

Ablation of Idiopathic VF

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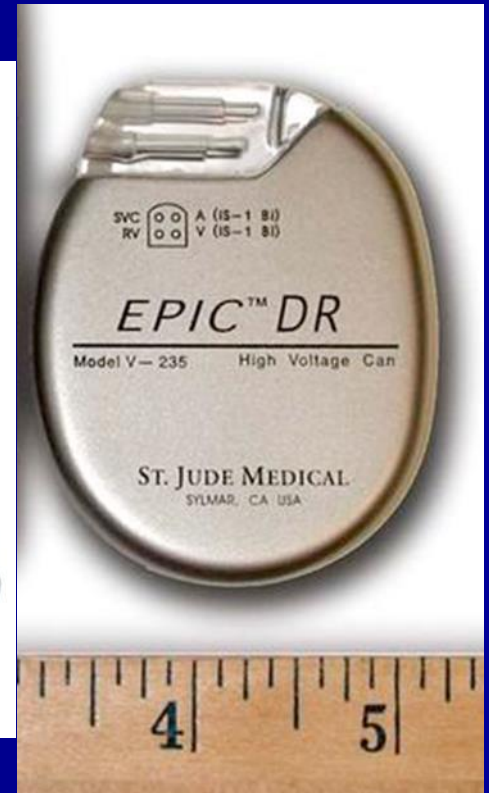
Conflict of Interest and Funding

- **Speaking honorarium:** Biosense Webster, Boston Scientific, Biotronik, Medtronic, St Jude Medical, Sorin Group, Sanofi-Aventis, Boehringer Ingelheim, Bayer, Pfizer
- **Consulting fees:** St Jude Medical, Voyage Medical, Sorin Group
- **Research grant:** Medtronic, Sanofi-Aventis

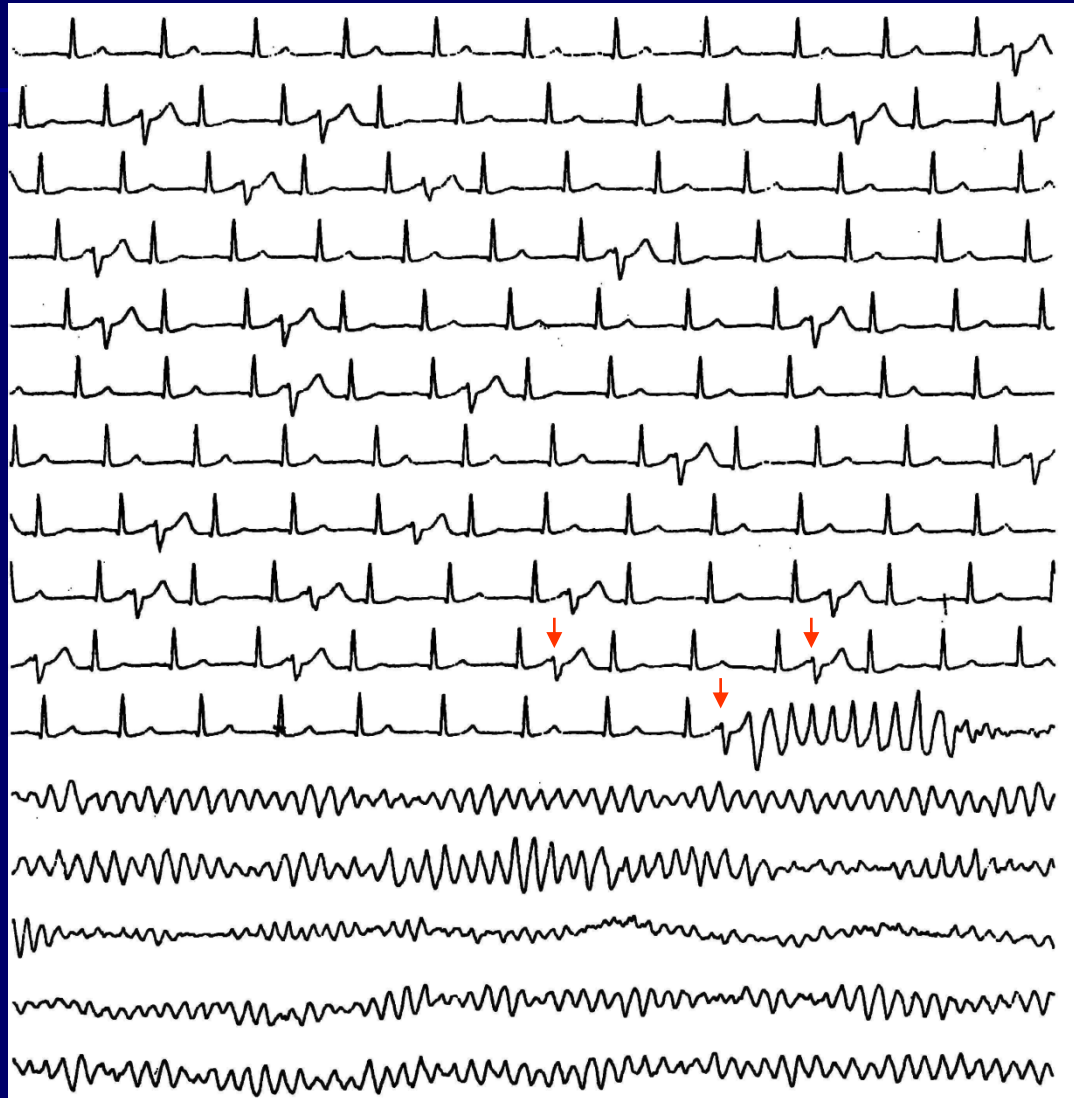
Primary Treatment for VF

For such patients,
Primary therapy remains.....

Defibrillation



Initiation of Ventricular Fibrillation



Role of Purkinje conducting system in triggering of idiopathic ventricular fibrillation

Michel Haïssaguerre, Dipen C Shah, Pierre Jaïs, Morio Shoda, Josef Kautzner, Thomas Arentz, Dietrich Kalushe, Alan Kadish, Mike Griffith, Fiorenzo Gaïta, Teiichi Yamane, Stephane Garrigue, Meleze Hocini, Jacques Clémenty

Lancet 2002; **359**: 677–678

- PVC originating from Purkinje system can be responsible for VF initiation

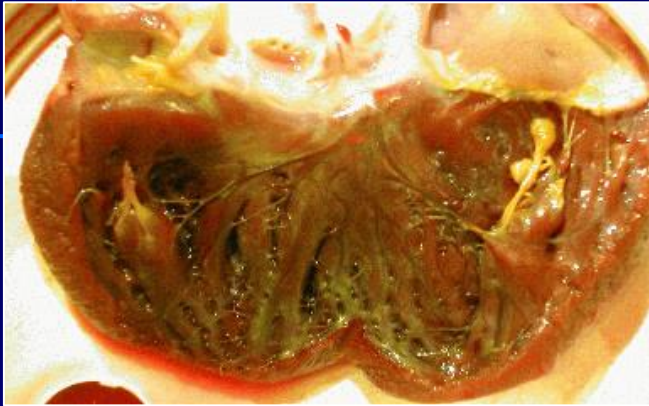
Mapping and Ablation of Idiopathic Ventricular Fibrillation

Michel Haïssaguerre, MD; Morio Shoda, MD; Pierre Jaïs, MD; Akihiko Nogami, MD; Dipen C. Shah, MD; Josef Kautzner, MD; Thomas Arentz, MD; Dietrich Kalushe, MD; Dominique Lamaison, MD; Mike Griffith, MD; Fernando Cruz, MD; Angelo de Paola, MD; Fiorenzo Gaïta, MD; Méléze Hocini, MD; Stéphane Garrigue, MD; Laurent Macle, MD; Rukshen Weerasooriya, MD; Jacques Clémenty, MD

