ELETTROFISIOLOGIA
13 Settembre 2025

Storm aritmico: esperienze di real life

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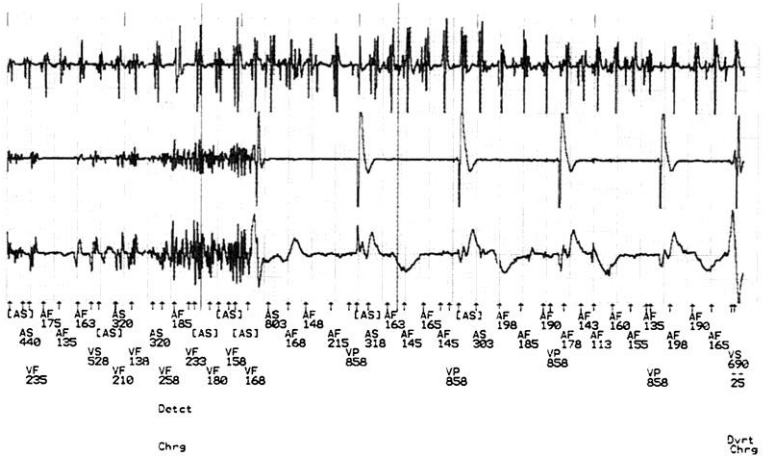
Giorgio, yob 1962 ♂

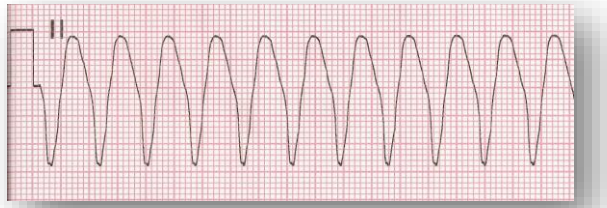
- **CV risk factors**: former smoker
- **Comorbidities:** COPD (mild), Beta-Thalassemia minor
- **2008 ADHF W&W (46 yrs):**
  - LVEF 16%, moderate MR
  - Negative coronary angiography
  - Negative LGE at cardiac MRI
- In the same year, **single lead (dual coil) ICD** implantation **(primary prevention)**
- **2010:**
  - inappropriate ICD shock (detection of noise and short VV intervals)
  - LVEF 30%
  - addition of a single coil high voltage lead

- **Multiple appropiate ICD interventions during follow-up (stable LVEF 30-35%):**
  - **2011** monomorphic VT → effective ATP
  - **2015** pacing induced fast monomorphic VT → effective ATP
  - **2017** post-PVC pause induced fast polymorphic VT → ICD shock

- **2021:** high voltage ICD lead failure → s-ICD implantation



- **2023 Jan:** hospital admission for the first electrical storm (repetitive MMVT at 200 bpm treated with 5 consecutive s-ICD shocks, patient conscious)



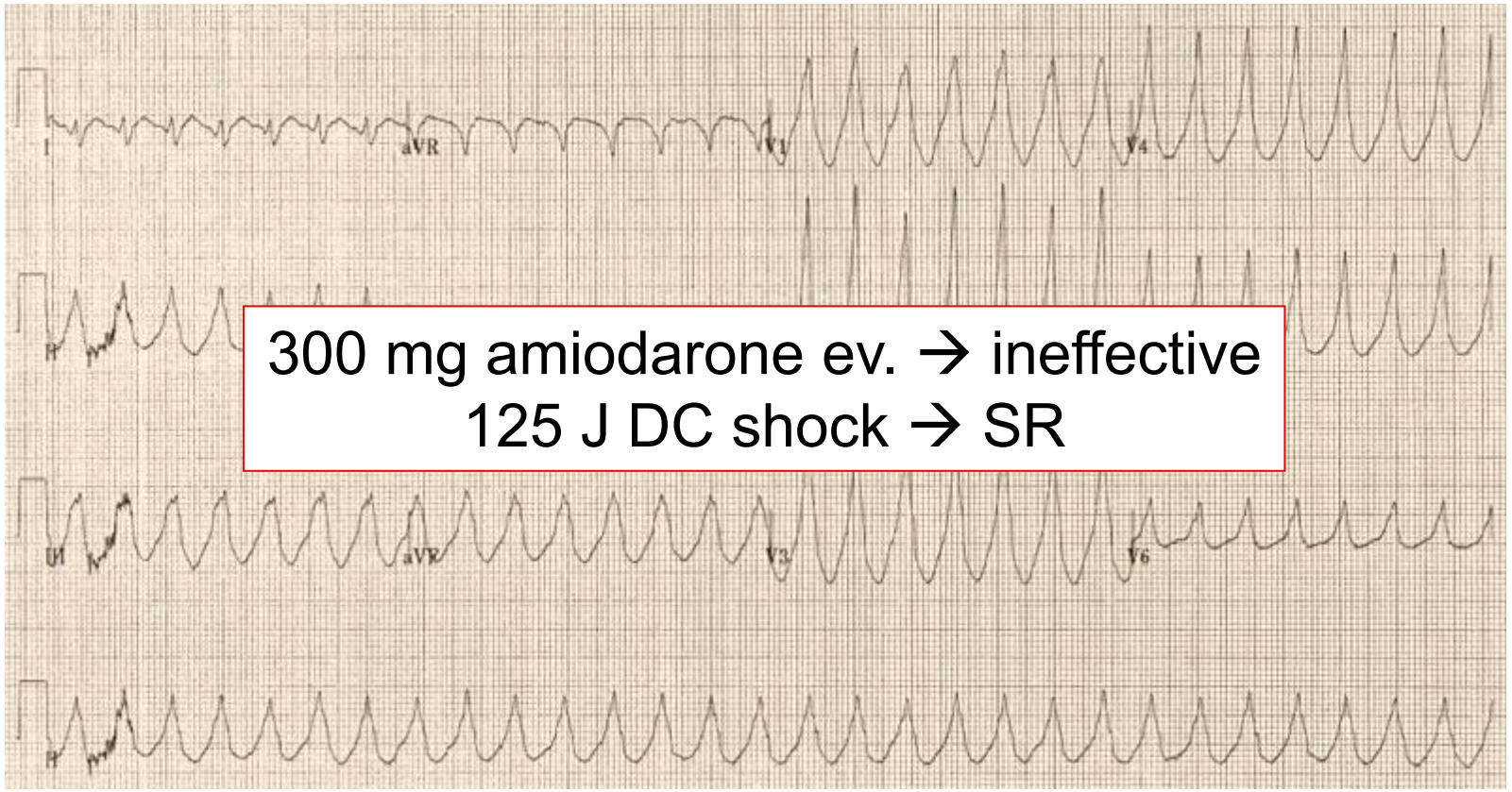
x 5

During hospitalization:

- echocardiography, LVEF 20%, mild MR, PASP 36 mmHg
- coronary angiography, absence of critical stenosis
- initiation of amiodarone

Therapy at discharge: metoprolol 50 mg BID, sacubitril/valsartan 24/26 BID, spironolactone 25 mg OD, furosemide 25 mg OD, amiodarone 200 mg OD

- **2023 May:** palpitations and hypotension → 112 →MMVT at 170 bpm

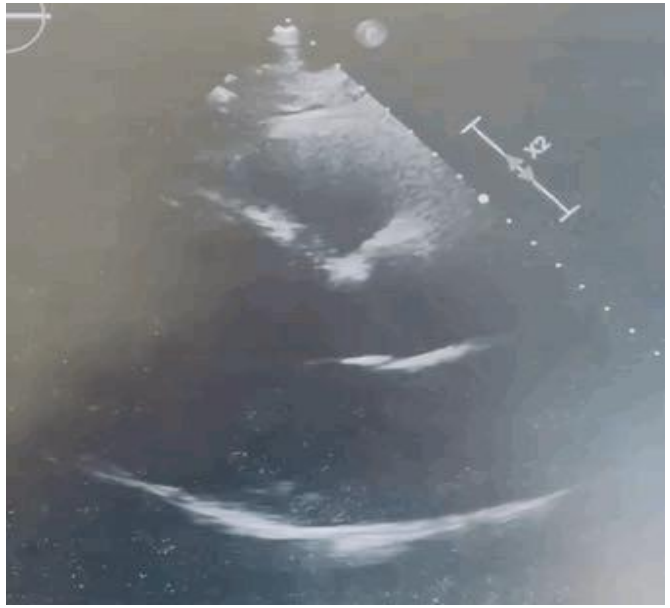


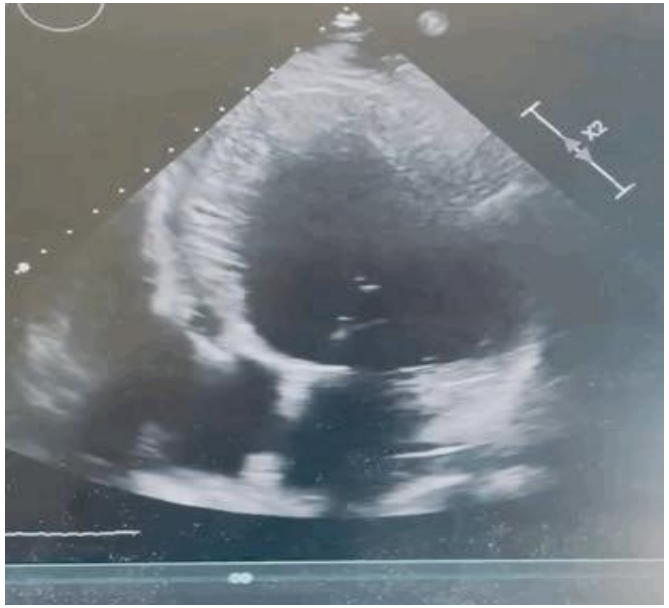
300 mg amiodarone ev. → ineffective
125 J DC shock → SR

- **ICD interrogation:** subthreshold VT, Mexiletine 200 mg BID added, referral

2023 June - First outpatient visit our centre, NYHA IIb

- **Echocardiography:** LVEF 25%, EDD 73 mm, EDV 130 ml/m^2 , normal filling pressures, RV dilatation (RVOT 47 mm, ED area 24 cm^2), TAPSE 24 mm, S' RV 9 cm/s LA dilatation (vol 50 ml/m^2), mild MR and TR, PASP 28 mmHg





CPET: VO2 max 11.5 ml/kg/min,

41% of the expected

NGS genetic analysis (Illumina, CMPs panel)

