Yield of LV dyssynchrony *as assessed with phase analysis* by gated myocardial perfusion SPECT in patients with ICD or CRTD: prediction of cardiac outcome

Nili Zafrir,, Tamir Bental, Boris Strasberg, Ariel Gutstein, Israel Mats, Doron Belzer, Yosef Hasid, Alejandro Solodky

Cardiology Department, Rabin Medical Center, Beilinson Hospital and Sackler Faculty of Medicine, Tel Aviv University, Israel

No Disclosure

Background

- Patients with heart failure and LVEF ≤ 35% receive ICD as primary prevention although it is not activated in the majority of them.
- Moreover, patients with heart failure and prolonged QRS who receive CRTD, third of them do not demonstrate clinical improvement
- Mechanical LV dyssynchrony (MLVD) is common in patients with LV dysfunction, and can be detected by different imaging modalities. However, its exact utility in identifying patients who benefit CRT or CRTD is not well established

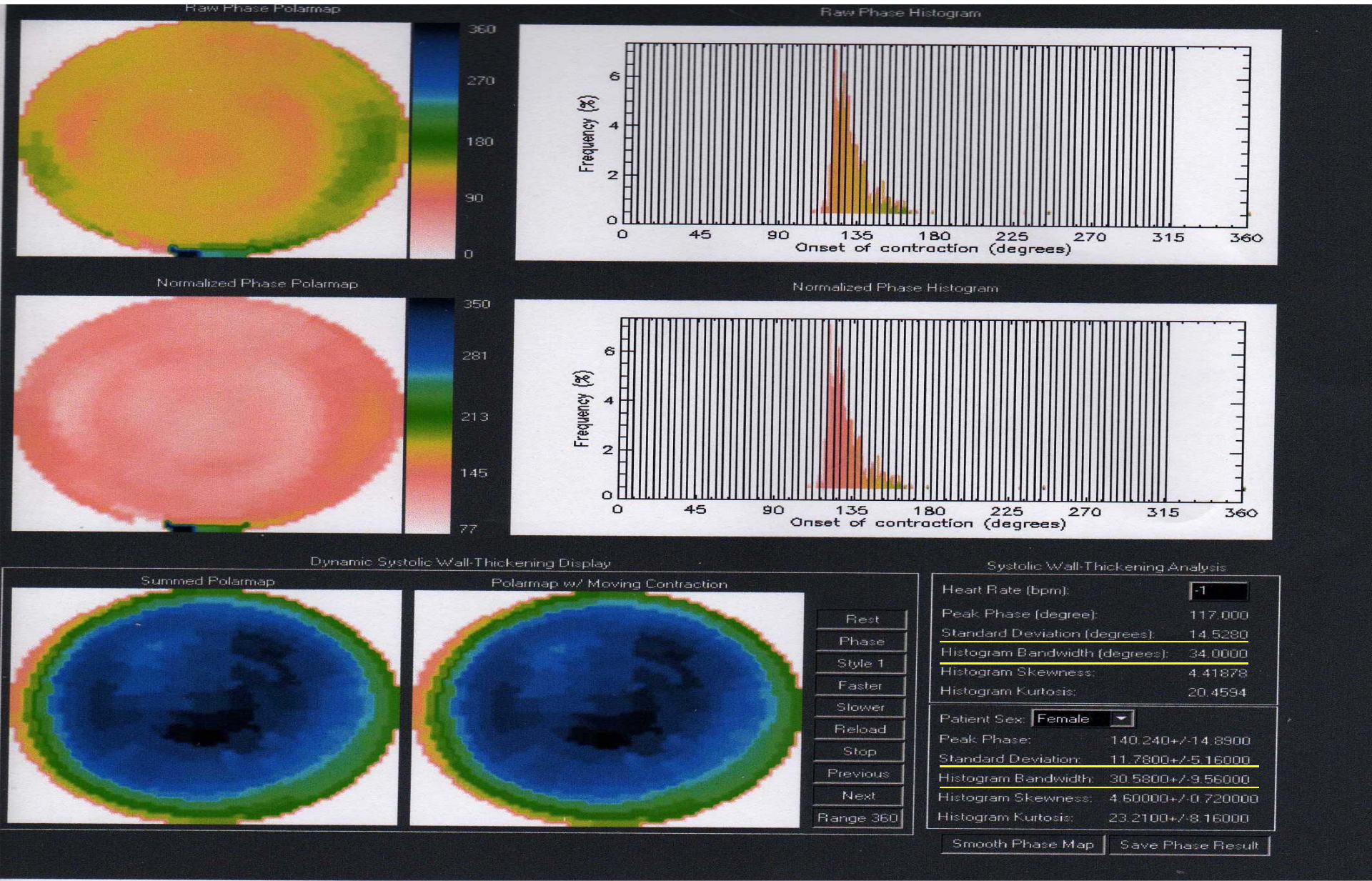
Background

- Mechanical LV dyssynchrony by Gated SPECT studies has been validated for measuring by phase analysis; a count based method that extract amplitude and phase from regional LV count changes throughout the cardiac cycle
- This technique is fully automated and processes data obtained during routine gated SPECT imaging.

- The most applicable parameters related with LV dyssynchrony: phase standard deviation (SD) and phase histogram bandwidth (PBW).

Chen J, JNC 2005

Normal phase analysis



Patient Name: *****

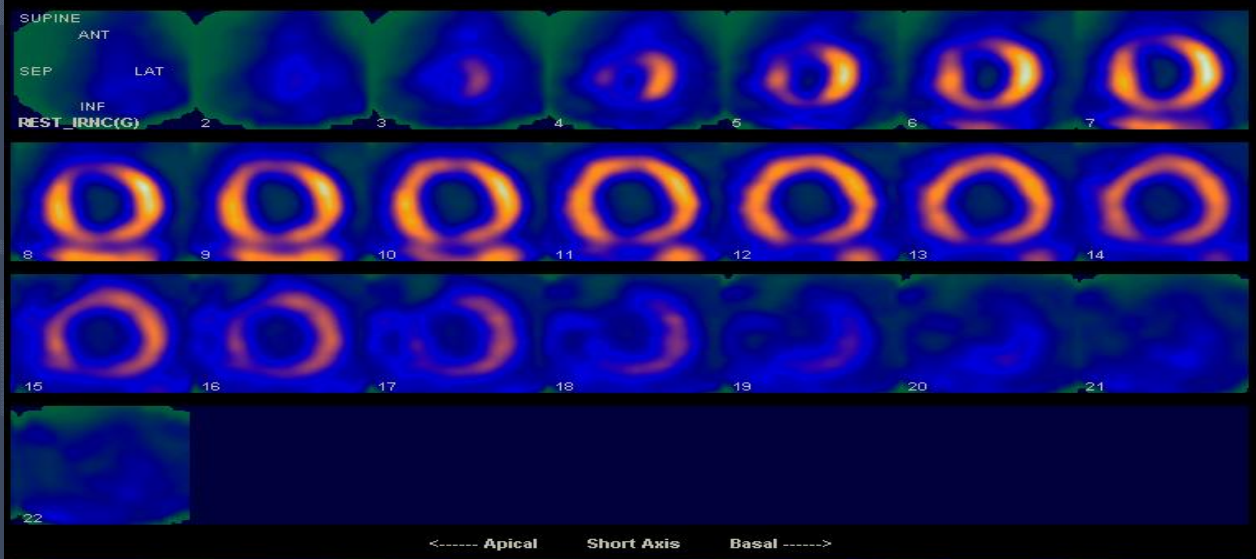
Patient Id: *****

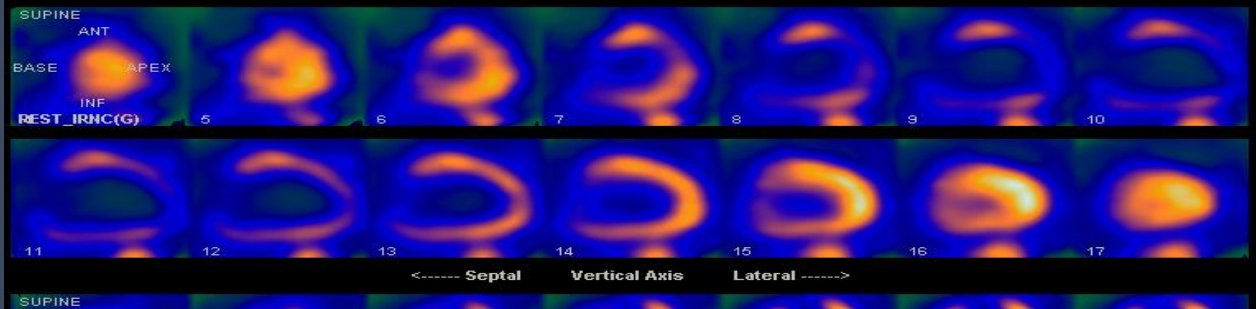
Nuclear Cardiology Unit
Rabin Medical Center Beilinson

