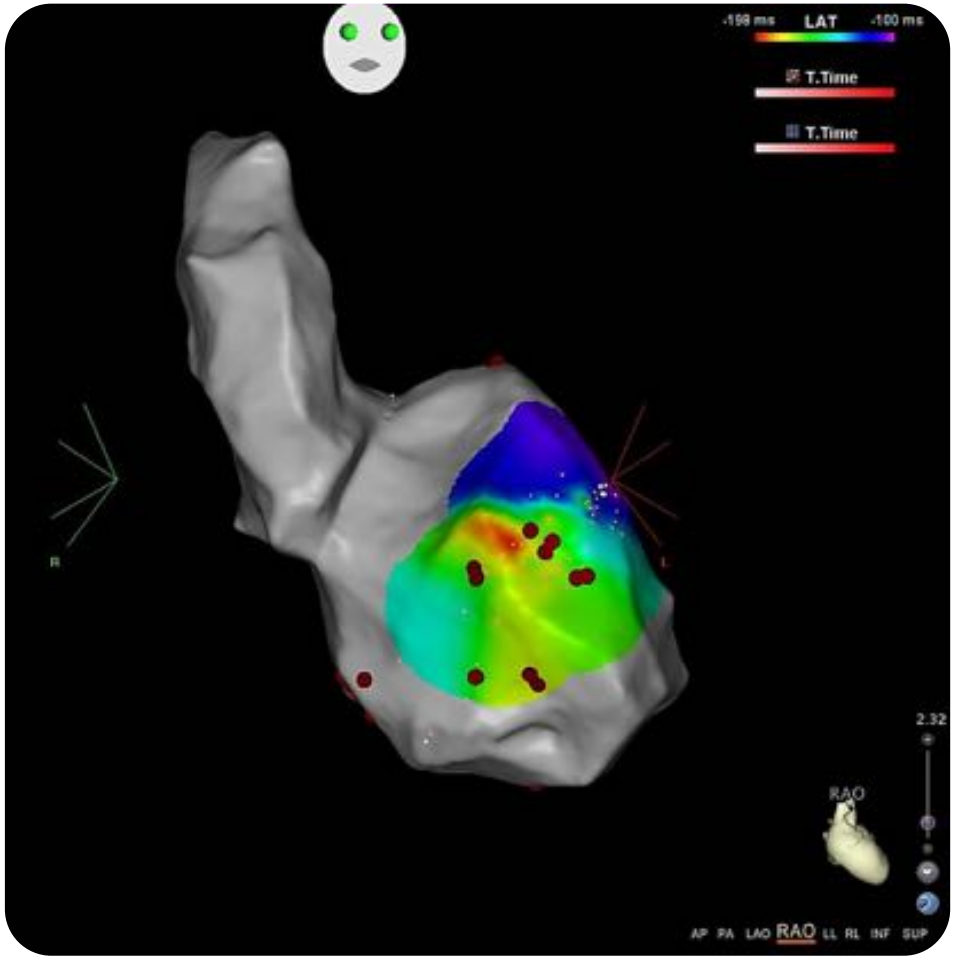


Activation mapping (endocardium)



RF delivery was ineffective in terminating any VT!





- Mexiletine 200 mg t.i.d. was added to tx
- Post-procedure observation (8 days) unremarkable
- At 1-yr FU: stable hemodynamic conditions (LV EF 20%, NYHA class II); no ICD interventions

Acute success of non-ischemic VT ablation: 38-67%

	Overall (n=226)	DCM (n=119)	ARVC (n=37)	Sarcoidosis (n=13)	HCM (n=7)	Congenital Heart Disease (n=16)	Valvular Disease (n=34)
No. of induced VT	2.7±2.1	2.7±1.9	2.7±1.8	4.0±5.2*	1.6±1.3	2.5±1.5	2.2±1.0
Fastest VT CL <400 ms	180 (80)	93 (78)	34 (92)	9 (69)	5 (71)	14 (88)	25 (74)
At least 1 unmappable VT	152 (67)	76 (64)	24 (65)	10 (77)	6 (86)	11 (69)	25 (74)
Epicardial ablation	52 (23)	34 (29)	11 (30)	2 (15)	3 (43)	1 (6)	1 (3)*
Acute outcomes							
Acute complete success	124 (55)	51 (43)	26 (70)*	8 (62)	4 (57)	12 (75)	23 (68)
VT modified	46 (20)	29 (24)	7 (19)	1 (8)	2 (29)	2 (13)	5 (15)
Acute failure	34 (15)	22 (18)	2 (5)	4 (31)	0 (0)	1 (6)	5 (15)
Not tested	22 (10)	17 (14)	2 (5)	0 (0)	1 (14)	1 (6)	1 (3)
Major complication	12 (5)	8 (7)	2 (5)	0 (0)	0 (0)	1 (6)	1 (3)