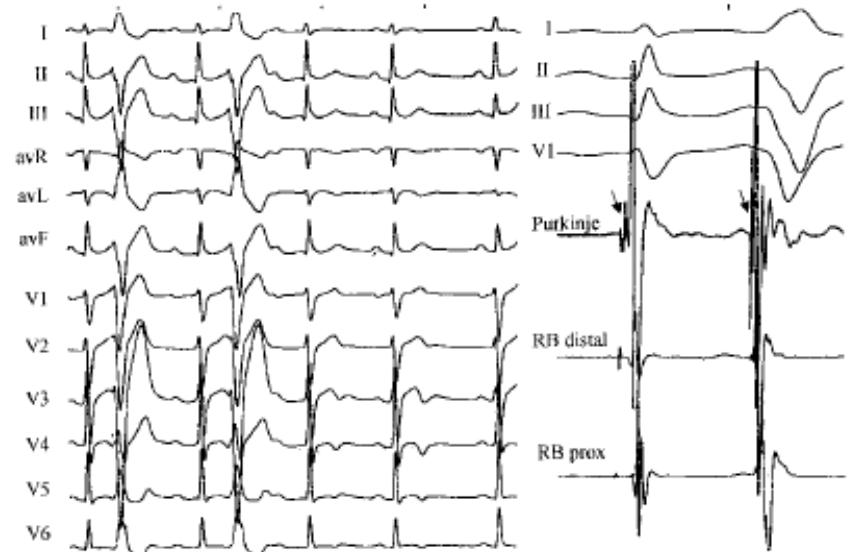
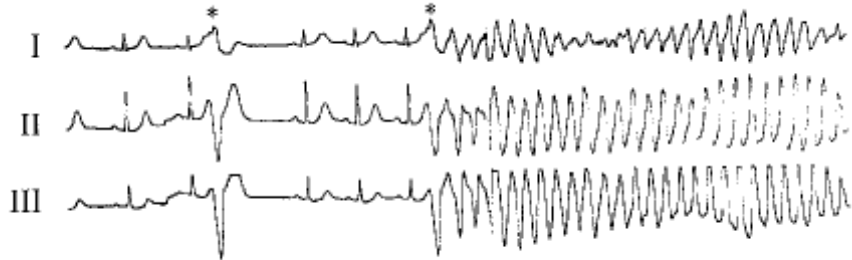
(Circulation. 2002;106:962-967.)

- Catheter ablation of these triggers may eliminate VF recurrence

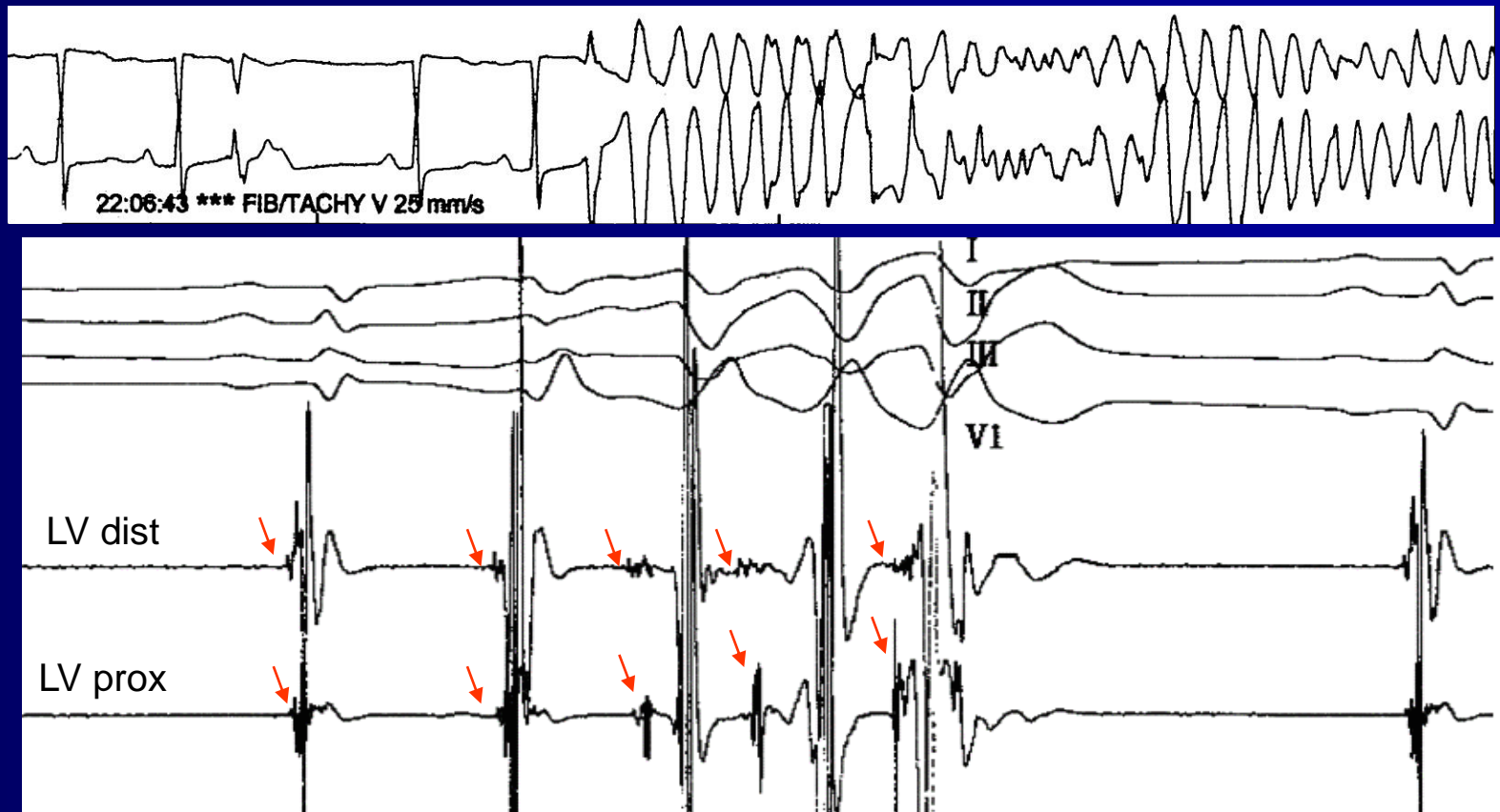
Purkinje VF triggers?



- 2% of ventricular mass
- Located Subendocardially
- Isolated from myocardium
- Electrophysiological properties different from myocardium
- Response to ischemic injury different from myocardium



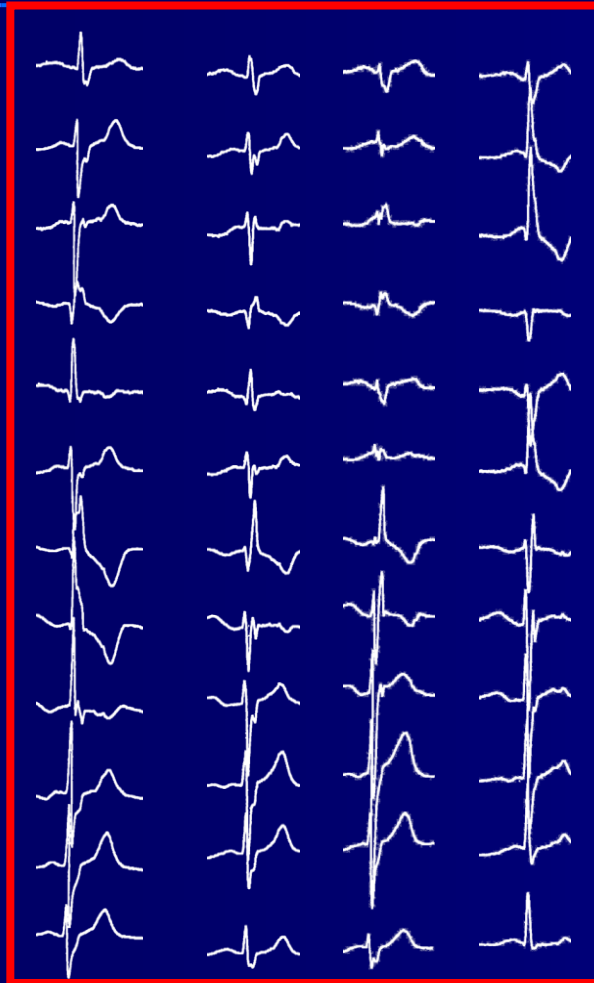
Initiation of idiopathic VF by Purkinje Repetitive Beats



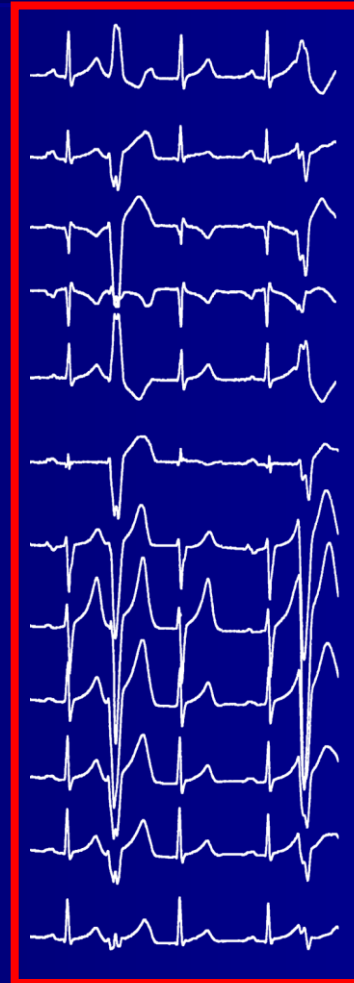
Each QRS complex is morphologically different but preceded by a Purkinje potential with a varying conduction time