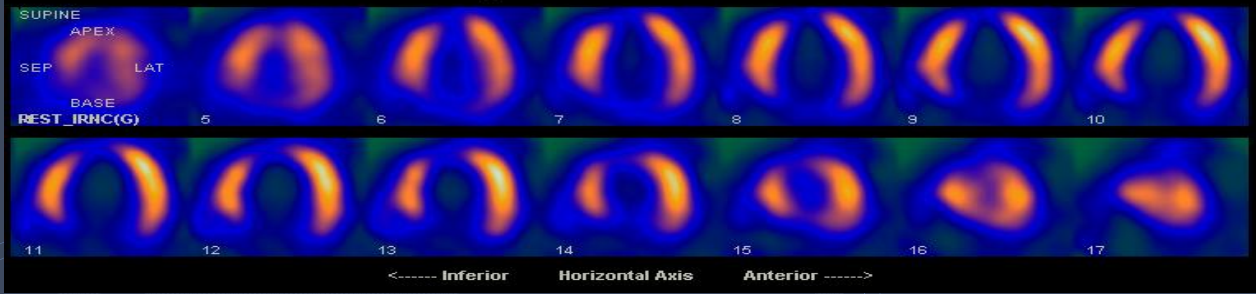
Study Name: VIABILITY REST G

Date & Time: 26-11-09

Manufacturer Model: VENTRI







REST_IRNC(G)

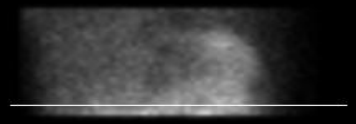
Date: 2009/11/26 13:59

EF: 15%

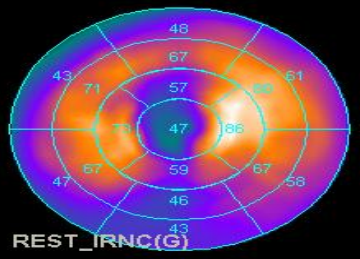
EDV: 298ml

ESV: 252ml

SV: 46ml

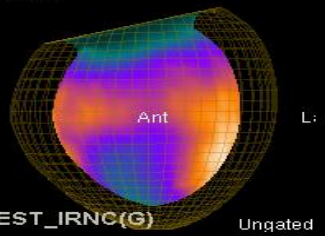


REST_Shift IRNC(G)(motion corrected)
2



REST_IRNC(G)

