

Presenting your most challenging cases

Venice  
Arrhythmias



## Ventricular Arrhythmias

Gioia Turitto, MD



# Presenter Disclosure Information

A questionable indication for  
CRT-D in a patient with VT  
after successful ablation

**Gioia Turitto, MD**

**Cardiac Electrophysiology Services  
NY Methodist Hospital  
Brooklyn, New York**

**Venice Arrhythmias  
2015**



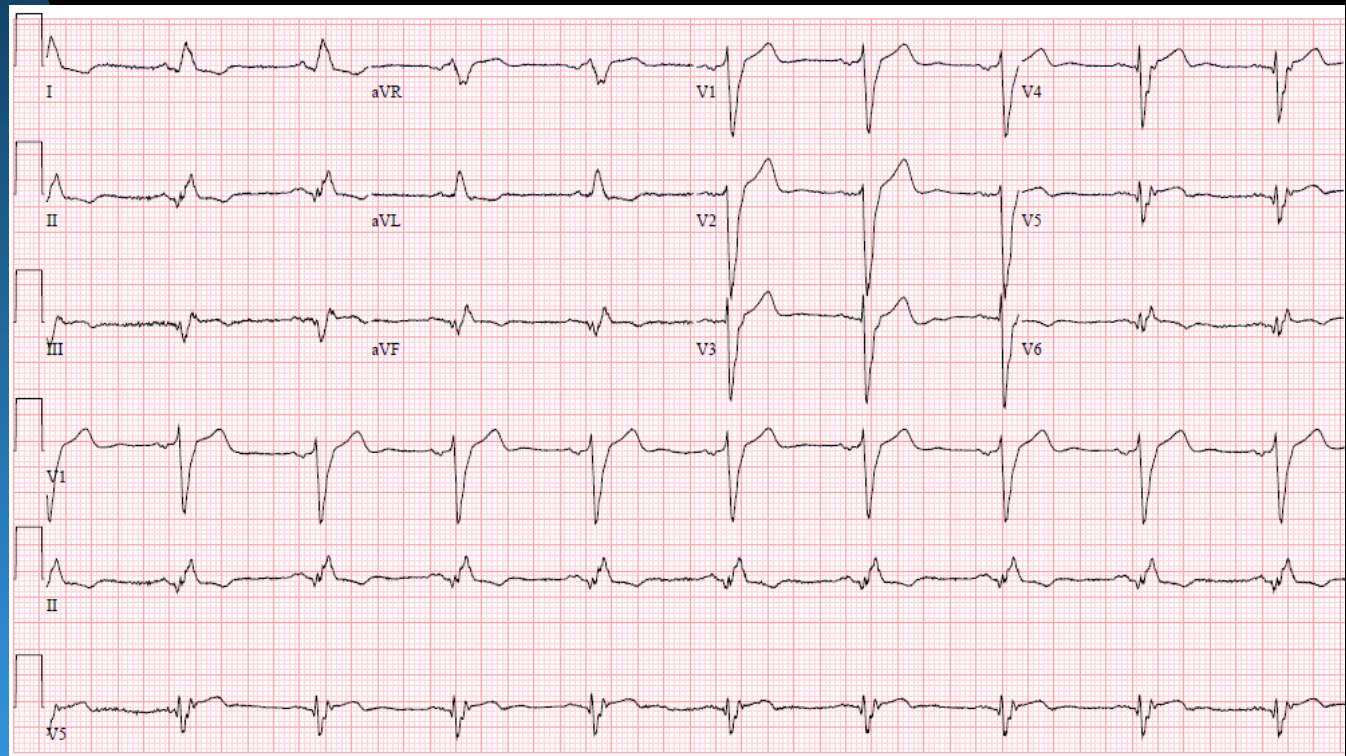
**There are no conflicts of interest  
to disclose**