Different morphologies of Purkinje PVCs triggering IVF

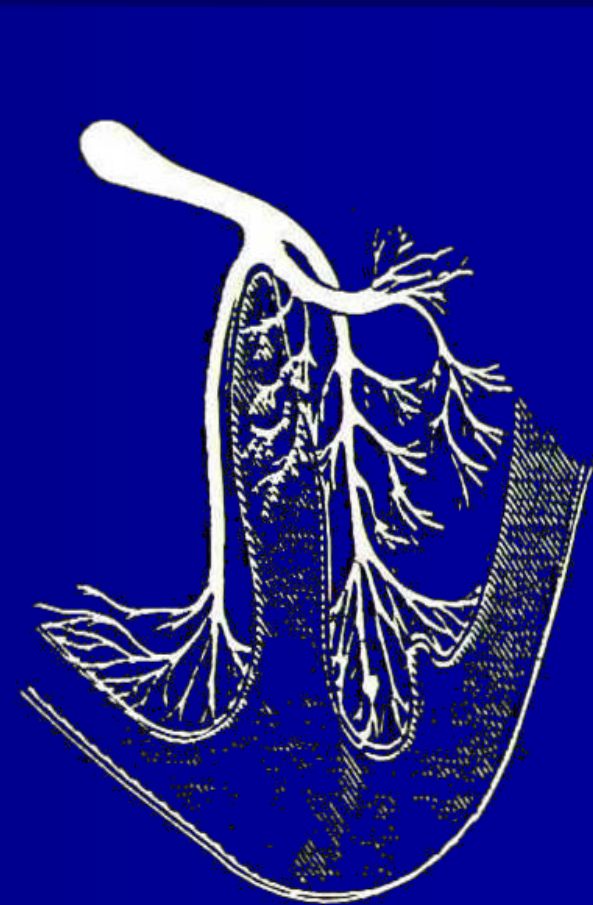
I
II
III
avR
avL
avF
V1
V2
V3
V4
V5
V6



LV Purkinje



RV Purkinje



Haissaguerre et al Circ 2002

Importance of 12-lead documentation of PVCs



Patient Selection

- Multiple episodes of “primary” VF or polymorphic VT
- Unresponsive to medication
- Experiencing multiple shocks unresponsive to reprogramming
- Frequent PVCs at the time of the procedure

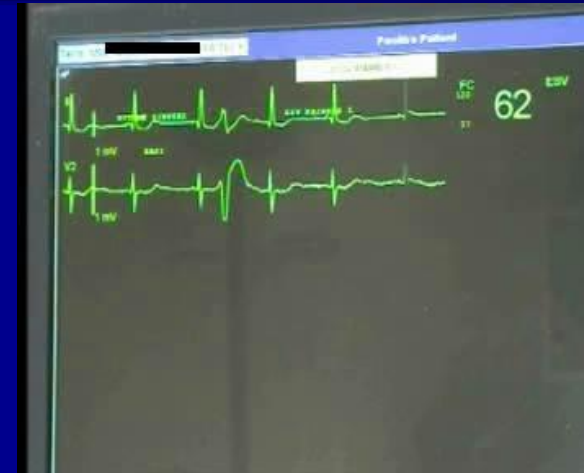
Unregistered HyperCam 2



Mapping Strategy

Based on the earliest endocardial activity of PVC origin

- **Opportunistic Procedural Timing**
Following an Arrhythmic Storm
- **Conventional Catheters Access**
Retrograde Aortic and Transeptal
- **Purkinje Origin**
High frequency (sharp) potential preceding a lower frequency muscle potential both in ST and during PVC



Idiopathic VF: Frequent short coupled VPBs

- 41 y old male
- Syncope x 2
- VF on arrival
- 11 Episodes VF within 24 hrs



Mr [REDACTED]

Heure EVNT: 21:50:59

Délag: 10 secondes

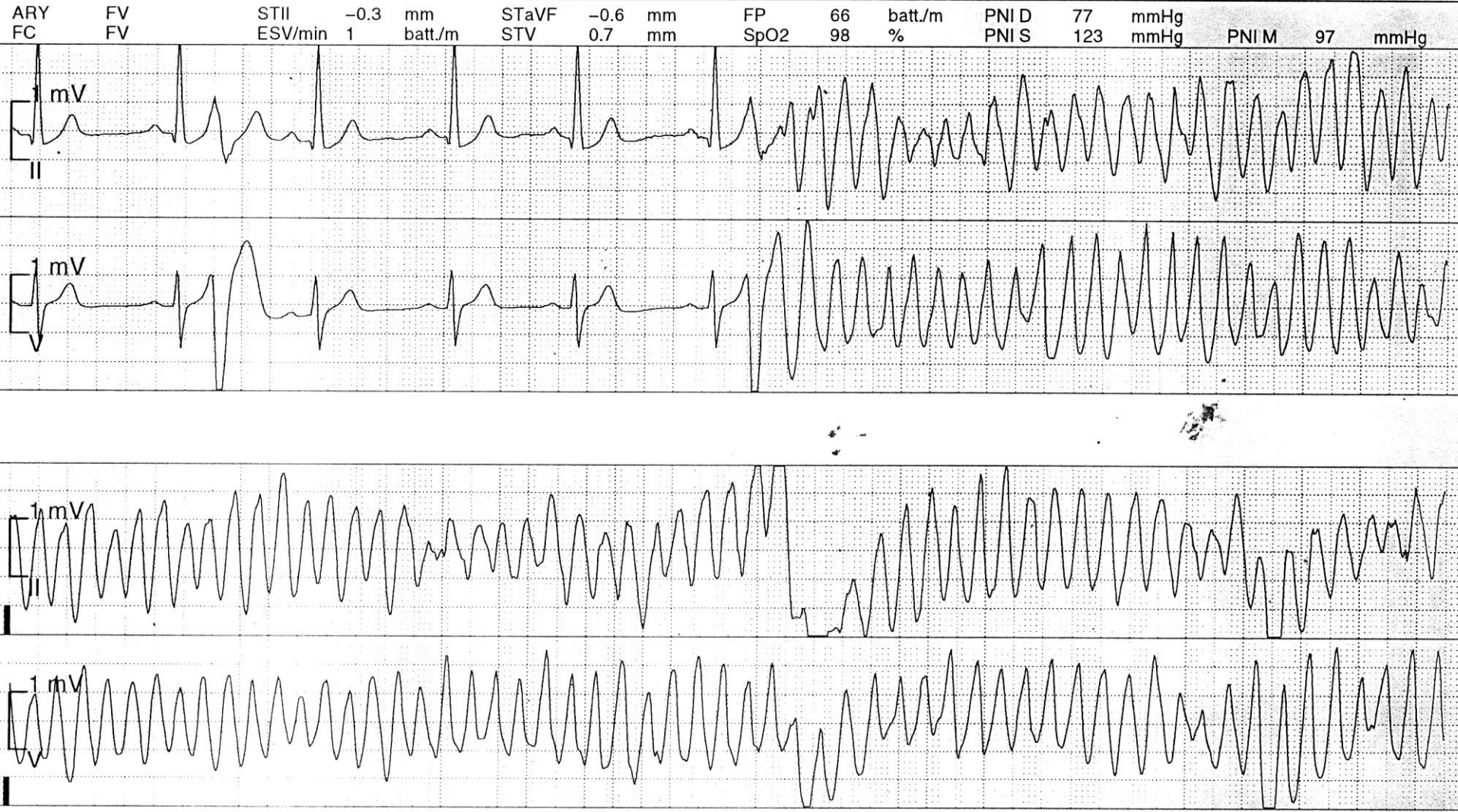
Date EVNT: 03-Mar-2008

Vitesse: 25mm/s

CSI CH106

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ARY: FIB! (Dériv. II)