Tokuda M et al, Circ Arrhythm Electrophysiol 2012;5:992-1000

Relationship between scar location and outcome after non-ischemic VT ablation

Catheter Ablation of Ventricular Arrhythmia in Nonischemic Cardiomyopathy

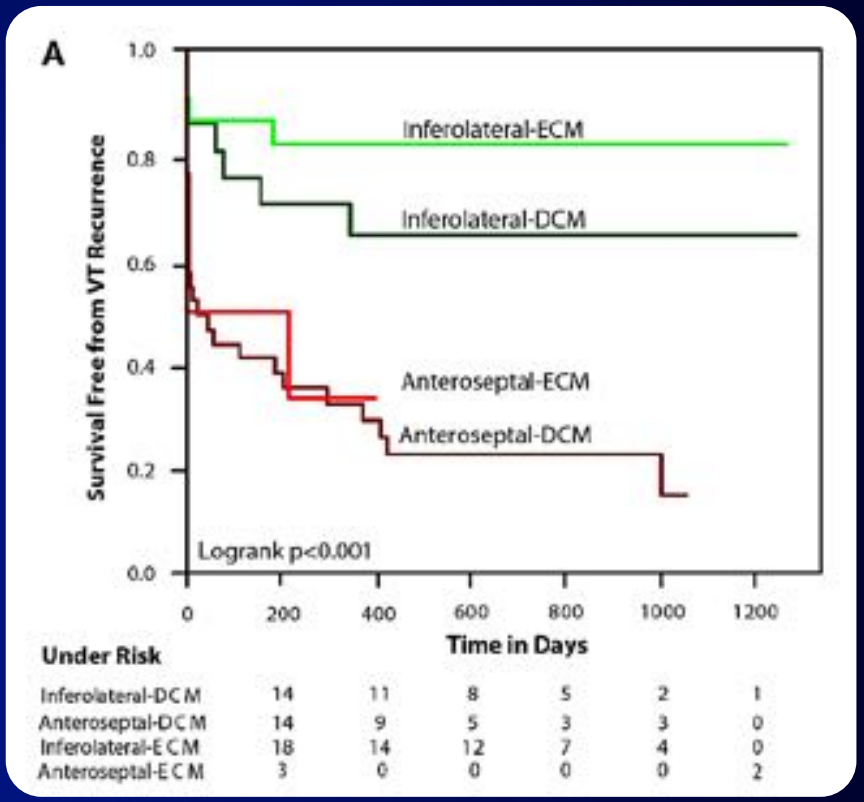
Anteroseptal Versus Inferolateral Scar Sub-Types

Teresa Oloriz, MD; John Silberbauer, MD (Res), MRCP; Giuseppe Maccabelli, MD; Hiroya Mizuno, MD, PhD; Francesca Baratto, MD; Senthil Kirubakaran, MD, MRCP; Pasquale Vergara, MD, PhD; Caterina Bisceglia, MD, PhD; Giulia Santagostino, MD; Alessandra Marzi, MD; Nicoleta Sora, MD; Carla Roque, MD; Fabrizio Guarracini, MD; Dimitris Tsiachris, MD, PhD; Andrea Radinovic, MD; Manuela Cireddu, MD; Simone Sala, MD; Simone Gulletta, MD; Gabriele Paglino, MD; Patrizio Mazzone, MD; Nicola Trevisi, MD; Paolo Della Bella, MD

Background—The aim was to relate distinct scar distributions found in nonischemic cardiomyopathy with ventricular tachycardia (VT) morphology, late potential distribution, ablation strategy, and outcome.

Methods and Results—Eighty-seven patients underwent catheter ablation for drug-refractory VT. Based on endocardial unipolar voltage, 44 were classified as predominantly anteroseptal and 43 as inferolateral. Anteroseptal patients more frequently fulfilled diagnostic criteria for dilated cardiomyopathy (64% versus 36%), associated with more extensive endocardial unipolar scar (41 [22–83] versus 9 [1–29] cm²; $P<0.001$). Left inferior VT axis was predictive of anteroseptal scar (positive predictive value, 100%) and right superior axis for inferolateral (positive predictive value, 89%). Late potentials were infrequent in the anteroseptal group (11% versus 74%; $P<0.001$). Epicardial late potentials were common in the inferolateral group (81% versus 4%; $P<0.001$) and correlated with VT termination sites ($\kappa=0.667$; $P=0.014$), whereas no anteroseptal patient had an epicardial VT termination ($P<0.001$). VT recurred in 44 patients (51%) during a median follow-up of 1.5 years. Anteroseptal scar was associated with higher VT recurrence (74% versus 25%; log-rank $P<0.001$) and redo procedure rates (59% versus 7%; log-rank $P<0.001$). After multivariable analysis, clinical predictors of VT recurrence were electrical storm (hazard ratio, 3.211; $P=0.001$) and New York Heart Association class (hazard ratio, 1.608; $P=0.018$); the only procedural predictor of VT recurrence was anteroseptal scar pattern (hazard ratio, 5.547; $P<0.001$).

Conclusions—Unipolar low-voltage distribution in nonischemic cardiomyopathy allows categorization of scar pattern as inferolateral, often requiring epicardial ablation mainly based on late potentials, and anteroseptal, which frequently involves an intramural septal substrate, leading to a higher VT recurrence. (***Circ Arrhythm Electrophysiol.* 2014;7:414-423.**)



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- Distinctive scar pattern in DCM pts
  - smaller (compared to ischemic pts)
  - areas of patchy fibrosis (instead of dense scar)
  - frequent septal, intra-mural or epicardial distribution
- Electrophysiological substrate
  - functional reentry (due to diffuse fibrosis, fiber disarray, cardiac dilatation, connexin-43 dysfunction, etc)

Future directions

- Better understanding of VT substrate (MRI) and mechanism
- Higher definition mapping systems
- Alternative approaches (i.e. ethanol ablation) and energy delivery modalities (i.e. bipolar ablation, needle catheters)