# Case Presentation - 1

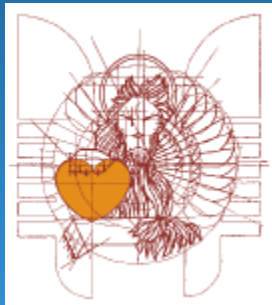
- History of HTN, dyslipidemia, NIDDM, past smoking habit, works as an ambulance driver
- 44-y/o: CABG
- 53-y/o: ICD for primary prevention of SCD
- 57-y/o: On warfarin for LV thrombus; EF by echo= 13%
- 58-y/o: Started on amiodarone for exercise-induced VT leading to ICD shocks; referred for cardiac catheterization
- Coronary angiography shows:
  - ◆ Severe native CAD with  $\geq 99\%$  3-vessel disease;
  - ◆ Patent LIMA to LAD, patent SVG grafts to RPDA, OM2

# Case Presentation -2

- Pt in NYHA FC= III despite compliance to medical therapy (ASA, digoxin, carvedilol, valsartan, HCTZ, rosuvastatin, warfarin , amiodarone)
- ECG shows atrial paced rhythm, QRS duration= 176 msec
- Pt is referred for device upgrade to BIV ICD



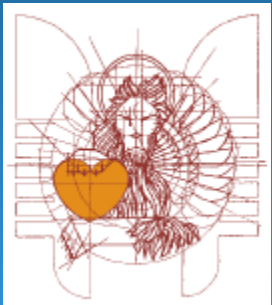
Venice Arrhythmias  
2015



# Case Presentation - 3

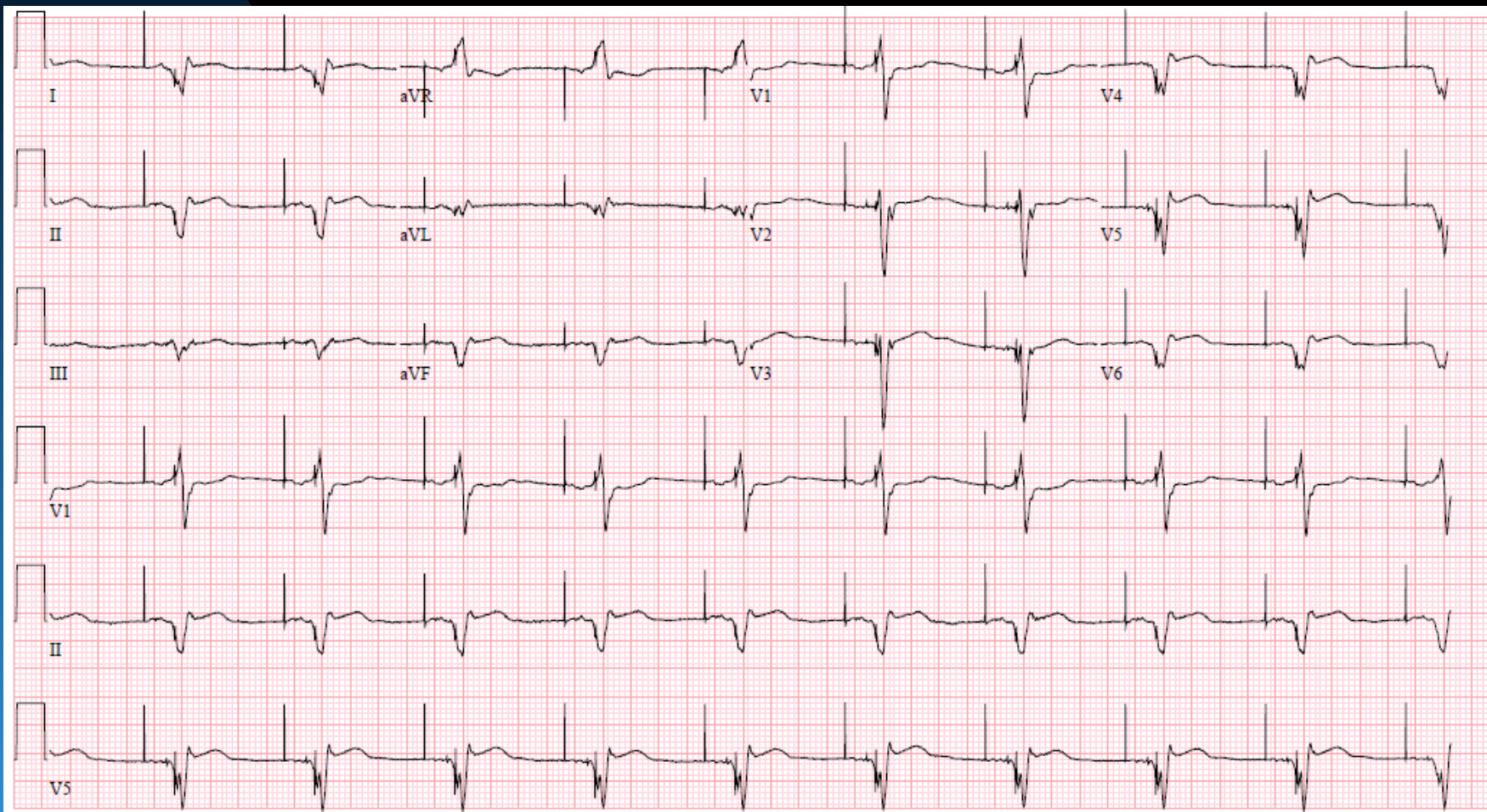
- Intraoperative findings:
  - ◆ Coronary sinus angiography shows a high anterior lateral branch (too small to accommodate the LV lead) and a postero-lateral branch. Pacing in the distal portion of the latter vein has a high threshold. The lead is repositioned more proximally with satisfactory threshold.