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Date EVNT: 03-Mar-2008

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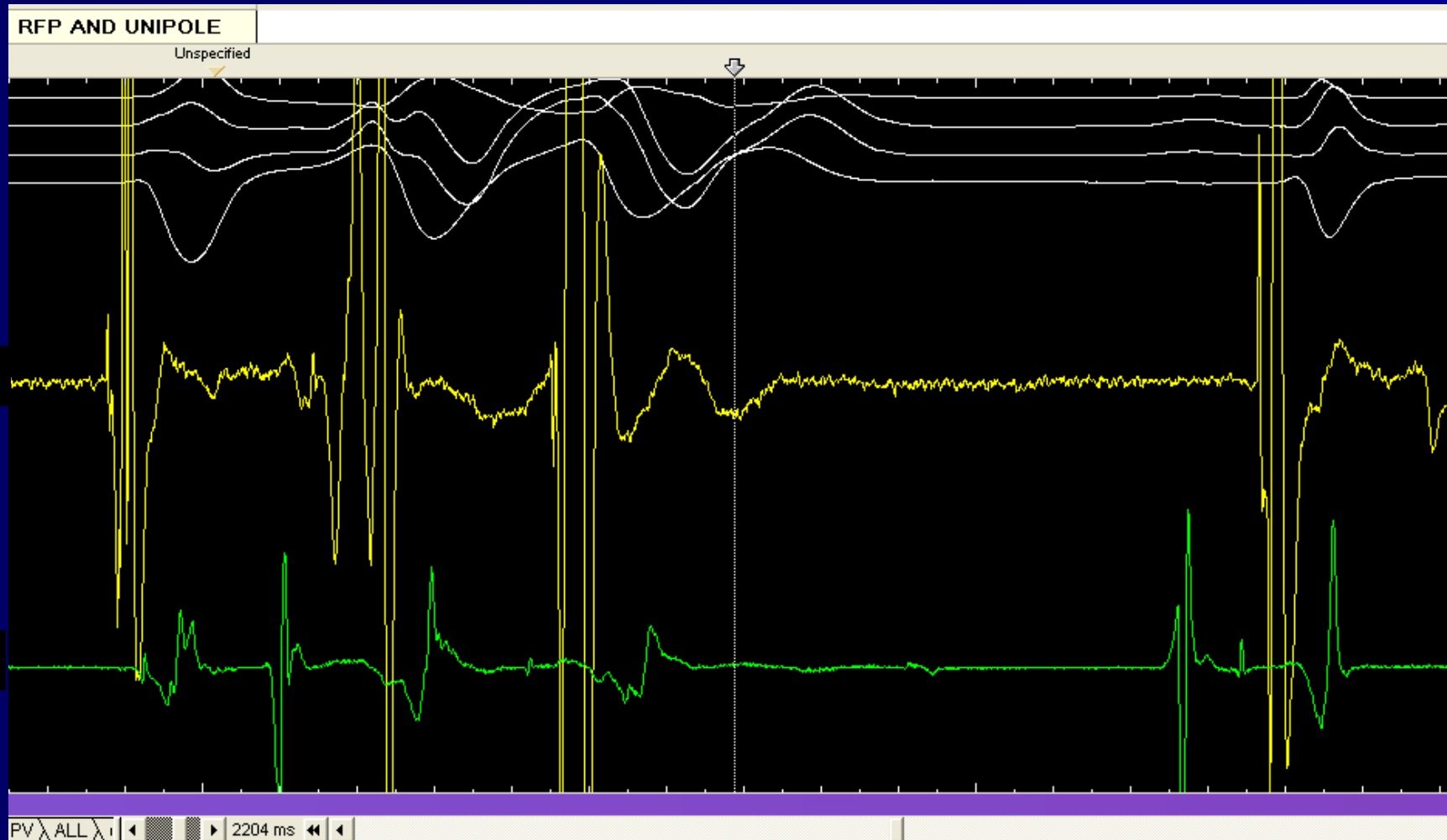
CSI CH106

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ARY: FIB! (Dériv. II)



Mapping the Purkinje Potentials and PVCs



Map dist

His dist

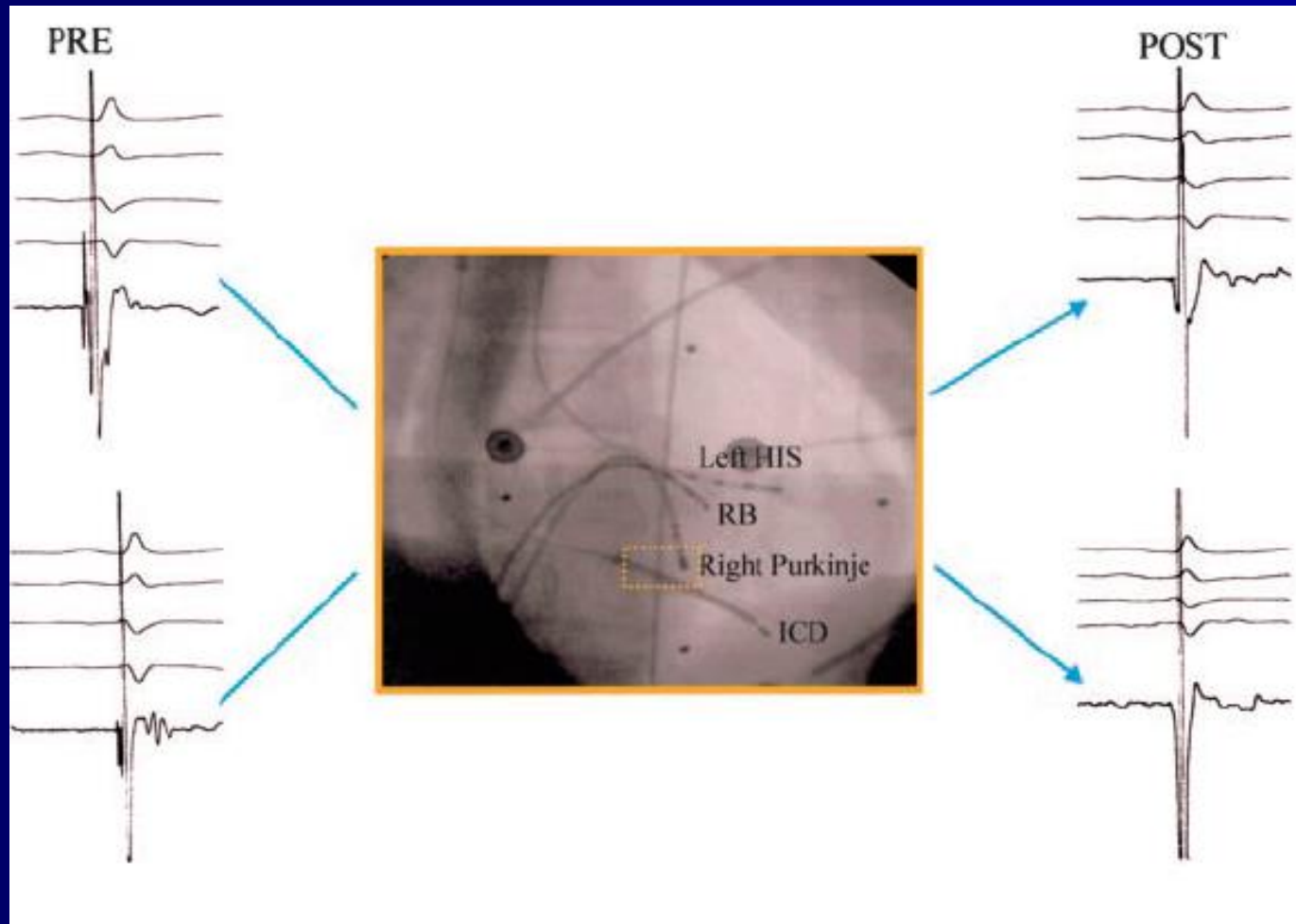
RBBB - Conceals Purkinje Potential



Ablation starts...



Purkinje Potentials: Endpoints of Ablation



VF trigger ablation in 121 patients



	Purkinje	RVOT	Myocardial
Idiopathic VF	54 (LV-RV)	5	
Post MI VF	32 (LV)		3
Brugada S	1 (RV)	8	
LQTS	4 (LV)		
Aortic Valve	1 (LV)		1
Dilated C M			1
Others	7		3

Predictor of ablation failure = multiple trigger morphologies

Reasons for failure

- No PVCs recorded on 12 leads
- Bundle branch block that prevent Purkinje Mapping
- VF storm during catheter mapping
 - 4 patients (2 teenage girls, 2 males 45/50yo)

Long-Term Follow-Up of Idiopathic Ventricular Fibrillation Ablation

A Multicenter Study

VF ablation a viable strategy ?