Medical therapy optimization:
Sacubitril/Valsartan 49/51 mg BID, Dapagliflozin 10 mg, Mexiletine 200 mg TID

24h Holter ECG 12 D

Same night…

- ER admission for multiple ICD shocks (112 to Rivoli, then centralized to Molinette on lidocaine drip)

- **S-ICD Interrogation: 19 ICD discharges on MMVT at 190/195 bpm in 11 minutes**

Parametri programmabili del dispositivo

Impostazioni correnti del dispositivo

Terapia: ON
Zona di shock: 240 bpm
Zona di shock condizionale: 190 bpm
Post shock pacing: ON
SMART Charge: 4,8 s (17 intervalli)
SMART Pass: ON

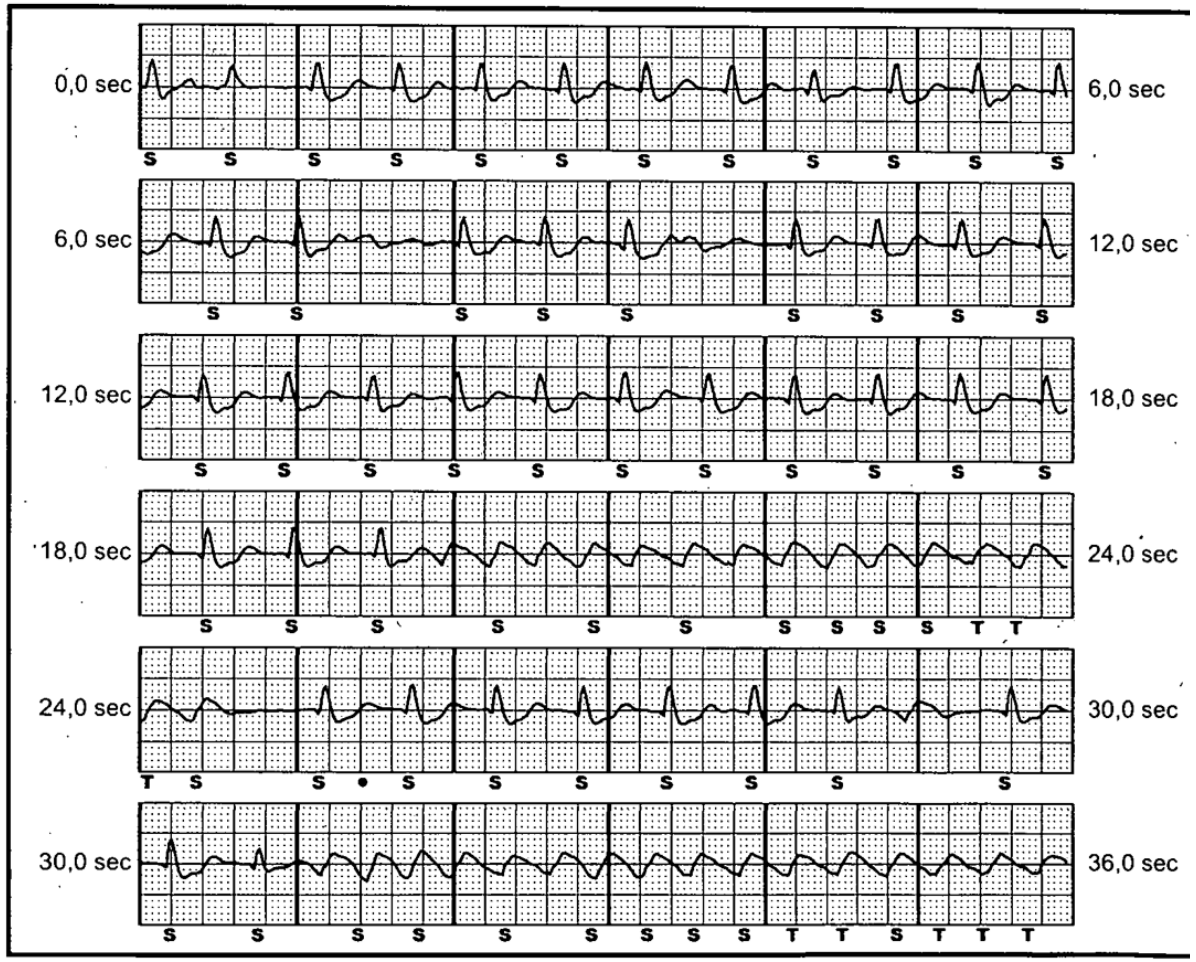
Impostazione guadagno: 1X
Configurazione di sensing: Vettore primario
Polarità di shock: REV

Impostazioni iniziali del dispositivo

Terapia: ON
Zona di shock: 240 bpm
Zona di shock condizionale: 190 bpm
Post shock pacing: ON
SMART Charge: 4,8 s (17 intervalli)
SMART Pass: ON

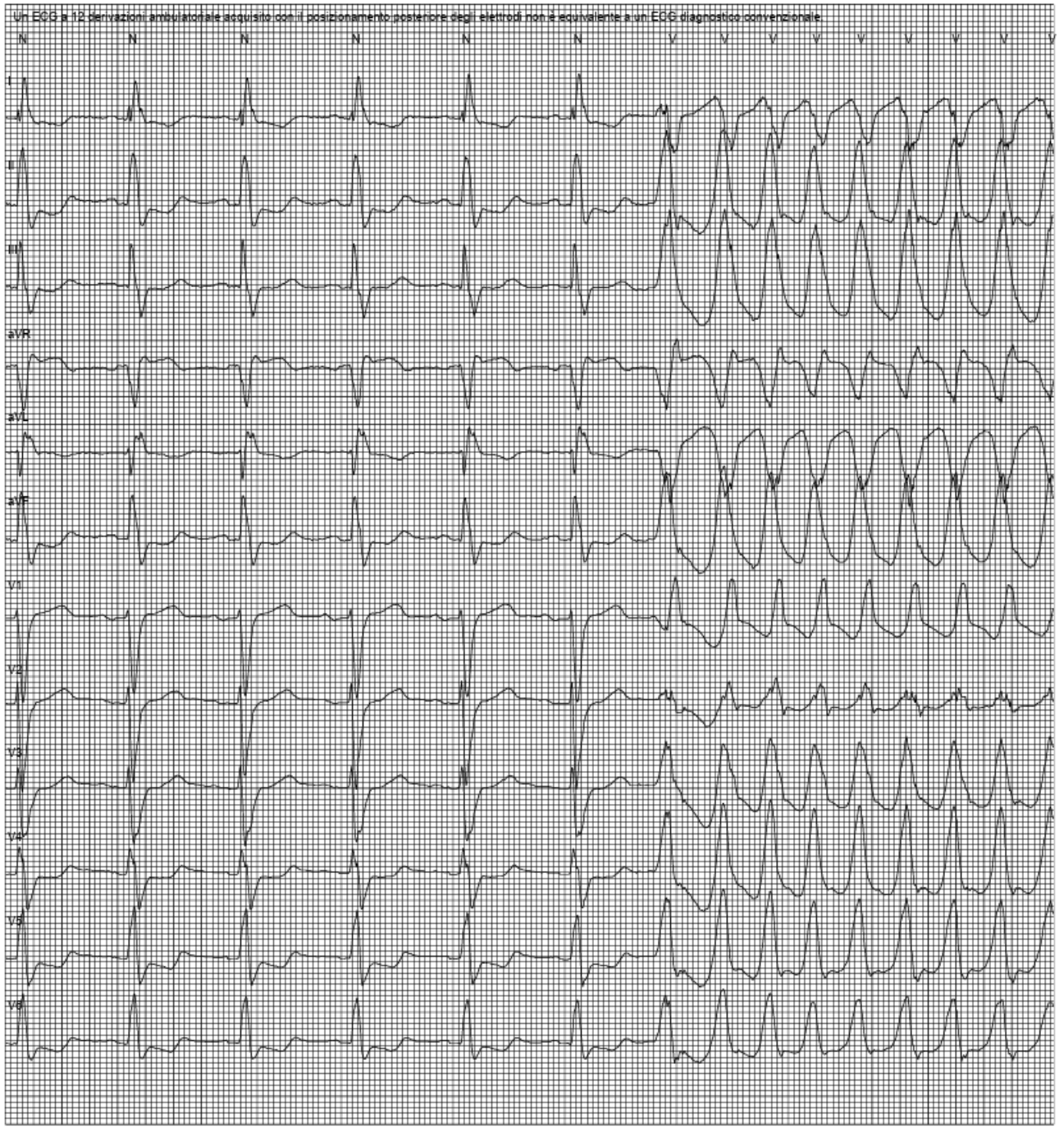
Impostazione guadagno: 1X
Configurazione di sensing: Vettore primario
Polarità di shock: REV

EPISODIO TRATTATO 271: 20/06/2023 22:01:31 25 mm/sec 2.5 mm/mV
IMPEDENZA SHOCK = 107 Ohm POLARITÀ di SHOCK FINALE= STD



inizio TV1 R monof in prec e asse inf RR 350 FCMV 170 7,5s FC114 BPM 25mm/s 10mm/mV 0,05-60Hz 20/06/2023 21:39:40

Un ECG a 12 derivazioni annualonale acquisito con il posizionamento posteriore degli elettrodi non è equivalente a un ECG diagnostico convenzionale



Electrical storm management in structural heart disease

Acute phase stabilization → **Subacute/Chronic phase**

Intra-hospital dedicated protocols

Cardioversion/Defibrillation/ACLS

Initial strategy:

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  - **Lidocaine iv**: 1-2 mg/kg boluses, if effective continue 20-50 y/kg/min
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  - **Non-selective BB**: e.g. oral propranolol 10-40 mg every 6h; if more rapid effect needed: iv esmolol or landiolol
- **Mild to moderate sedation**: benzodiazepine + opioid, consider dexmedetomidine.
- **Correction of reversible causes**: ischemia, hypoxemia, fever, electrolytes imbalance (K^+>4 mEq/L, Mg^{2+} > 2 mg/dL, corrected Ca^{2+} in range), toxins
- **ICD reprogramming**
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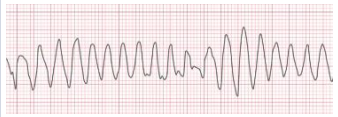
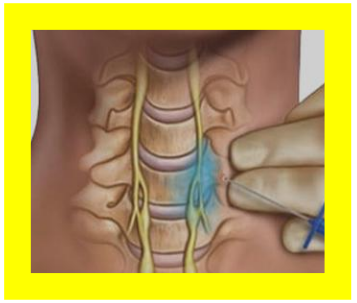
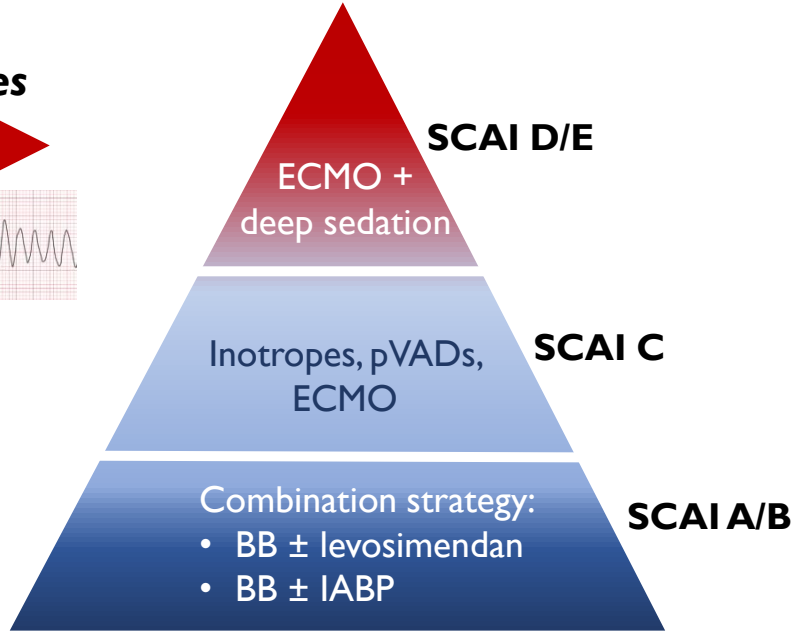
Recurrences





PLSGB (or TEA) independently from SCAI



Hemodynamic evaluation

Referral to specialized centers

Multidisciplinary heart team discussion (eligibility for permanent LVAD and/or HTx assessment)

1. **Non-pharmacological treatments implementation:**
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2. **If 1 unfeasible/excessive risk/refused:**
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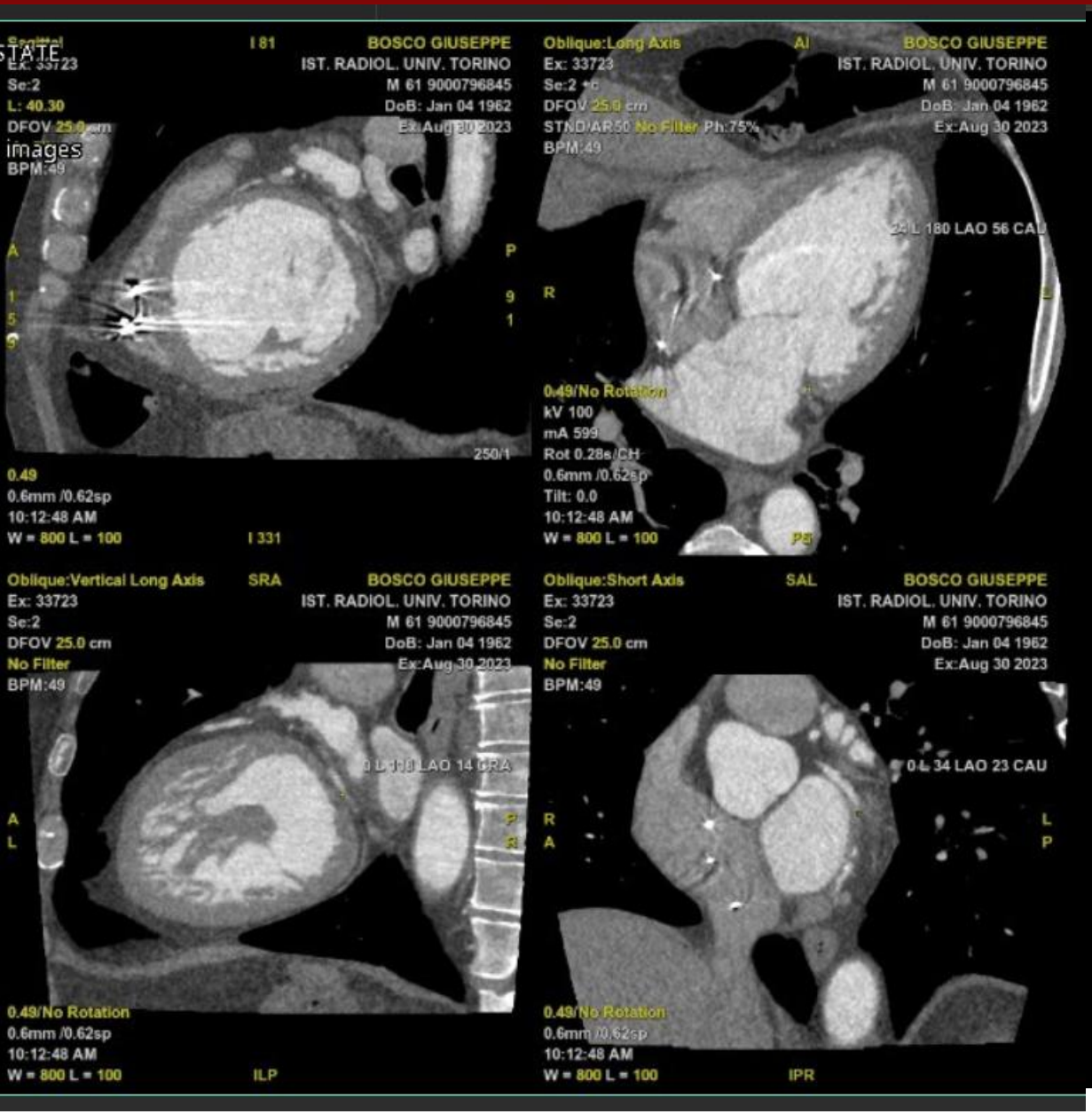
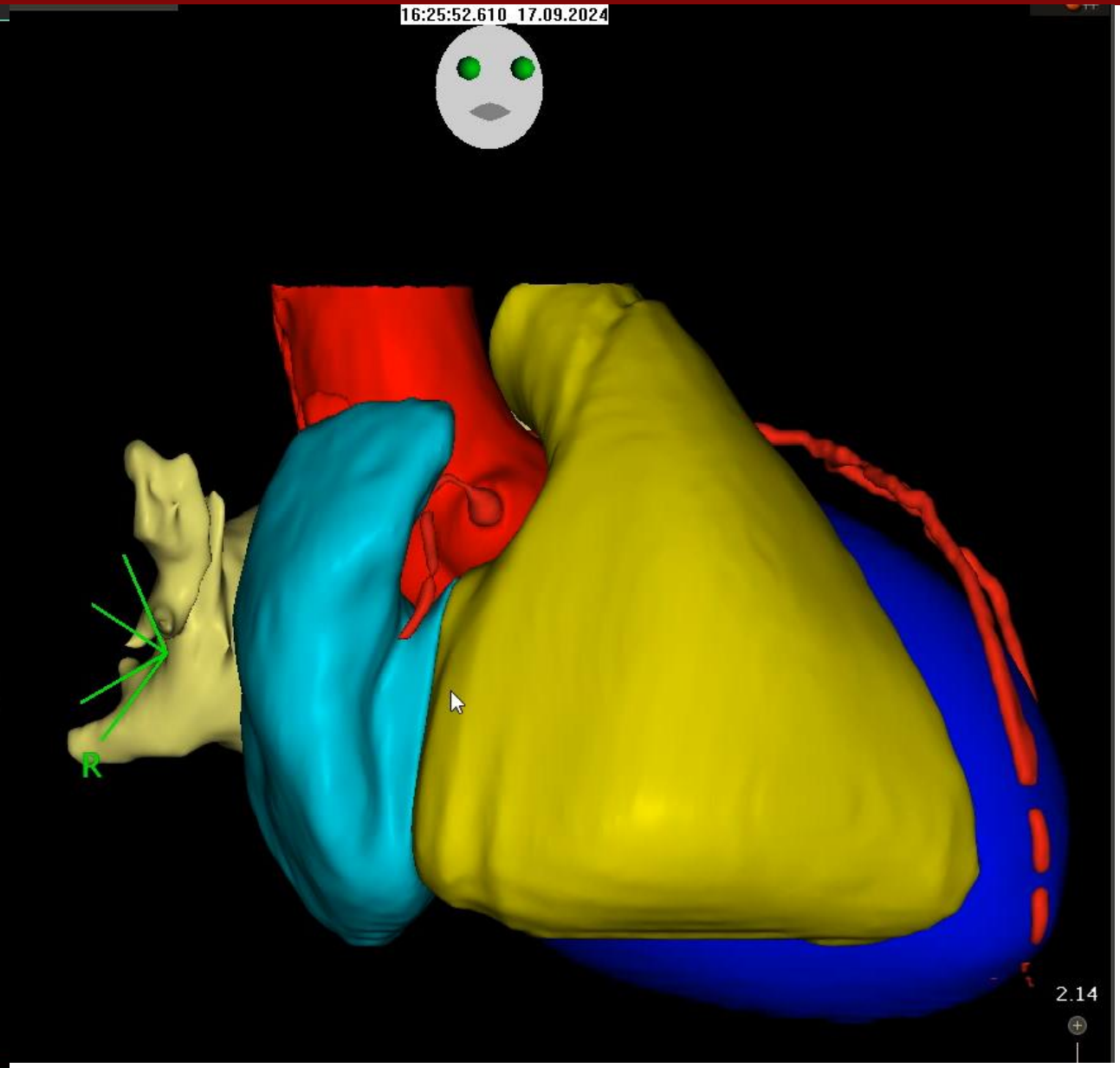
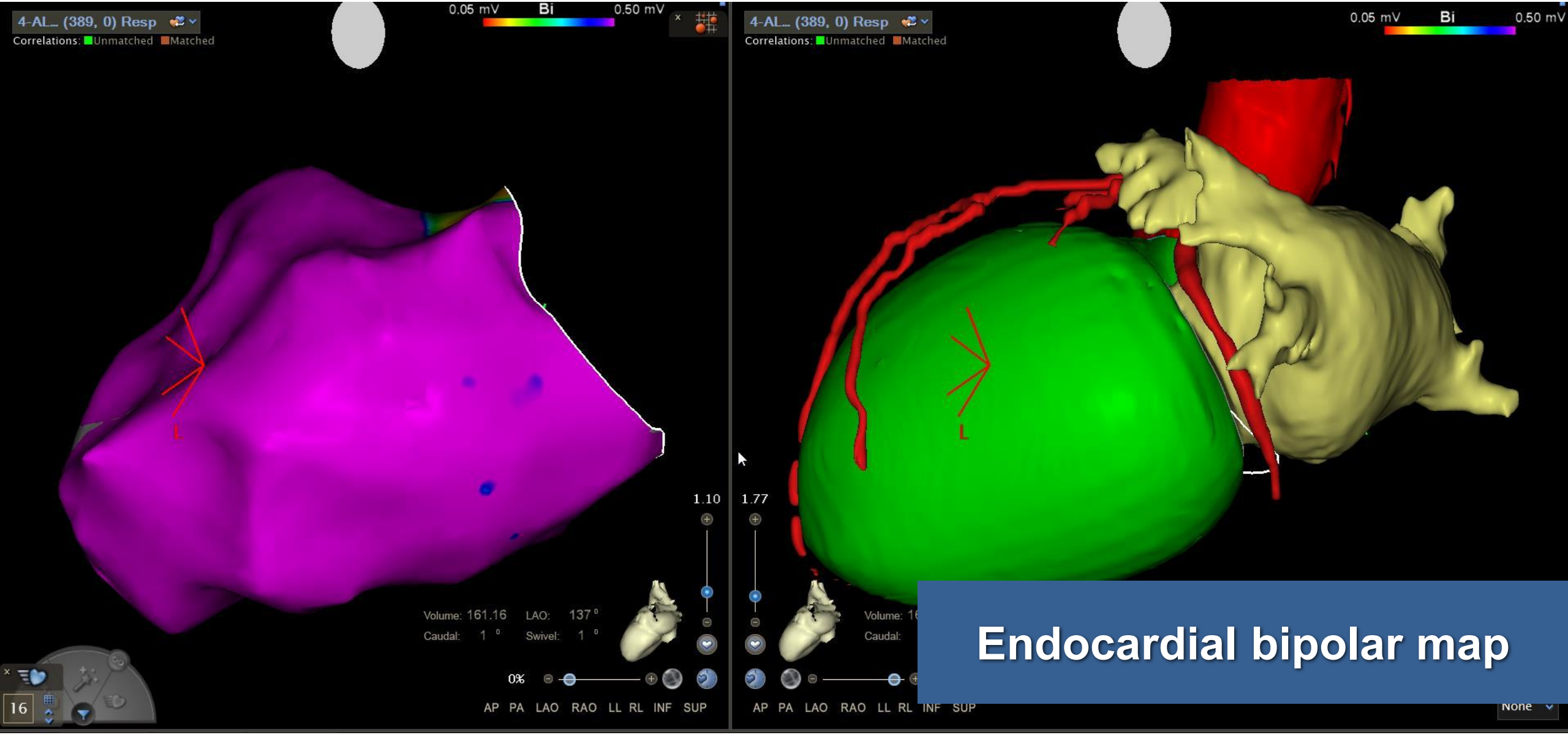
Scar Localization Imaging