Venice Arrhythmias  
2015



# Case presentation - 4

ECG after BIV ICD upgrade



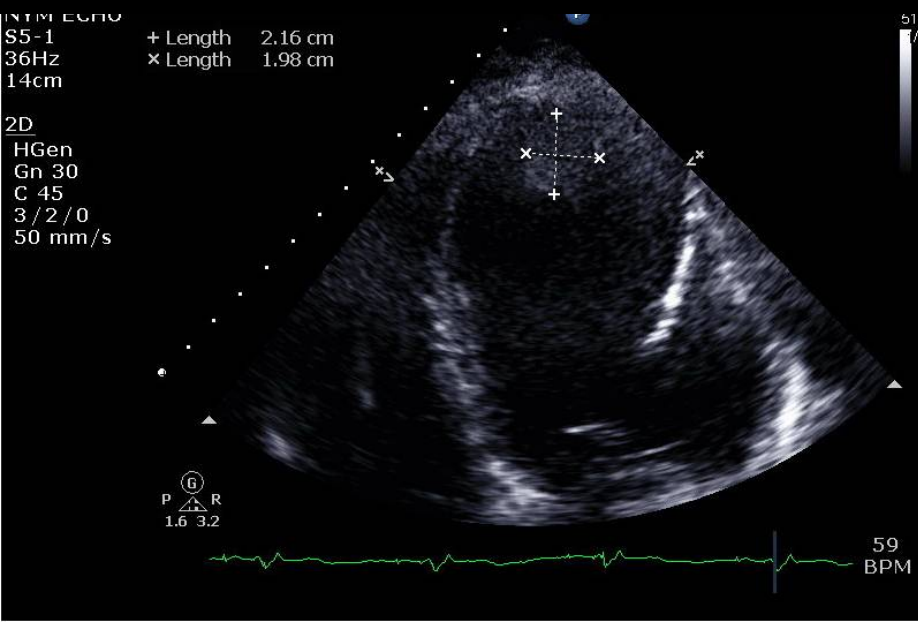


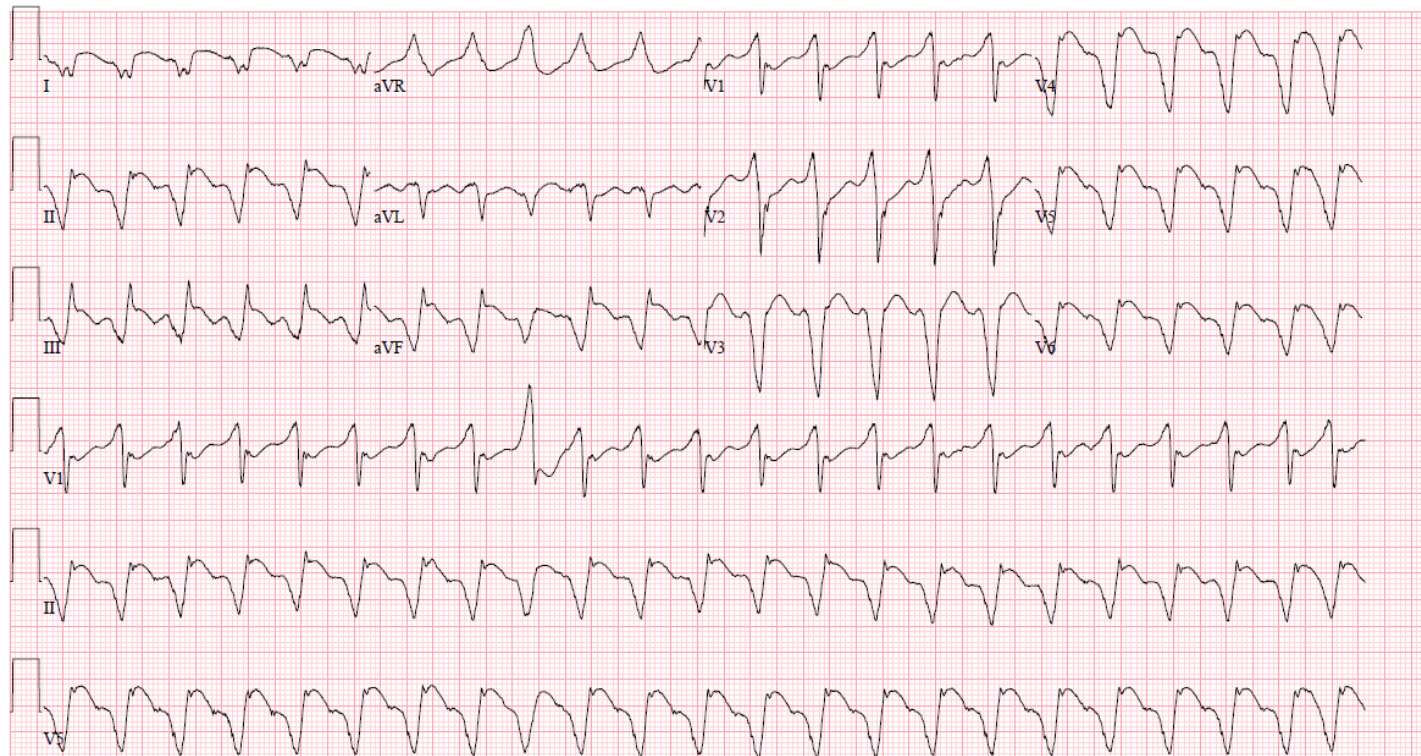
# Case Presentation - 5



Venice Arrhythmias  
2015

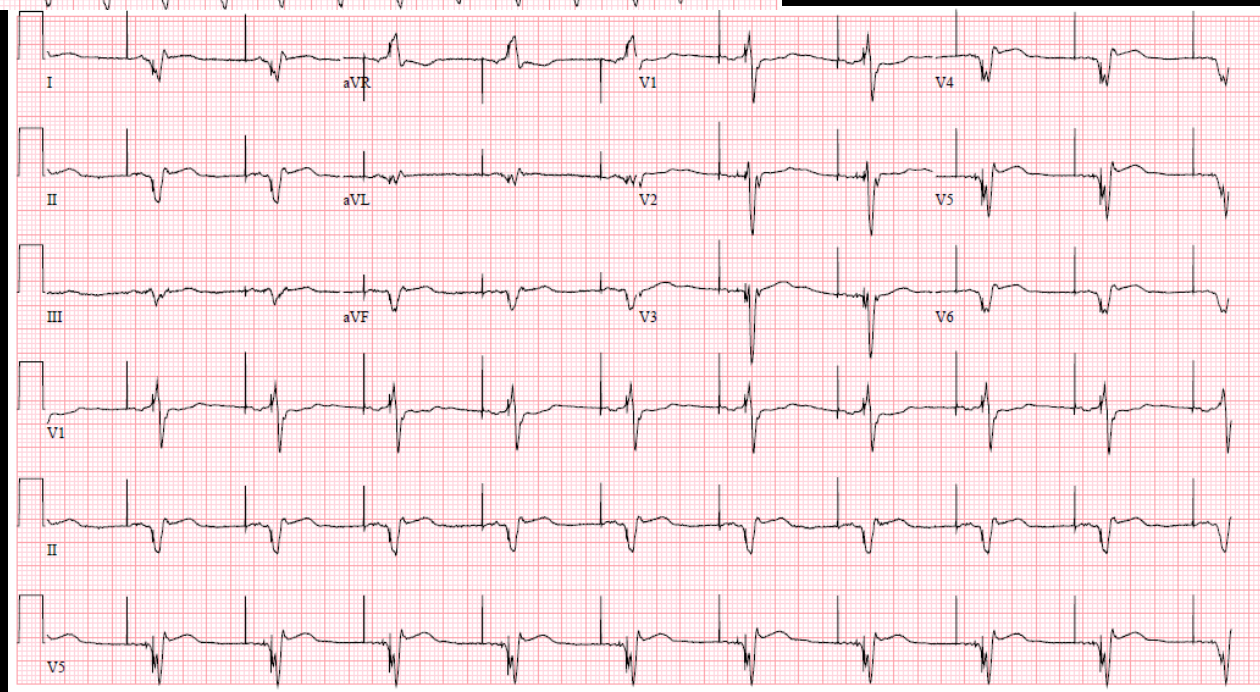
- Patient is readmitted 2 weeks after device upgrade with complaints of multiple ICD shocks.