Sébastien Knecht, MD,*‡‡ Frédéric Sacher, MD,* Matthew Wright, MBBS, PhD,*
Mélèze Hocini, MD,* Akihiko Nogami, MD,† Thomas Arentz, MD,‡ Bertrand Petit, MD,§
Robert Franck, MD,|| Christian De Chillou, MD,¶ Dominique Lamaison, MD,# Jérónimo Farré, MD,**
Thomas Lavergne, MD,†† Thierry Verbeet, MD,‡‡ Isabelle Nault, MD,* Seiichiro Matsuo, MD,*
Lionel Leroux, MD,* Rukshen Weerasooriya, MD,* Bruno Cauchemez, MD,§§
Nicolas Lellouche, MD,* Nicolas Derval, MD,* Sanjiv M. Narayan, MD, PhD,* Pierre Jaïs, MD,*
Jacques Clementy, MD,* Michel Haïssaguerre, MD*

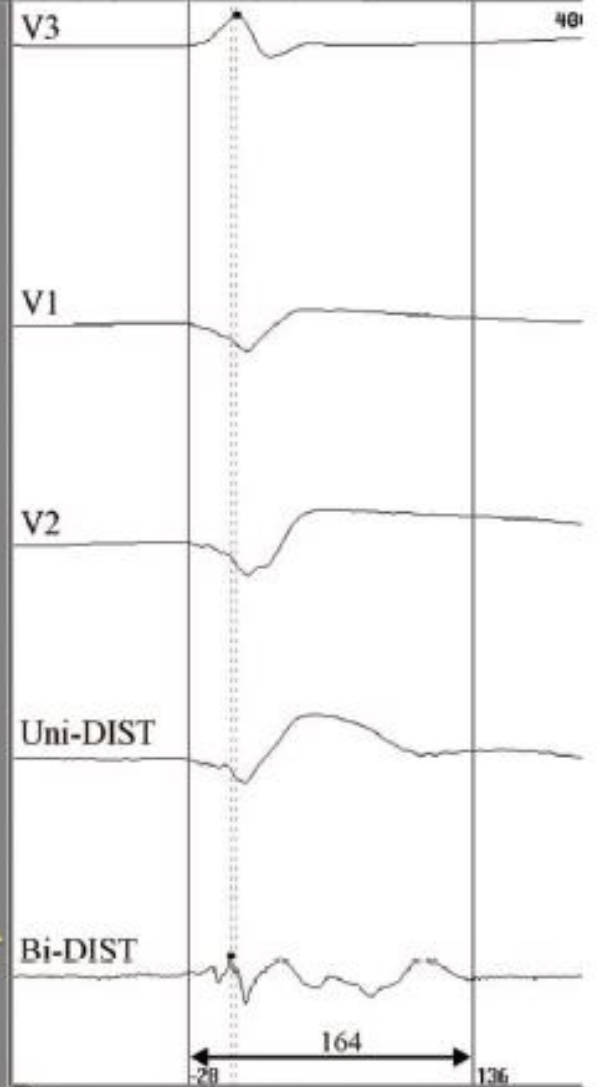
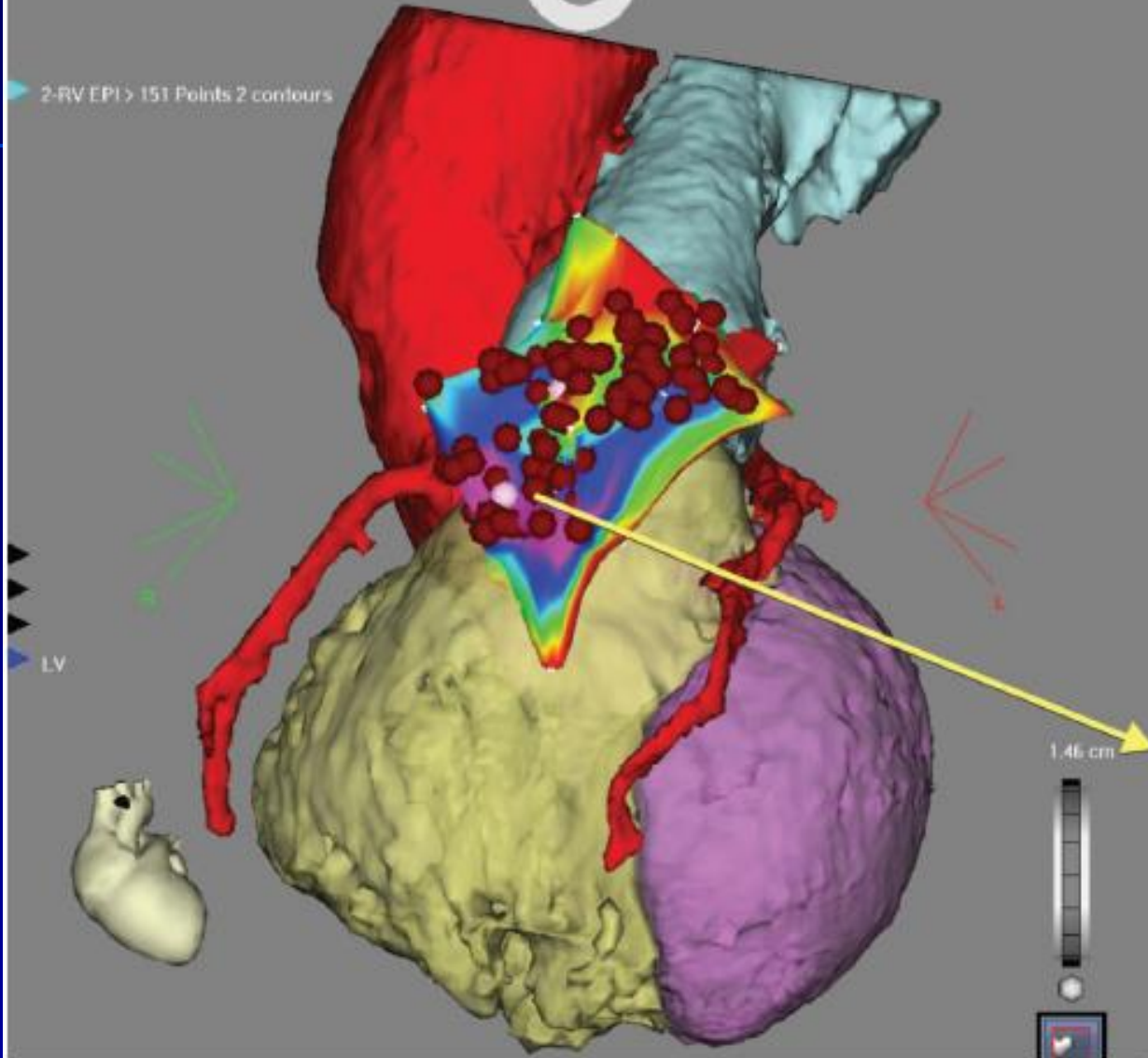
Median follow-up duration of 5 Years (63 months/40-80) :

- 31 of 38 (86%): no recurrence of VF as demonstrated by ICD monitoring
- Repeat ablation performed in 5 patients
 - Four of the 5 had non targeted VPB morphologies
 - No recurrence at 28 (24-72)months