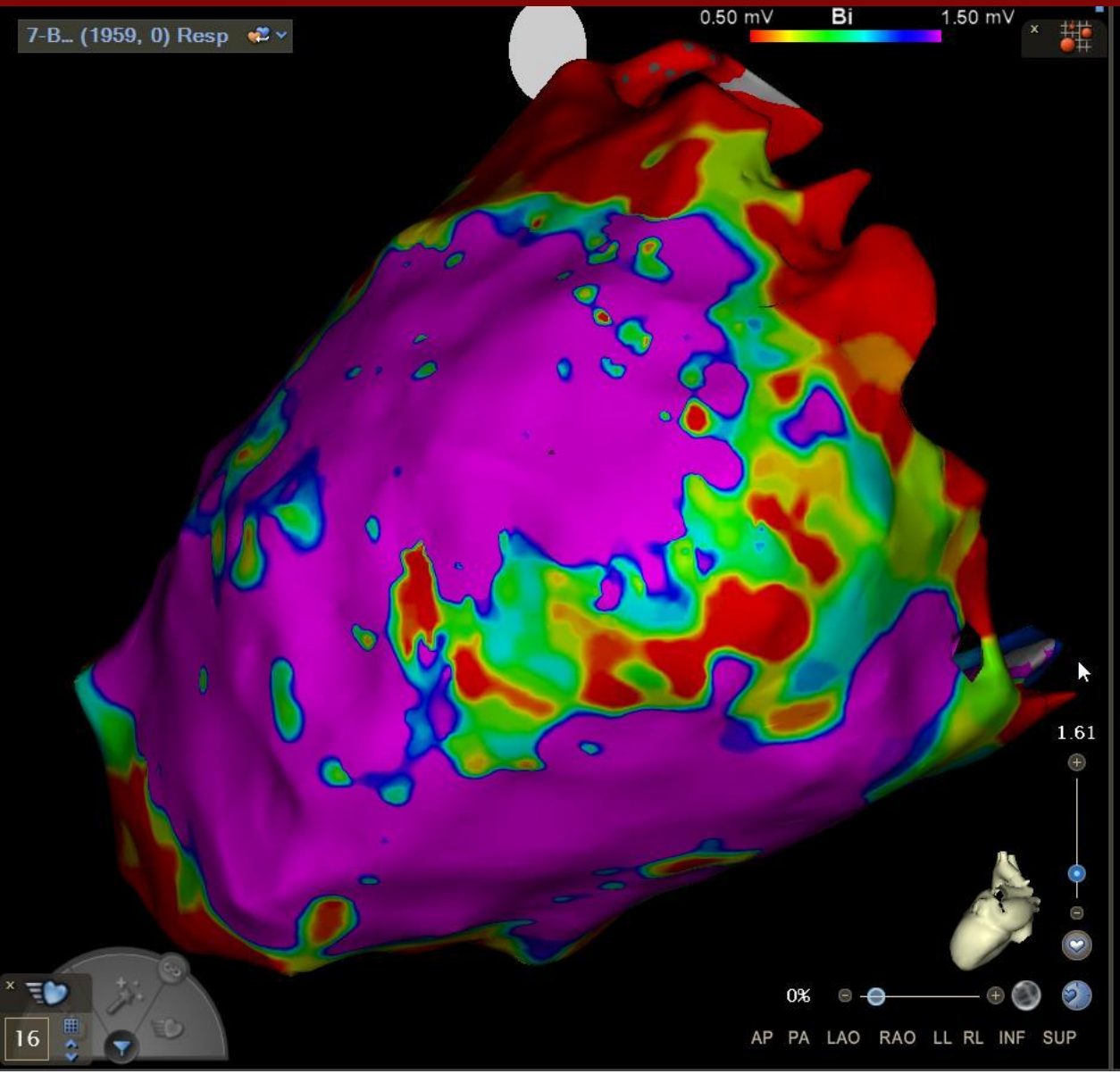


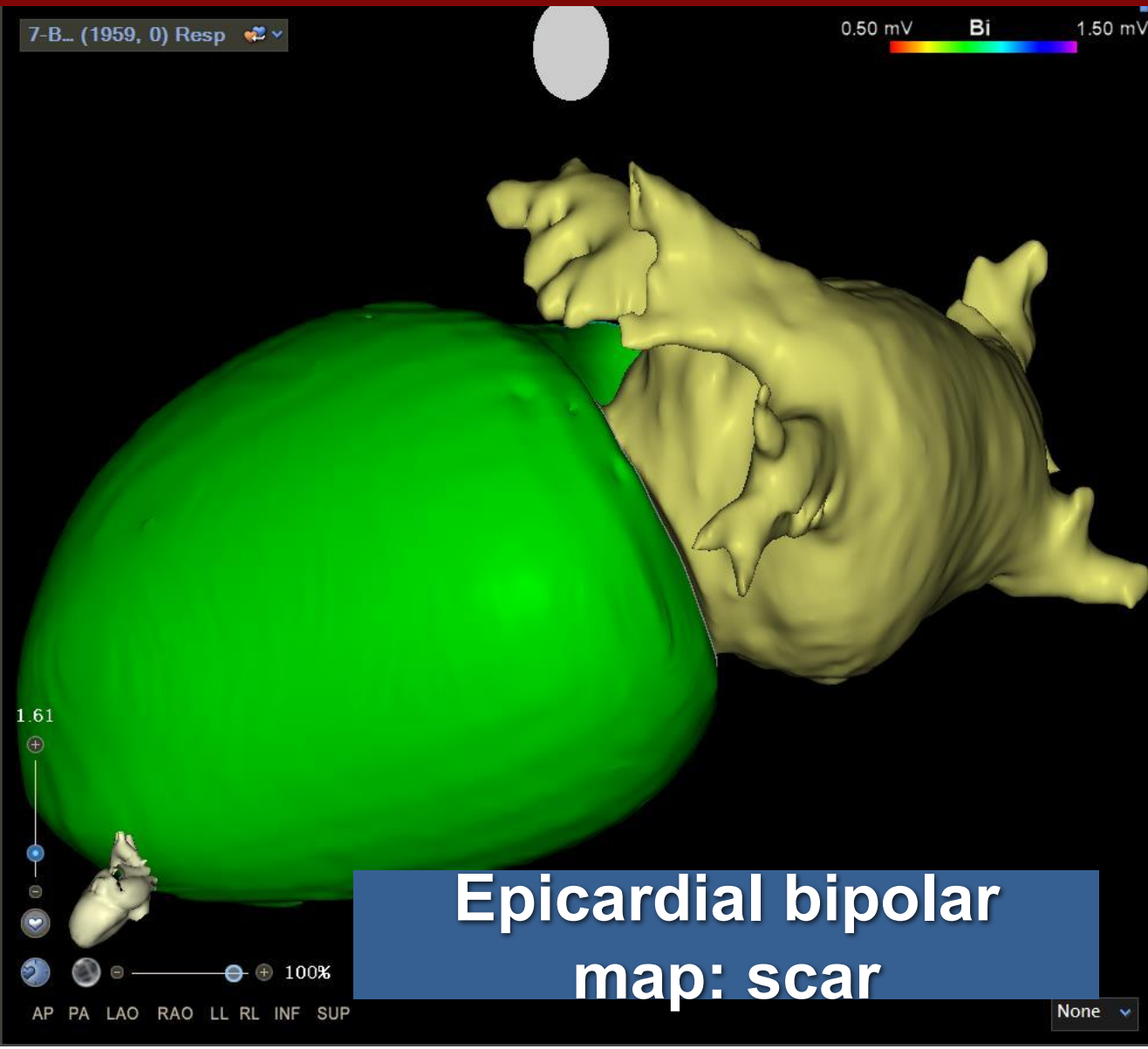
Endocardial substrate map



Endocardial bipolar map

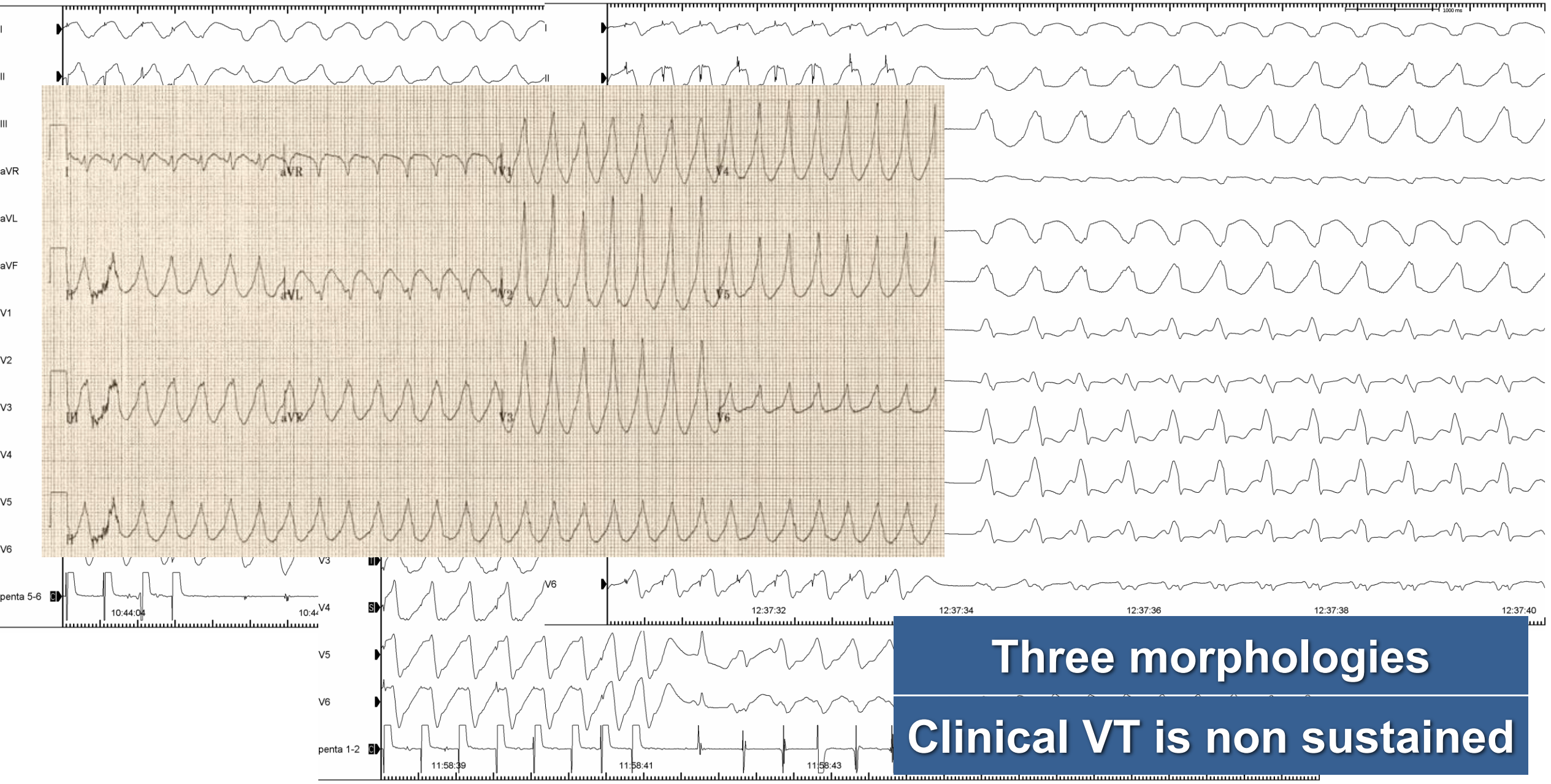
Epicardial substrate map





Epicardial bipolar map: scar

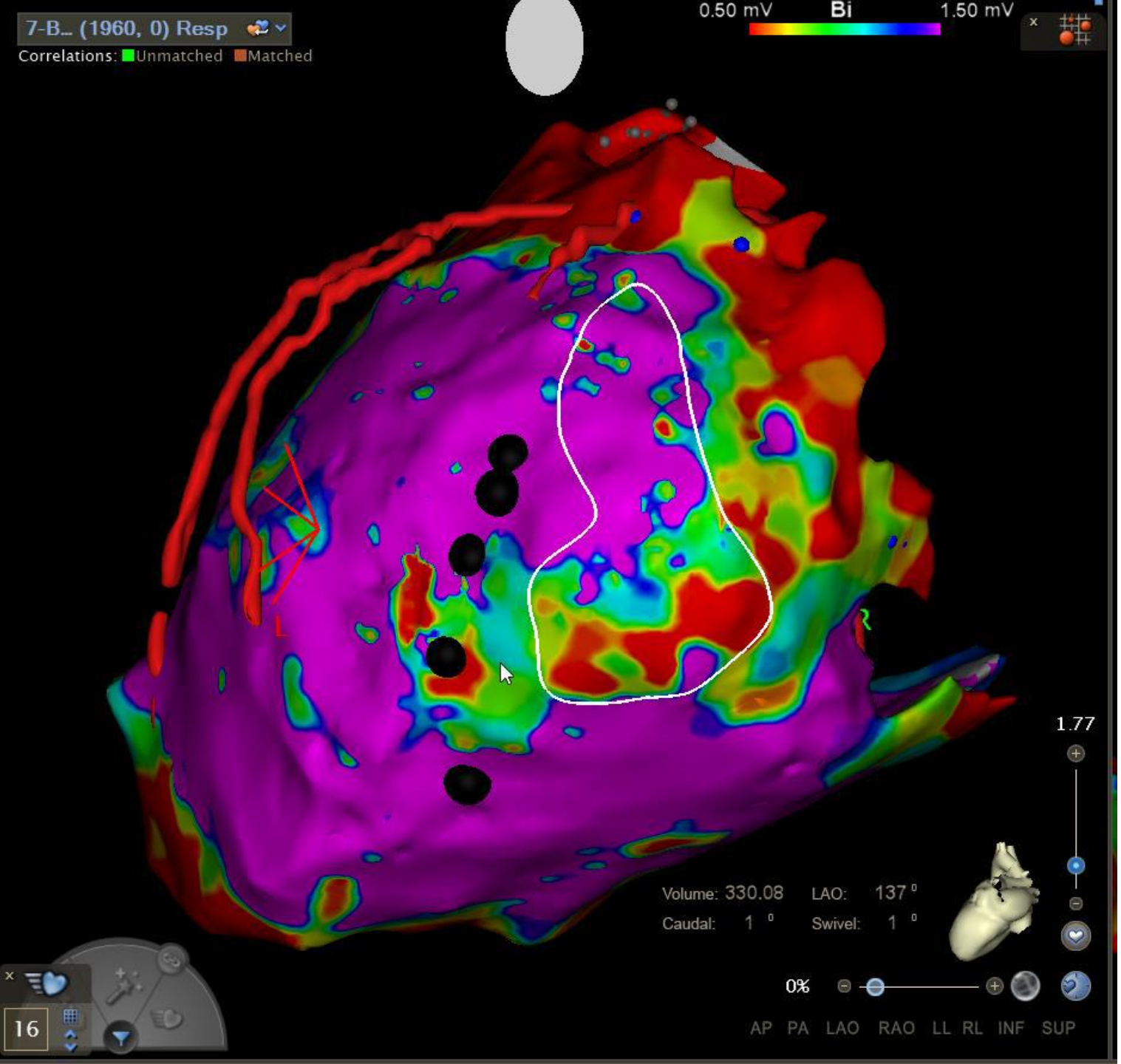
Induction



Three morphologies

Clinical VT is non sustained

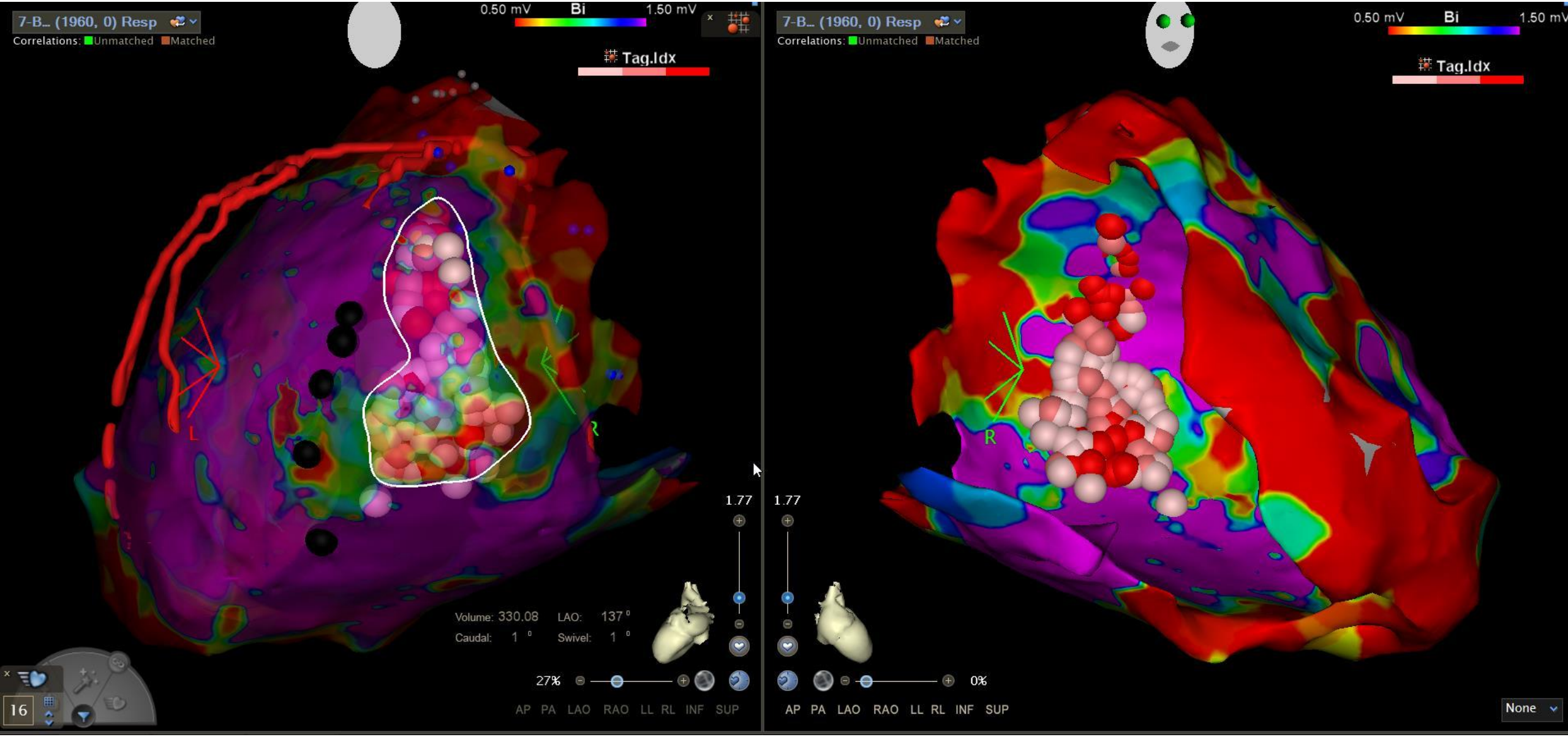
Substrate ablation: target



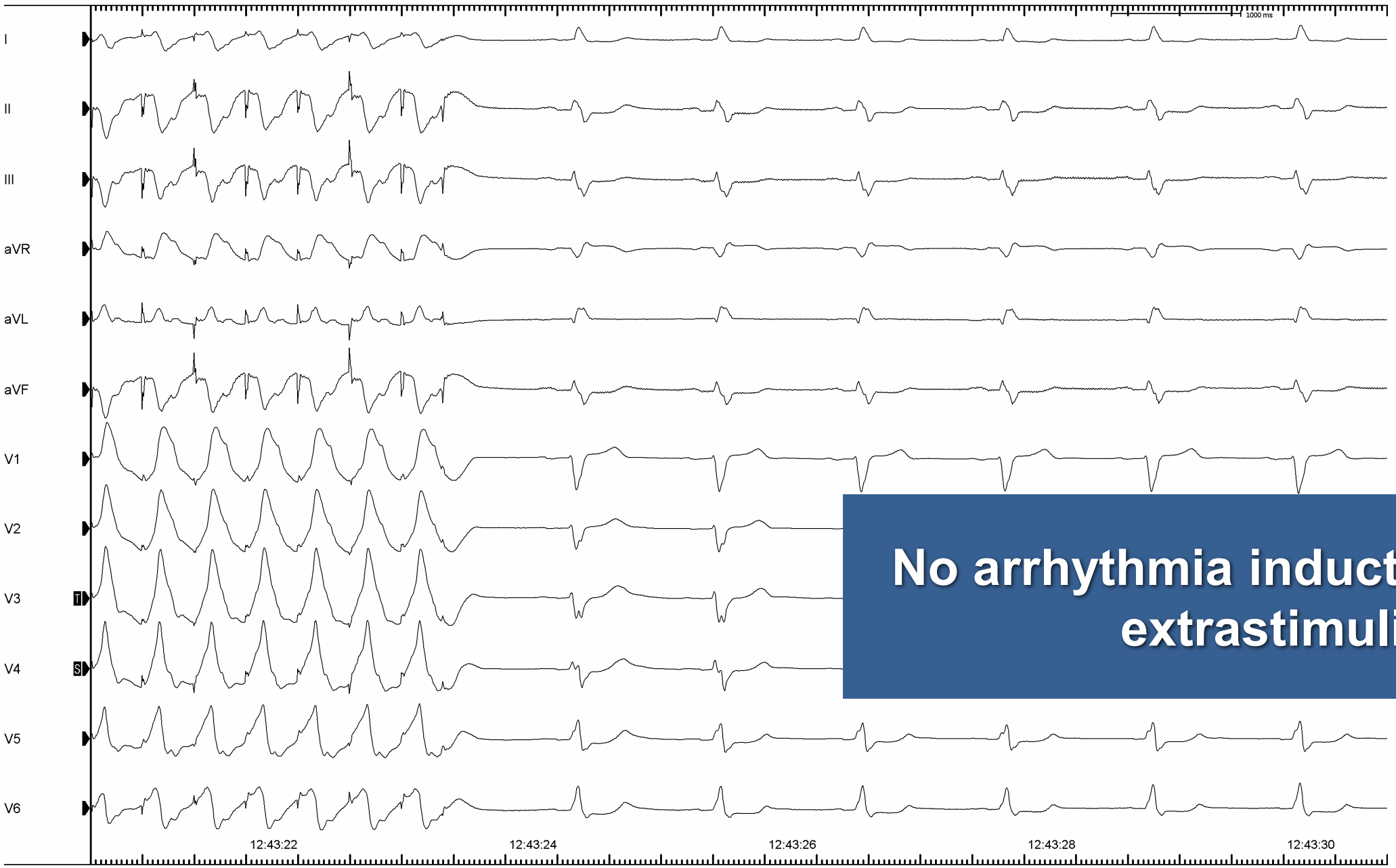
Circumflex Coronary artery