- Echo shows EF= 20%, apical dyskinesia with probable thrombus.
- Discharged on higher amiodarone dose, continuing anticoagulation





ECG during  
VT storm

Post-operative ECG





# Case Presentation - 6

- Patient is readmitted 8 weeks after device upgrade with complaints of recurrent ICD shocks and is found to have VT storm. His arrhythmia could not be terminated by ATP, and he is started on IV lidocaine
- A repeat echo with “Definity” rules out LV thrombus
- The patient is offered RF ablation of the arrhythmia substrate

Venice Arrhythmias  
2015



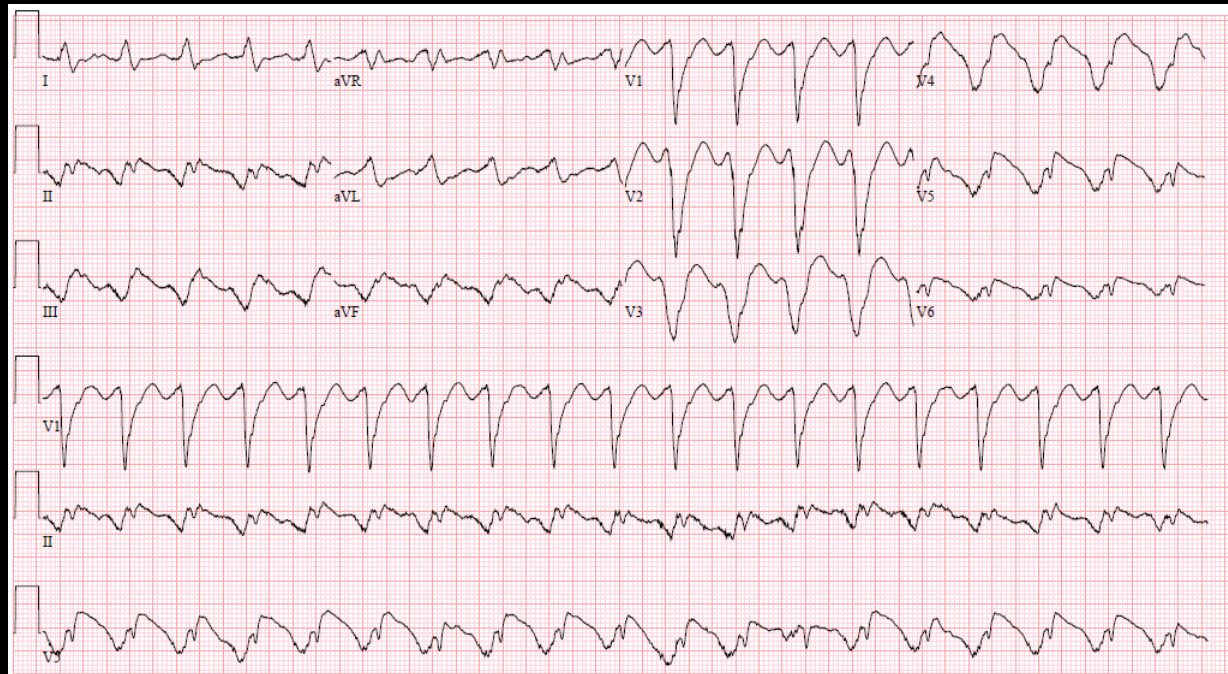
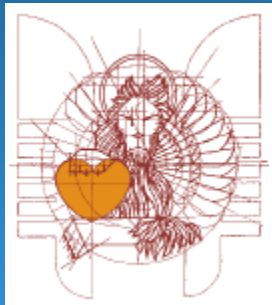
# Case Presentation - 7