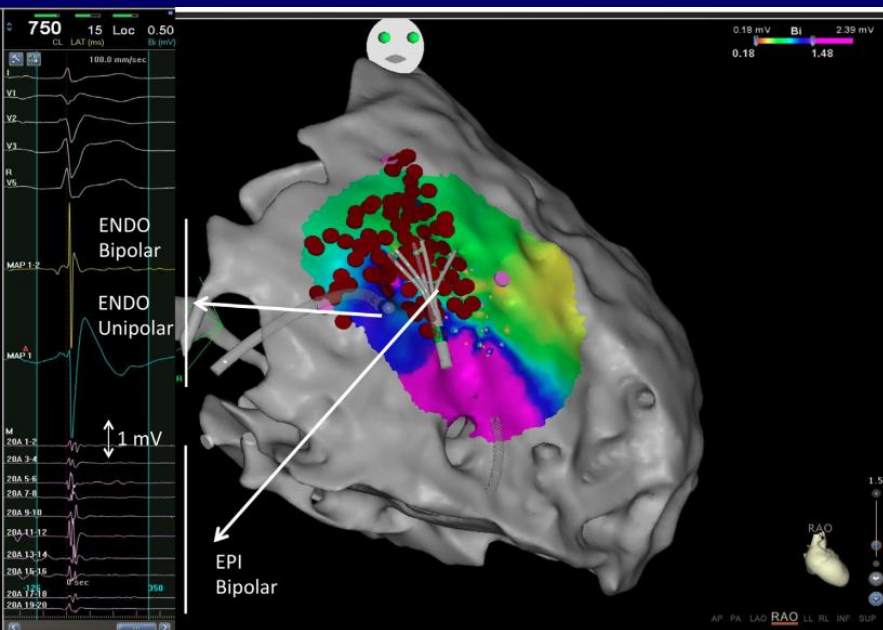
A2-A1



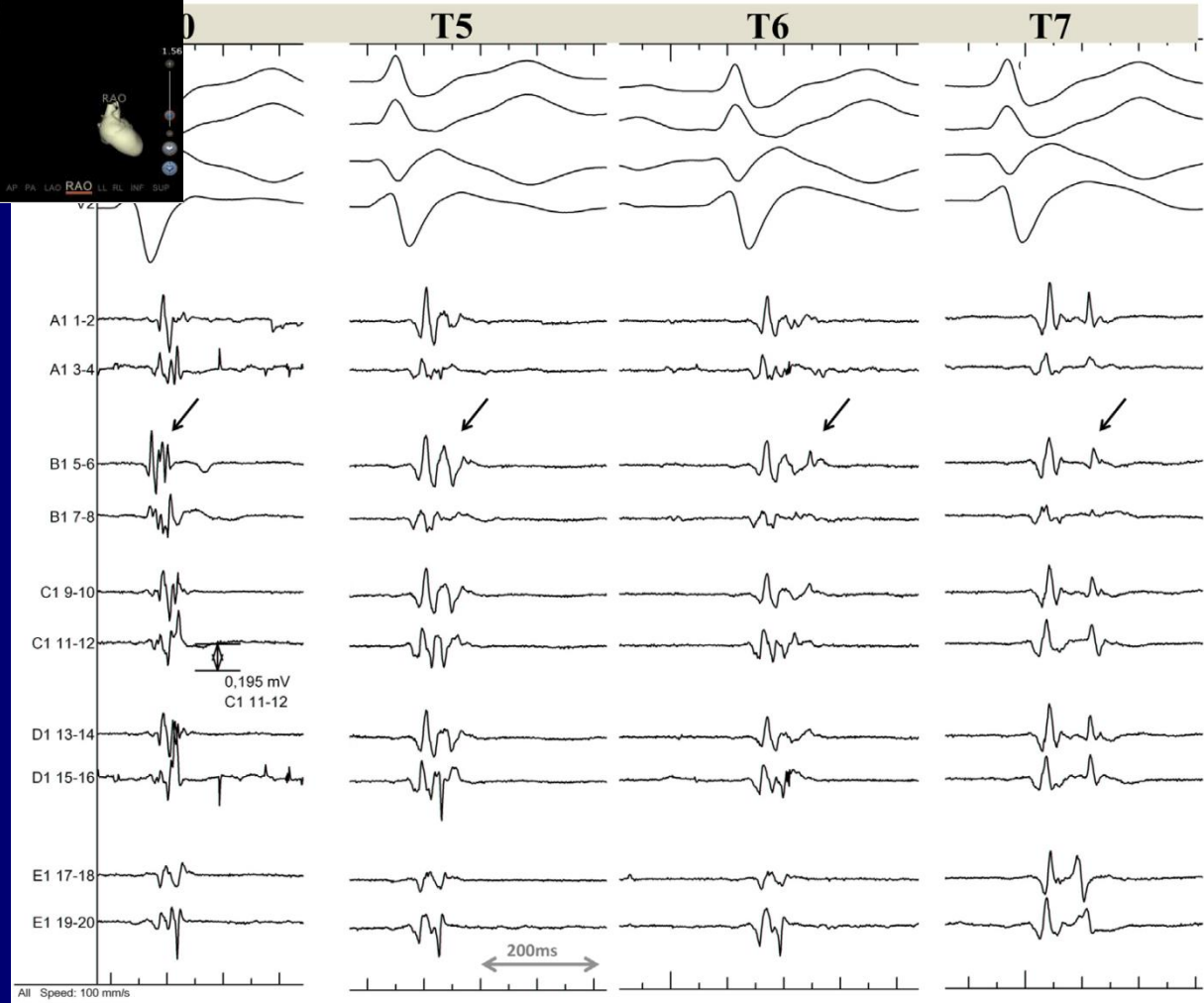
2-RV EPI > 151 Points 2 contours



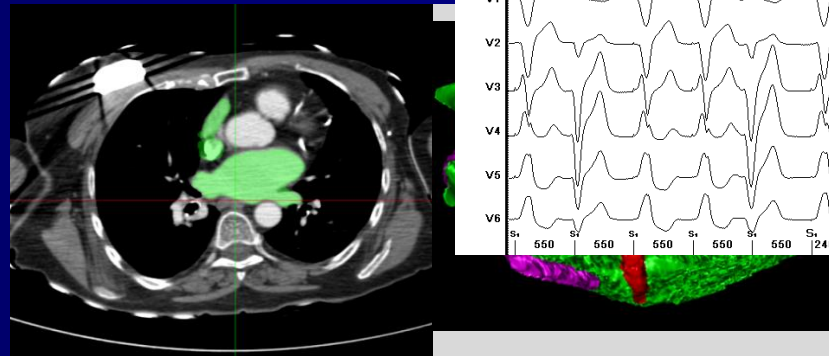
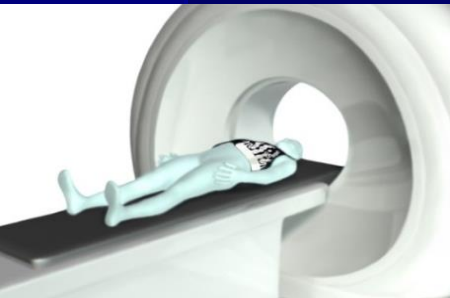
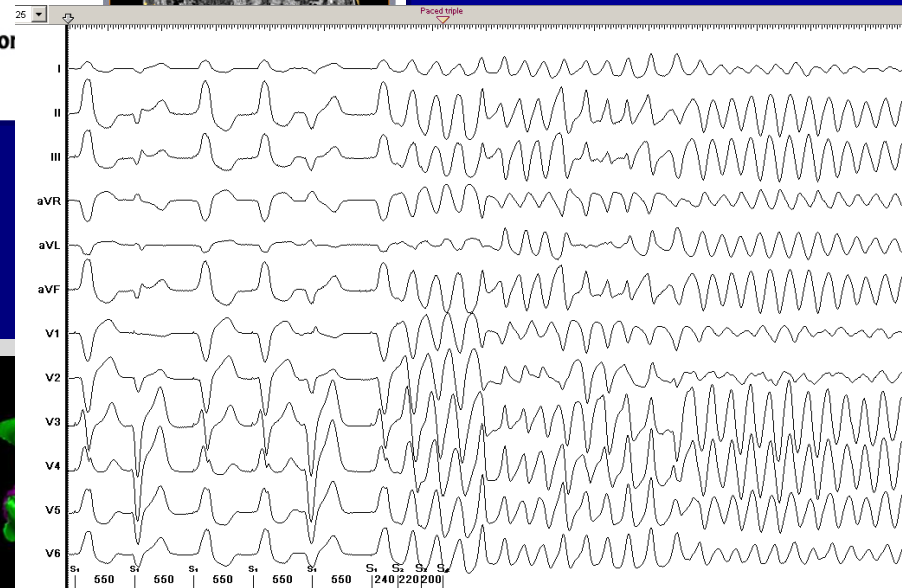
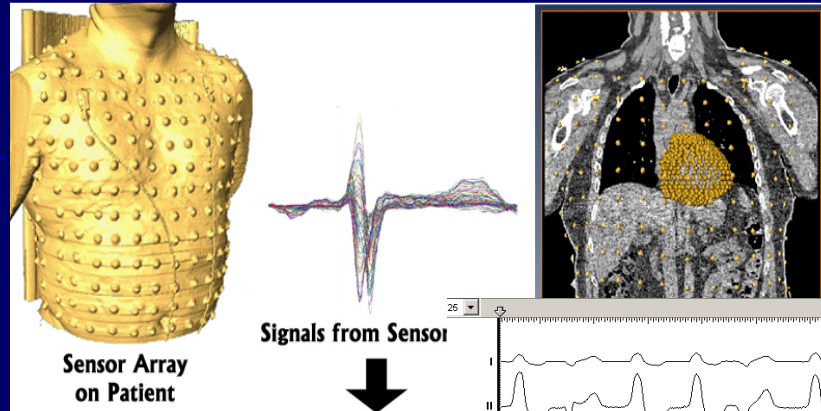
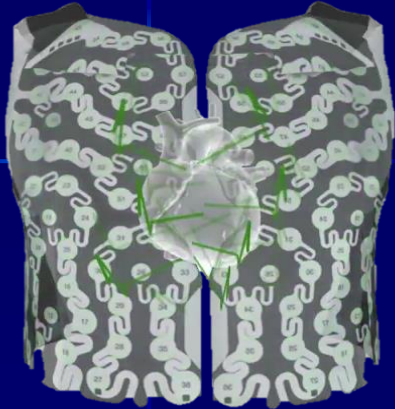
775 LAT CL Loc