Left Phrenic Nerve

Ablation


7-B... (1960, 0) Resp
Correlations: Unmatched Matched
0.50 mV
Bi
1.50 mV
Tag.Idx
Volume: 330.08
LAO: 137 °
Caudal: 1 °
Swivel: 1 °
1.77
27%
AP PA LAO RAO LL RL INF SUP
16
7-B... (1960, 0) Resp
Correlations: Unmatched Matched
0.50 mV
Bi
1.50 mV
Tag.Idx
1.77
0%
AP PA LAO RAO LL RL INF SUP
None

Final EP study



No arrhythmia induction with 3 extrastimuli

After VT ablation

Before discharge

-Transcutaneous single lead ICD implant to guarantee the possibility of ATP treatment

-No atrial lead (too risky)

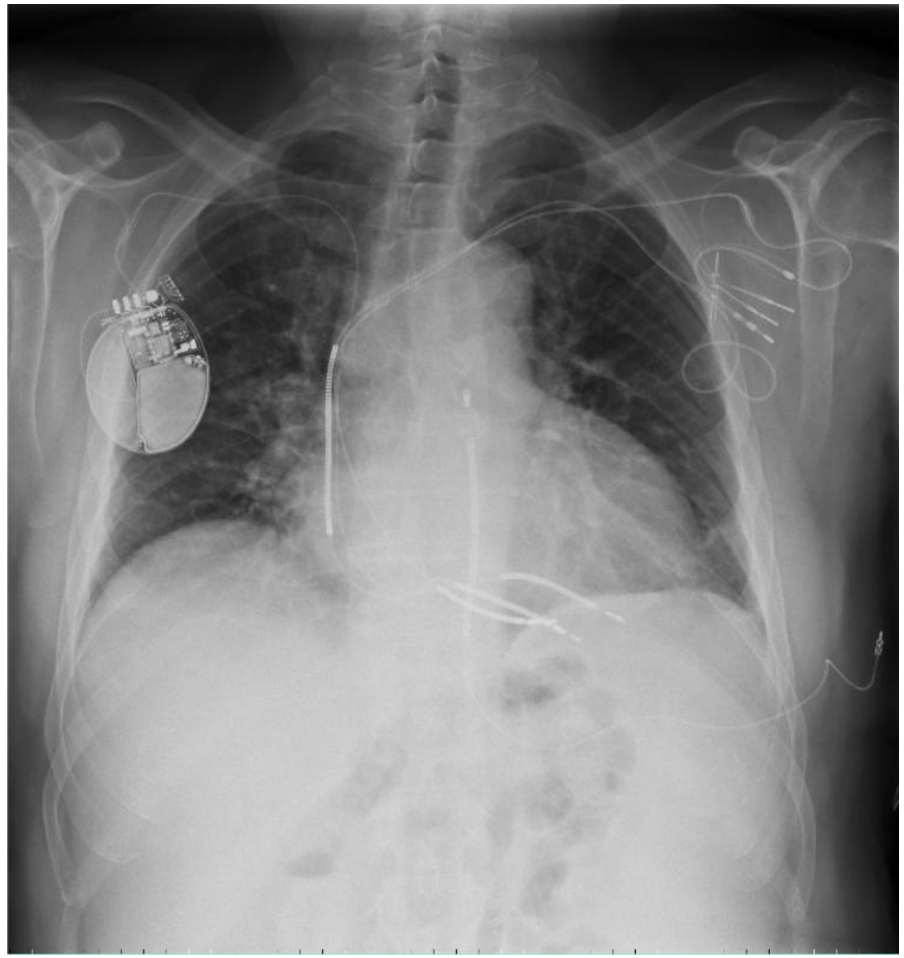
-sICD removal

-Single clinical MMVT at 155 bpm recurrence treated with ATP (burst), 6 days after VT ablation

-AAD at discharge: amiodarone 200 mg/die, mexiletine 800 mg/die, propranolol 1.4 mg/Kg/die.

One month follow-up:

- Two more isolated single ATPs on the clinical MMVT at 155 bpm with palpitations. No syncope or pre-syncope
- **On active heart transplant waiting list (since 08/2024)**



Now what???