- Ablation is performed under mechanical ventilation and with hemodynamic support through Impella and vasopressors. The LV is entered through a transseptal puncture.
- Multiple (4) VT morphologies are induced.
- Given the patient's hemodynamic instability with inability to pace-terminate VT, a "substrate" modification of a large apical scar, extending septally, inferiorly and laterally, is performed.
- One of the VT morphologies is still inducible, although at a slower CL, and pace terminatable; the procedure is ended due to its considerable length.

# Case Presentation - 8

- Pt is discharged on day #2 post- ablation on Amiodarone and mexiletine.
- He is readmitted 3 days later with incessant VT
- He still experiences VT with LV pacing “off”
- He develops multiorgan failure and is referred for LVAD placement.

Venice Arrhythmias  
2015



# Ventricular tachyarrhythmias after ICD insertion: Prevalence

- ICD shock therapy of VT/VF occurs in 14-39% of patients enrolled in ICD trials for primary or secondary prevention of sudden cardiac death
- Electrical storm, defined as 3 or more VT/VF episodes in 24 h, occurs in 4-28% of ICD recipients

Venice Arrhythmias  
2015



# CRT: Is it antiarrhythmic or proarrhythmic?

---

## EVIDENCE FOR PROARRHYTHMIC EFFECT

---

### 1. Basic studies:

- a) Rabbit/canine LV wedge preparations
- b) Computer simulations/models

### 2. Clinical studies and case reports

- 1. Original reports on polymorphic VT (?TDR)
- 2. Subsequent focus on monomorphic VT

## EVIDENCE FOR ANTIARRHYTHMIC EFFECT

---

### 1. Basic studies:

- a) Is there cardiac remodeling with CRT?

### 2. Clinical studies:

- a) Spontaneous arrhythmias
- b) Induced arrhythmias
- c) Heart rate variability
- d) ECG markers for dispersion of repolarization on body surface ECG mapping
- e) T-wave alternans



# CRT-induced proarrhythmia: First systematic review

- Incidence: 8 out 191 pts (4%)
- Characteristics: Monomorphic VT in all cases
- Management: RFA or LV pacing OFF
- This study raised the issue of facilitation of reentry by LV pacing, due to the relationship between the stimulation site and the components of the reentrant circuit

*Nayak HM et al.*  
*J Cardiovasc*  
*Electrophysiol*  
*2008;19:708*

Venice Arrhythmias  
2015



# CRT-induced proarrhythmia: A working definition

- Electrical storm immediately following CRT implantation, refractory to antiarrhythmic drugs and often associated with cardiogenic shock
  - ★ And?
- VT morphology matching the LV pacing morphology.