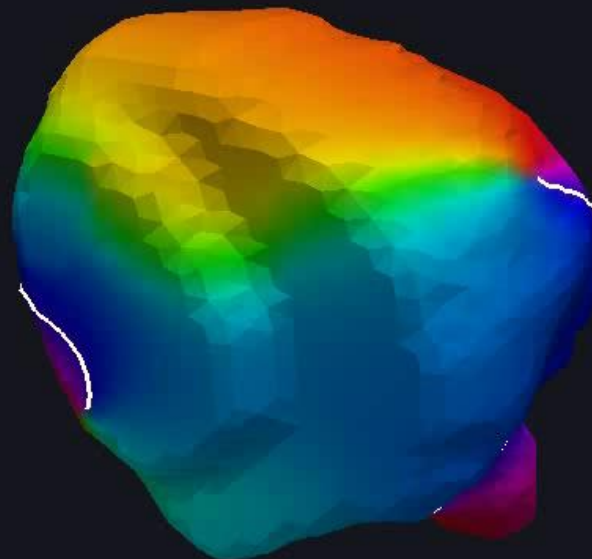
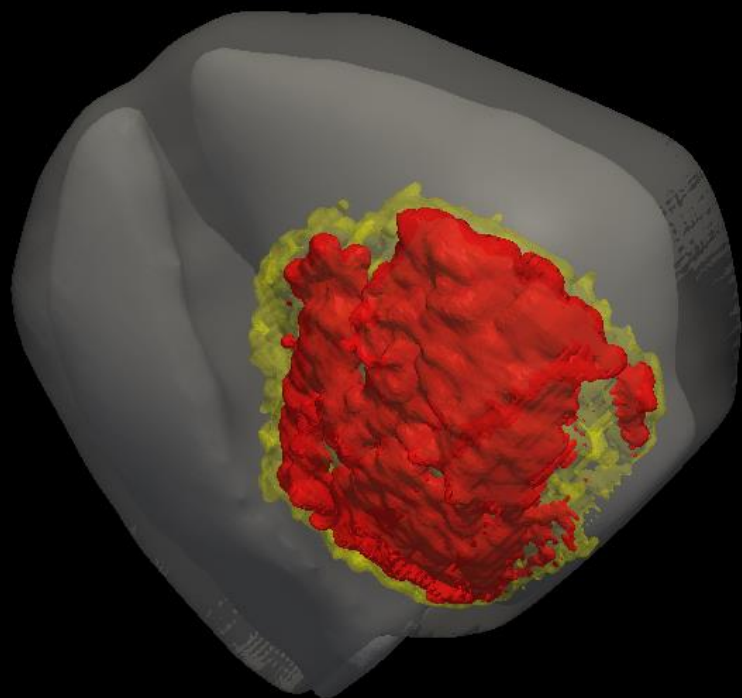
Brugada Syndrome Substrate



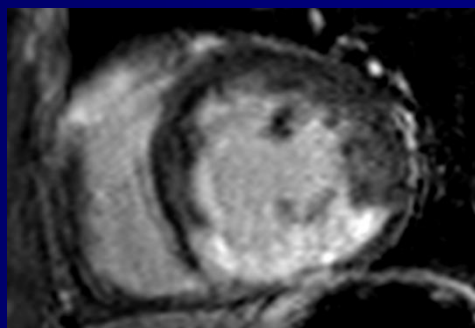
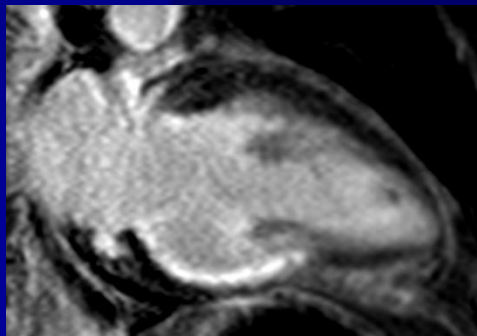
Non-invasive mapping in man