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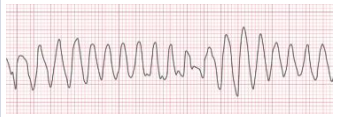

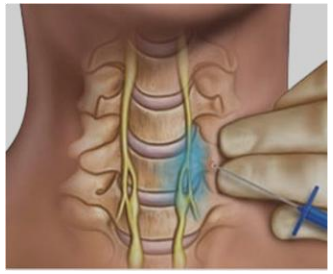

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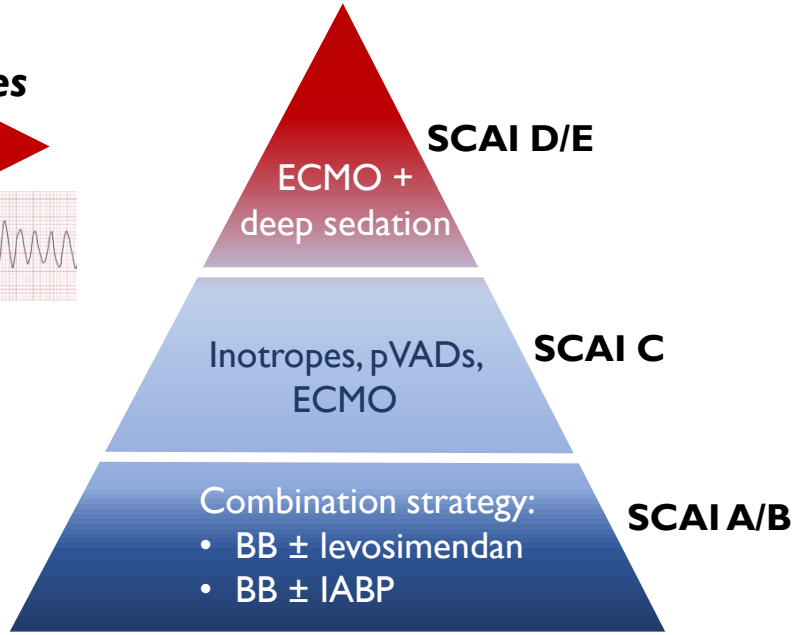

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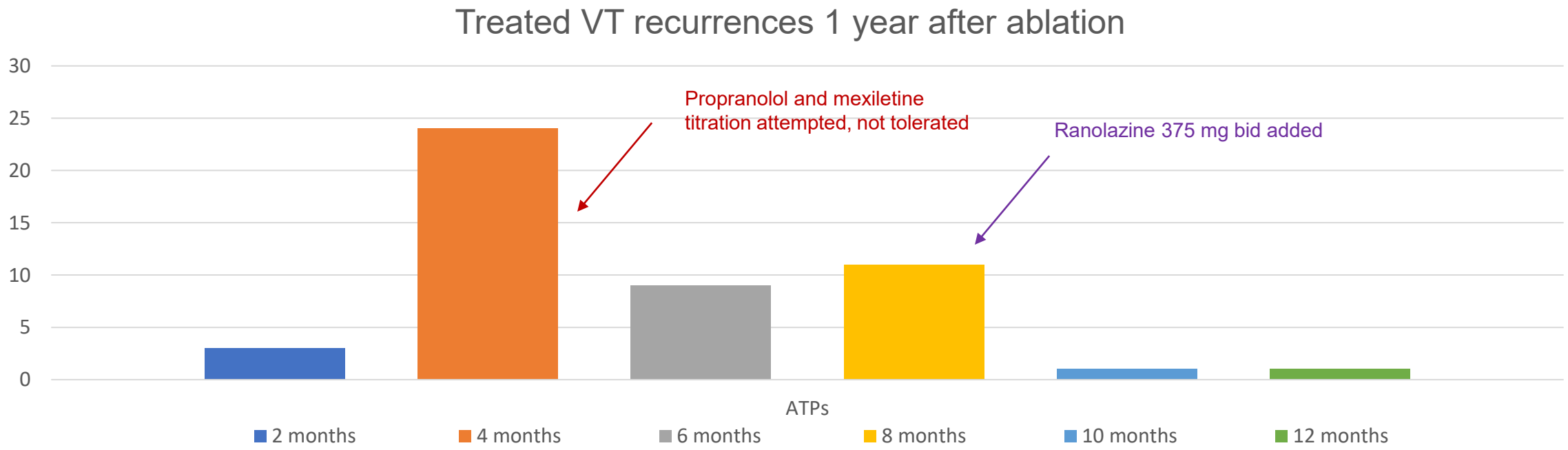
Snapshot at 12 months from VT ablation: no ICD shocks, several single ATPs on MMVT, ES only at night, asymptomatic



Ongoing drugs : Amiodarone 200 mg, mexiletine 800 mg, ranolazine 375 mg bid, propanolol 1.6 mg/Kg/die, furosemide 25 mg tid, sacubitril/valsartan 97/103 mg bid, pantoprazole 40 mg, eplerenon 50 mg, Empaglifozin 10 mg, allopurinol 150 mg

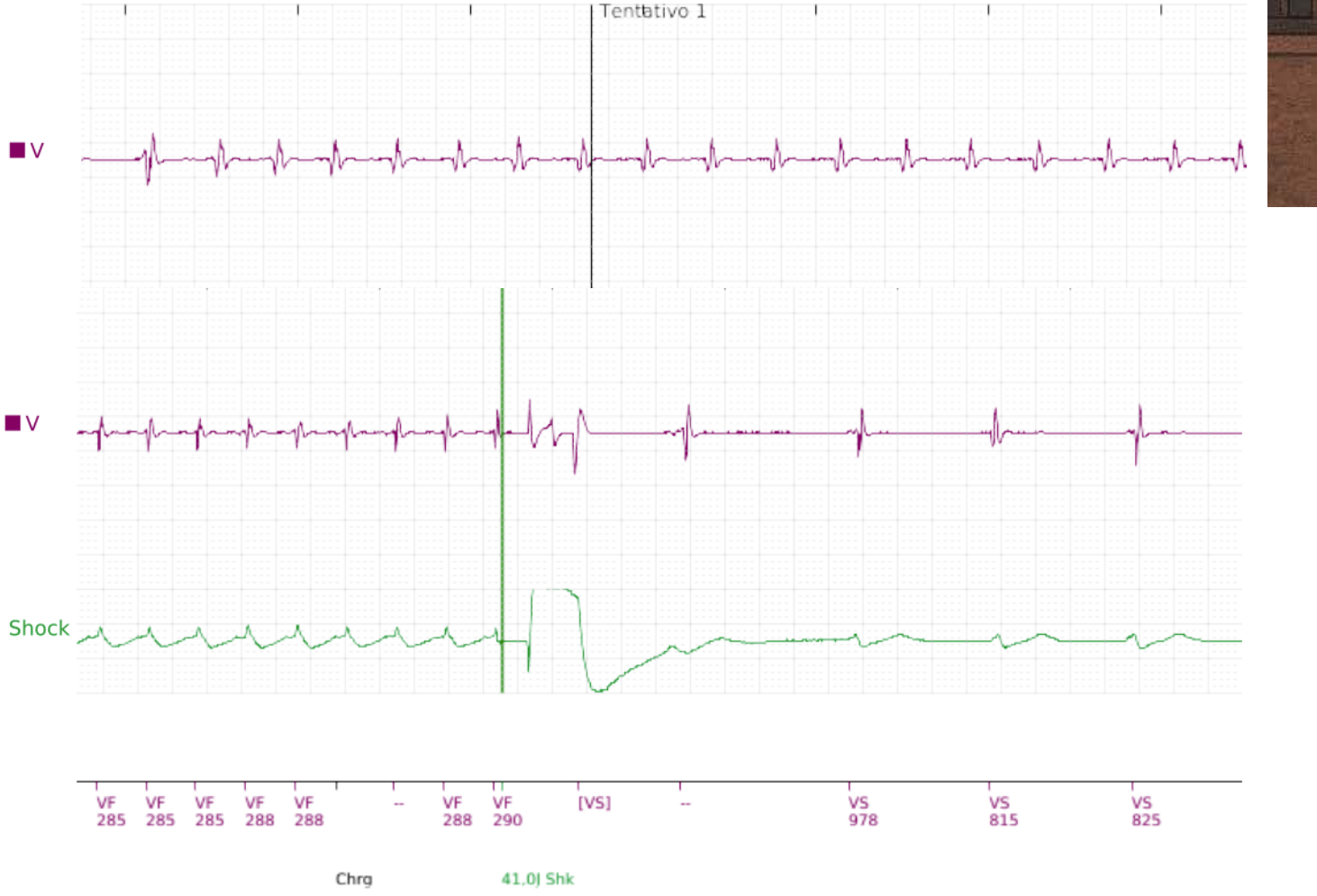
December 25, 2025

Giorgio cooked dinner for 12

- **ER admission for multiple ICD interventions, patient conscious (first Rivoli and than centralized to Molinette)**

- **12 leads ECG showing recurrent clinical MMVT at 160 bpm**

V-611	26 dic 2024 00:24	TV-1	ATPx1
V-607	26 dic 2024 00:19	TV-1	ATPx1
V-605	26 dic 2024 00:16	TV-1	ATPx2
V-604	26 dic 2024 00:14	TV-1	ATPx1
V-588	25 dic 2024 23:39	TV-1	ATPx1
V-587	25 dic 2024 23:38	TV	ATPx3
V-586	25 dic 2024 23:32	TV-1	ATPx9, 41J
V-585	25 dic 2024 23:30	TV-1	ATPx2
V-584	25 dic 2024 23:29	TV-1	ATPx2
V-583	25 dic 2024 23:26	TV-1	ATPx1
V-582	25 dic 2024 23:23	TV	ATPx5
V-581	25 dic 2024 23:10	TV	ATPx9
V-580	25 dic 2024 23:09	TV-1	ATPx1
V-579	25 dic 2024 23:08	TV-1	ATPx2
V-578	25 dic 2024 23:06	TV-1	ATPx1
V-577	25 dic 2024 23:05	TV-1	ATPx1
V-576	25 dic 2024 23:04	TV-1	ATPx2
V-575	25 dic 2024 23:02	TV-1	ATPx3
V-574	25 dic 2024 22:59	TV-1	ATPx5
V-573	25 dic 2024 22:57	TV-1	ATPx3
V-572	25 dic 2024 22:56	TV-1	ATPx2
V-571	25 dic 2024 22:51	TV-1	ATPx6
V-570	25 dic 2024 22:49	TV-1	ATPx1
V-569	25 dic 2024 22:48	TV-1	ATPx1
V-568	25 dic 2024 22:46	TV-1	ATPx2
V-566	25 dic 2024 22:44	TV-1	ATPx1
V-565	25 dic 2024 22:43	TV-1	ATPx1
V-564	25 dic 2024 22:41	TV-1	ATPx4
V-563	25 dic 2024 22:38	TV-1	ATPx5
V-562	25 dic 2024 22:37	TV-1	ATPx1
V-561	25 dic 2024 22:35	TV	ATPx2
V-554	25 dic 2024 22:21	TV	ATPx2, 41J
V-425	24 dic 2024 23:36	TV-1	Nessuna terapia
V-384	24 dic 2024 22:43	TV-1	Nessuna terapia
V-378	24 dic 2024 22:36	TV-1	Nessuna terapia
V-342	24 dic 2024 22:01	TV-1	Nessuna terapia
V-331	24 dic 2024 21:50	TV-1	Nessuna terapia



-32 treated VT episodes in 123 minutes, all started as MMVT at 160-168 bpm, in most cases responsive to ATPs (for a total of 83 delivered ATPs), in 2 cases with degeneration and need for shock. Patient conscious.