Venice Arrhythmias  
2015

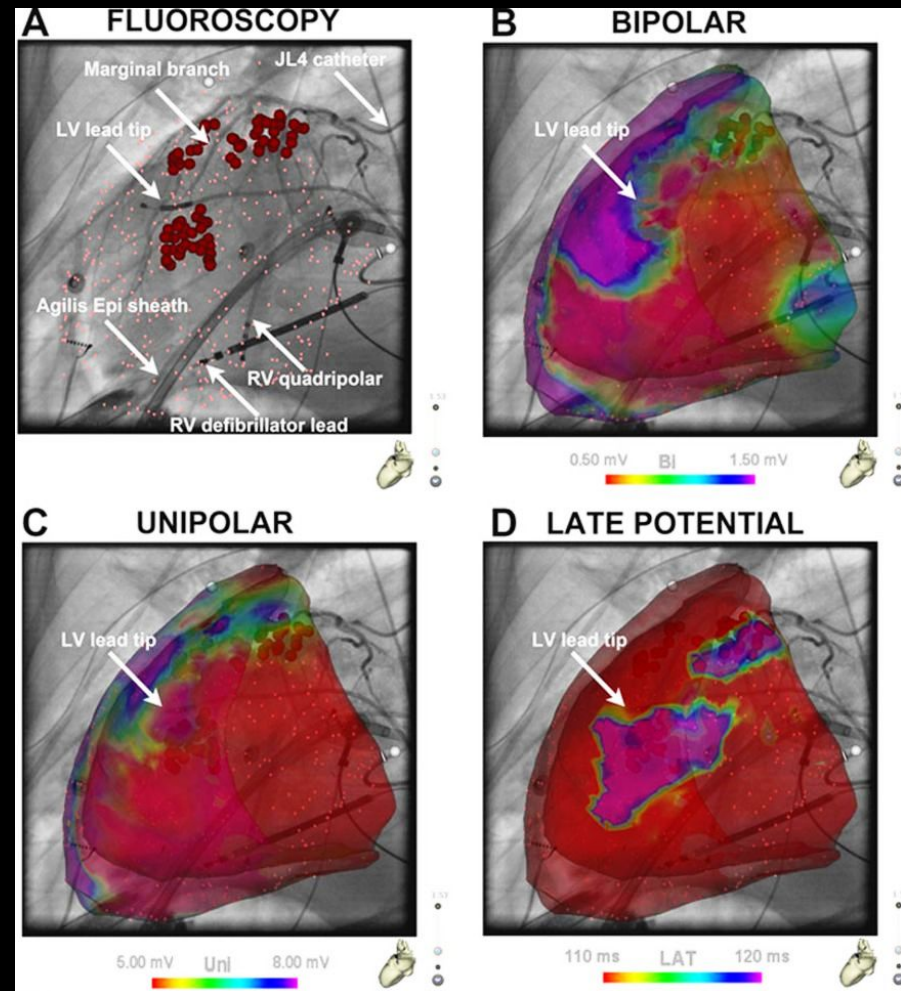


# An LV positioned on an epicardial scar could be a determinant of proarrhythmia

**Left ventricular (LV) lead/scar relationship during endo-epicardial ablation:**

- A) Fluoroscopy showing LV lead tip, epicardial access sheath, overlaid epicardial ablation points, and their relation with the coronary arteries;**
- B) Epicardial bipolar scar with LV lead tip within the border zone;**
- C) Epicardial unipolar scar;**
- D) Epicardial late potential map with LV lead tip on the border of the late potential area.**

**Roque et al, Circ EP 2014;7:1064**



# CRT-induced proarrhythmia: Unanswered questions

- Can we better understand the characteristics of a scar that control electric propagation?
- Would combining electroanatomic and imaging criteria help?
- Can we identify scar regions to be avoided when placing LV leads, based on electroanatomic and imaging criteria?

Venice Arrhythmias  
2015





THANK YOU