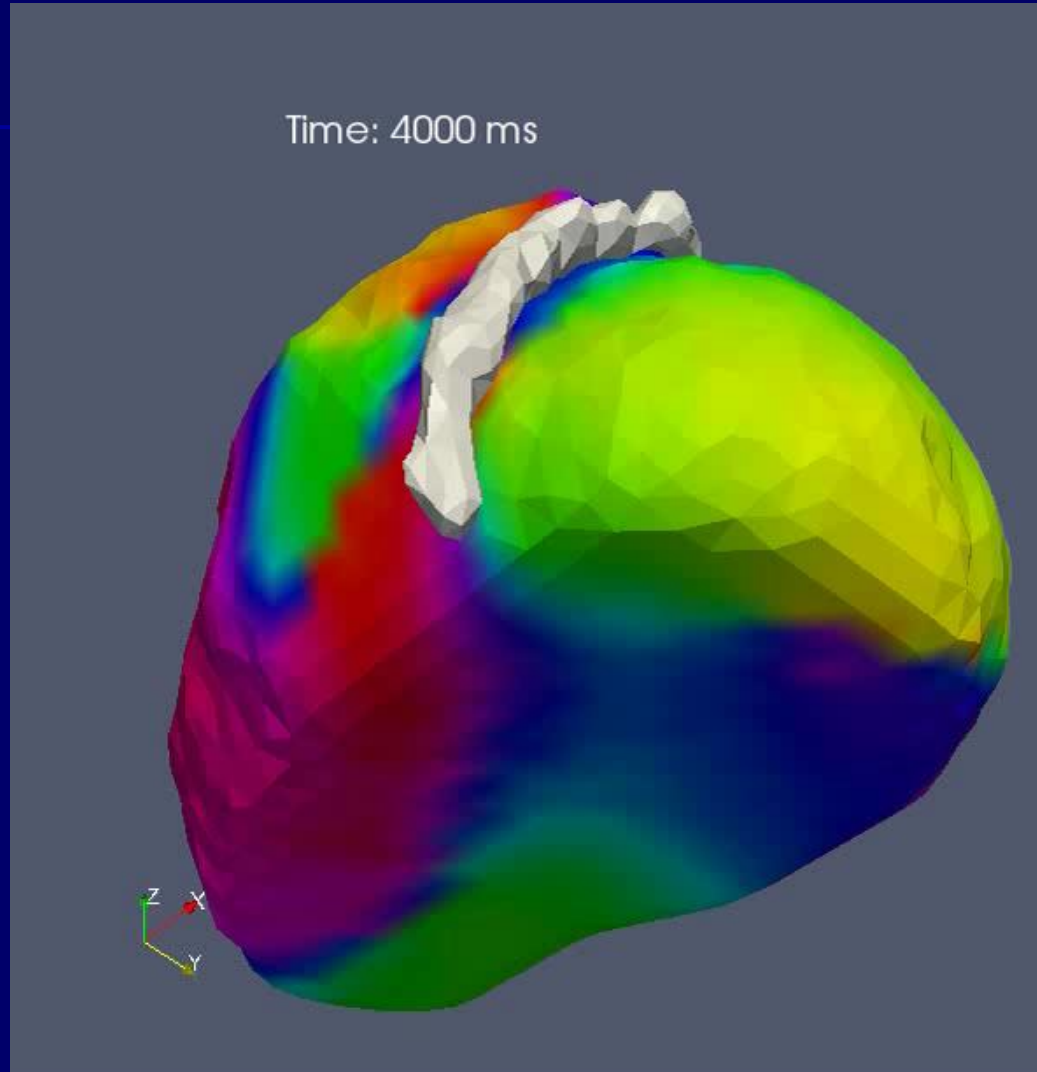
Impact of MI scar on rotor dynamics



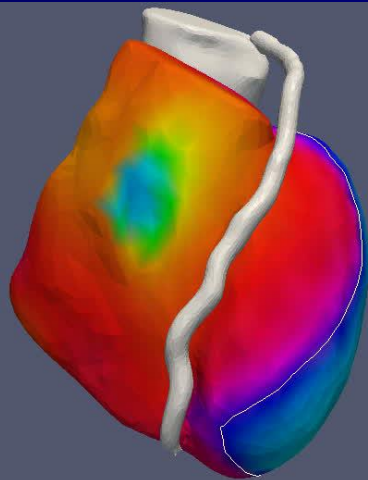
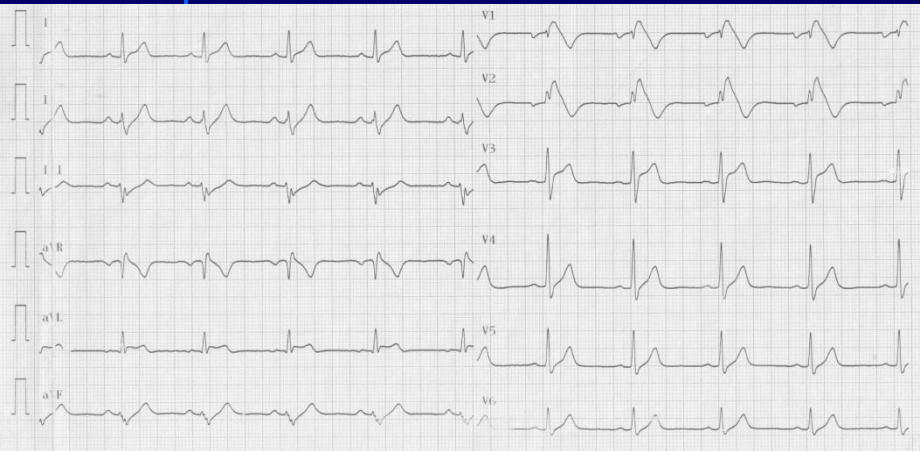
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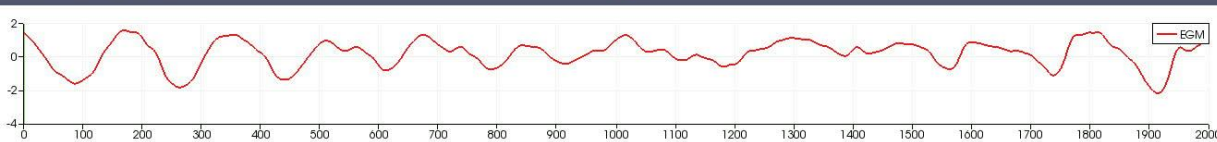
Case: Male 24 yo, SCA due to idiopathic VF



Case: Male 52y old, Brugada type 1



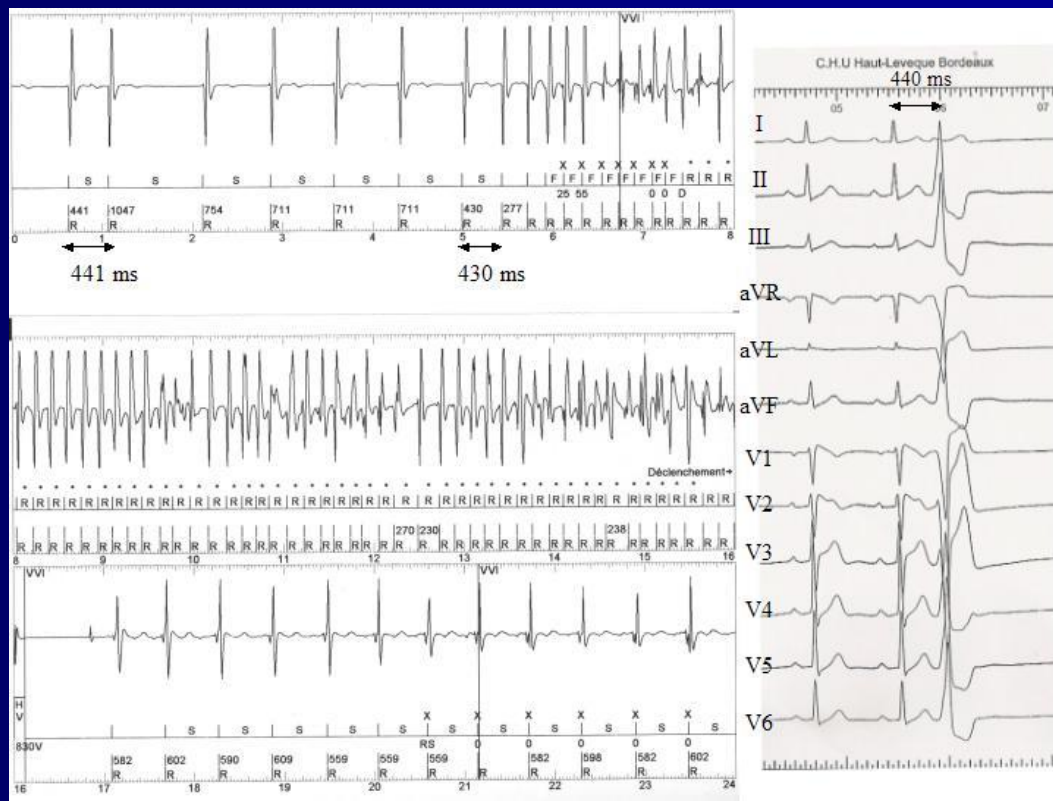
Time: 0 ms



- No previous medical history
- No familial history of sudden cardiac death
- 20/12/2011: syncope at rest
- Normal brain CT scan, Normal transthoracic echocardiography, cardiac MRI
- 23/11/2011: single chamber ICD implantation (MEDTRONIC protecta VR)
- 01/05/2012: VF, 1 ICD shock

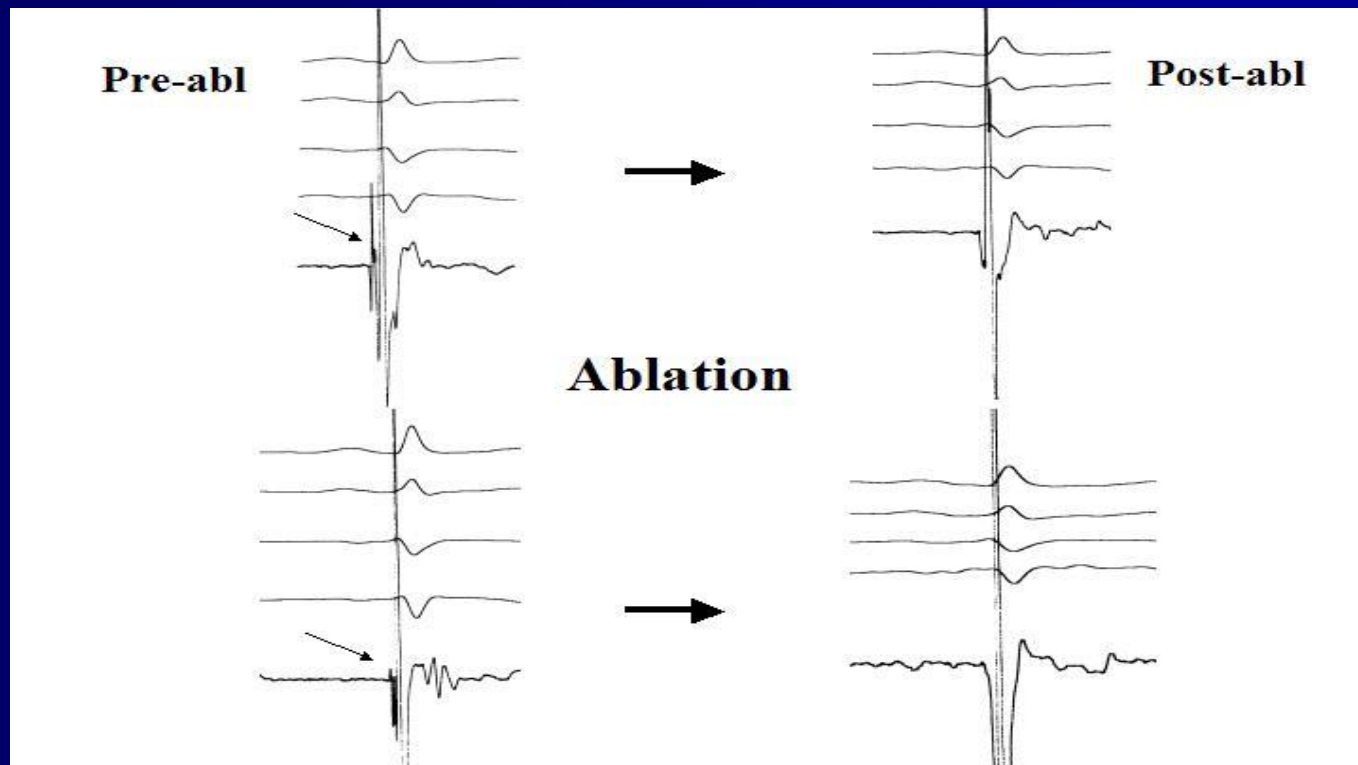
Take home messages

- ❖ Opportunistic procedural timing during arrhythmic storm
- ❖ Get a 12 lead ECG of all PVC morphologies particularly during repetitive discharges



Take home messages

- ❖ During RF delivery, episodes of polymorphic VT/VF may occur
- ❖ The endpoint of Purkinje tissue ablation is elimination of targeted potentials



Acknowledgments

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