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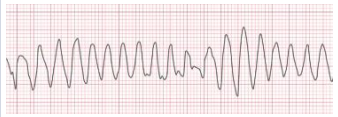

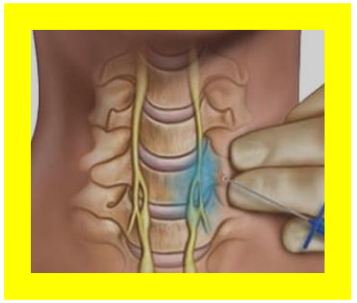

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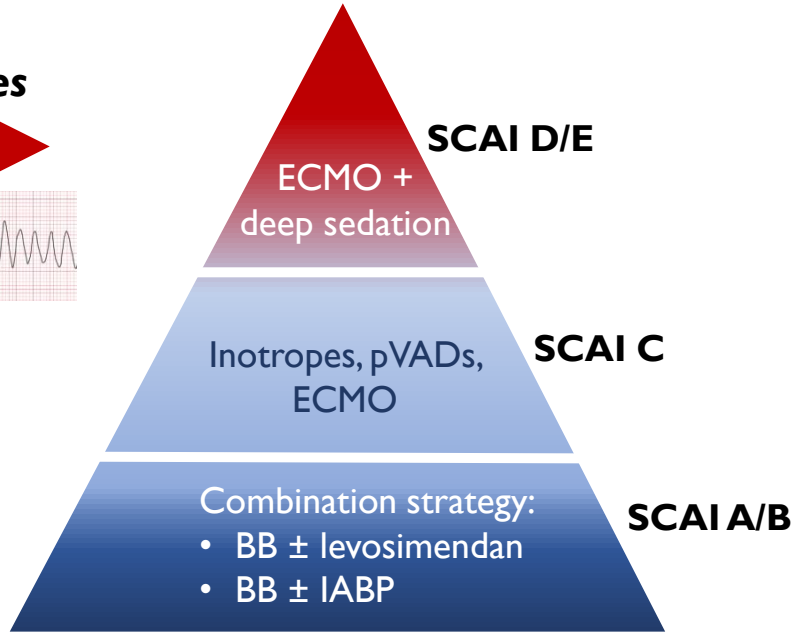

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VT in SHD on GDMT for HF (± sotalol in ARVC)

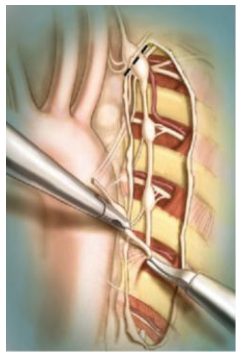
First line

Amiodarone ± Mexiletine

Invasive VT ablation (including epicardial access when indicated)

"Interventional Second lines"

CSD, GL approved

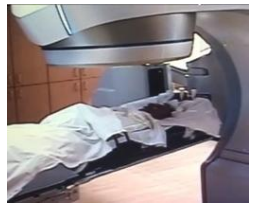


Favor in case of:

- Polymorphic VT/VF
- MMVT >150 bpm
- Multiple VT morphology
- Young patients
- Low NYHA functional Class

- Can slow down the VT and improve the response to a subsequent invasive/non-invasive VT ablation

- Ongoing Italian Registry (CUT-VT: PI: GM De Ferrari)



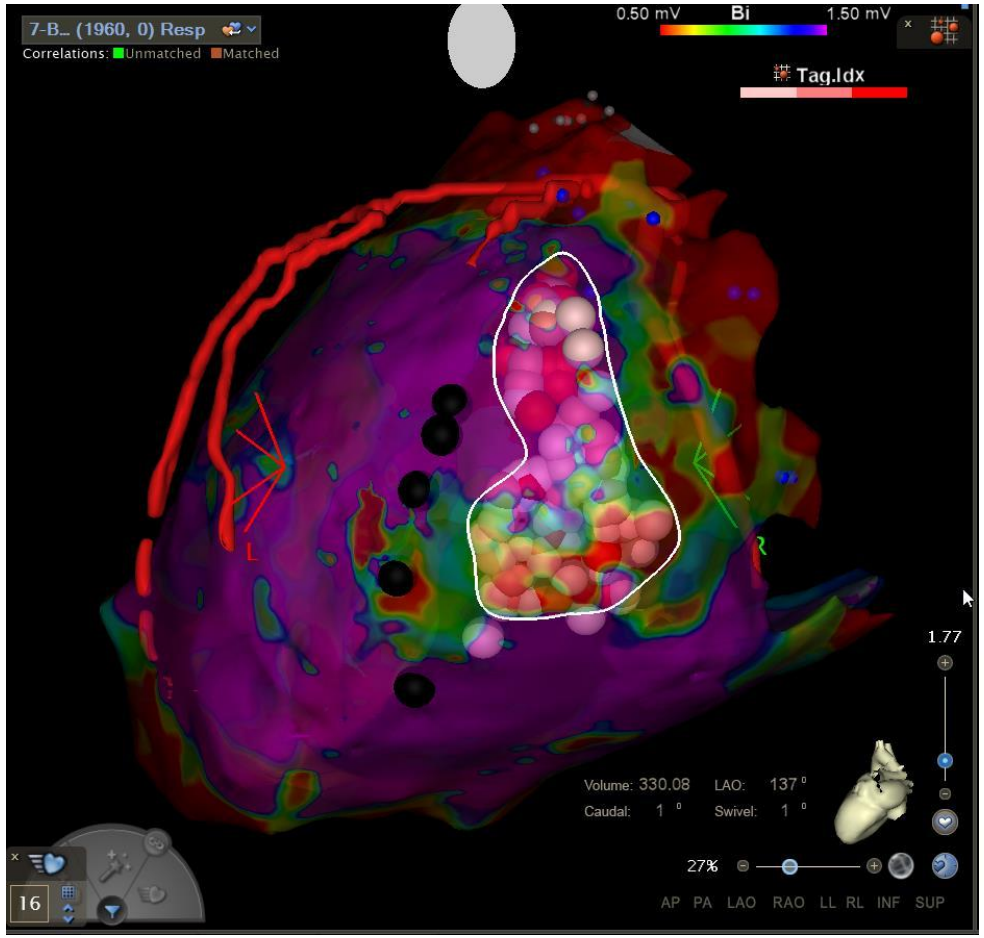
Non-invasive stereotactic VT ablation (STAR), still investigational

Favor in case of:

- Single, very stable, slow MMVT, particularly in older patients and/or with no indication for HTx
- High NYHA functional Class/procedural risk
- Only within registries/prospective studies

- Ongoing Italian Registry within the STOPSTORM European Consortium, (POPSTORM, PI: GM De Ferrari)

Stereotactic body radiation therapy (SBRT)
Jan 16, 2025



Boston Scientific

[redacted]
Clinica: **Ospedale Molinette**
Chiave di Ricerca:
Modo Tachy: **Monitor + Terapia**

Ultima Trasmissione Dispositivo: **22 ago 2025 00:15 CEST**
Ultima interrogazione ambulatoriale: **21 ago 2025**
Data di impianto: **27 giu 2023**
Gruppo di Pazienti: **Ospedale Molinette (Primario)**

Eventi da: Impianto

Tipo di evento: Tachy Ventricolare

Massimo di 250 episodi visualizzati

Evento	Data/Ora	Tipo	Terapia	Durata hh:mm:ss
V-772	15 mar 2025 22:32	VNonSost	Non sostenuti	00:00:15
V-771	09 feb 2025 19:59	VNonSost	Non sostenuti	00:00:14
V-770	22 gen 2025 01:20	VNonSost	Non sostenuti	00:00:14
V-769	21 gen 2025 18:59	VNonSost	Non sostenuti	00:00:16
V-768	20 gen 2025 19:12	VNonSost	Non sostenuti	00:00:14
V-767	20 gen 2025 19:11	VNonSost	Non sostenuti	00:00:18

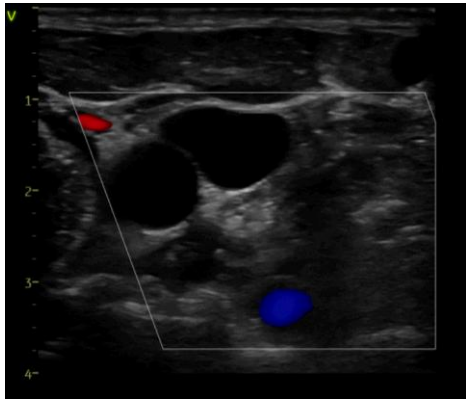
13 ottobre 2025
25 novembre 2025

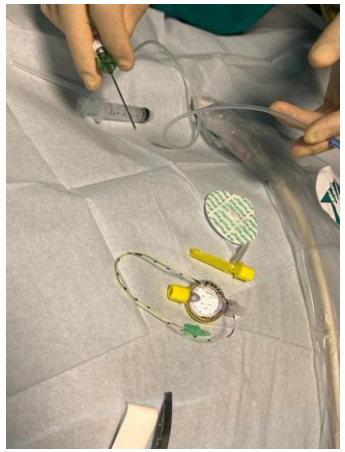
UNIVERSITÀ DI TORINO

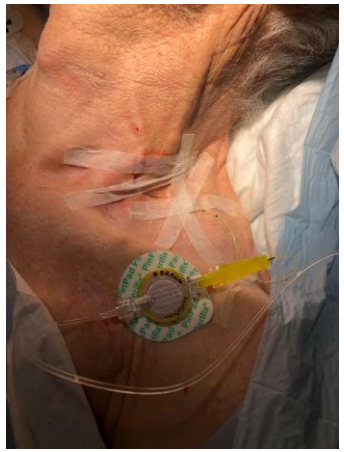
Iscrizioni aperte!

Gestione avanzata dello storm aritmico in terapia intensiva e blocco percutaneo del ganglio stellato

https://sites.google.com/view/stormaritmico/home







8.9 ECM

Advanced ES management

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