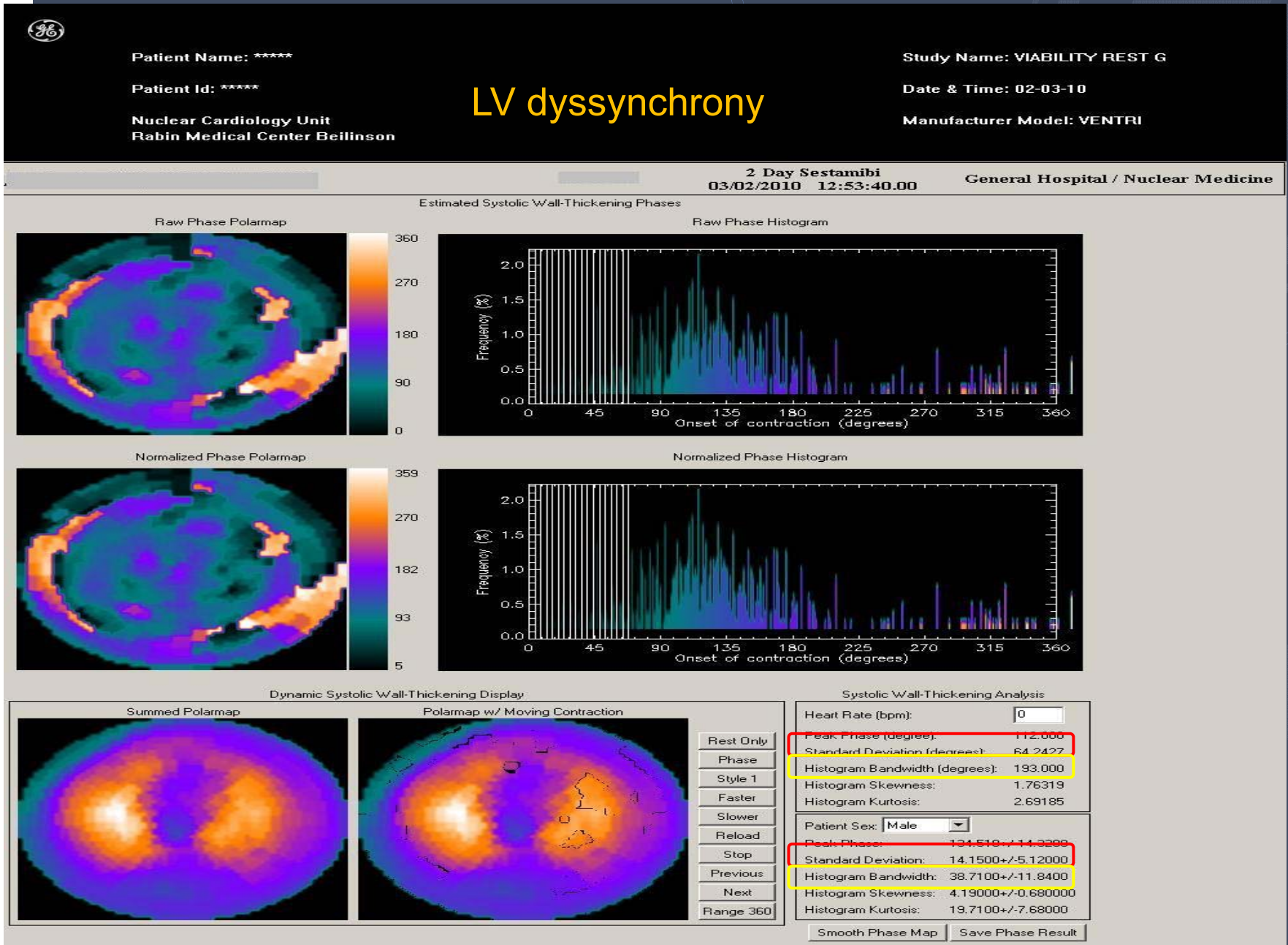
Endo+Epi



REST_IRNC(G)

Ungated

LV dyssynchrony



Aim

- To assess LV dyssynchrony by phase analysis from gated SPECT myocardial perfusion imaging (MPI), in patients prior ICD for primary prevention or CRTD
- To investigate whether LV dyssynchrony can also be used to identify who might benefit from receiving ICD or CRTD therapy.
- Predictors for cardiac events in patients received ICD or CRTD.

Methods

- During 2010-2012, In a prospective study, patients post MI with LVEF ≤ 35 % who were scheduled for ICD or CRTD underwent gated SPECT MPI study prior procedure (about one month)
- LV dyssynchrony was measured by “syncTool software “ phase standard deviation (PSD) and histogram bandwidth (PBW).

Methods

- Patients characteristics, risk factors for CAD, SPECT MPI, phase analysis results, QRS width of baseline ECG and EF were analyzed and compared in ICD and CRTD groups

- The patients were followed-up for cardiac events defined as: cardiac death, heart failure deterioration - hospitalization, life threatening arrhythmias

Results

- The study cohort consisted of 108 pts, 58 with ICD and 50 pts with CRTD

- The patients were followed up for mean of 16.4± 8.0 months for cardiac death, CHF deterioration, VT/VF/ shock. There were 32 (24%) cardiac events

- Cardiac Events

  14 cardiac death

  12 HF deterioration + hospitalizations

  6 VT/VF/appropriate shock

Table 1: Clinical characteristics, MPI and Phase Analysis results

	ICD	CRTD	p value
Number	58	50	ns
Age	68.6±10	69.1±12	ns
Male	50 (86%)	41 (82%)	ns
BMI (kg/m2)	25.6 ±3.6	27.7 ±5.5	0.05
DM	35 (60%))	28 (56%)	ns
HTN	30 (51.7%)	21 (42%)	ns
QRS width	115±33	139±32	0.0001
NYHA class	2.3±0.75	2.7±0.6	0.03
Scar	3.52±1.5	2.88±1.9	0.06
EF (%)	25.7±6.5	23.7±6.9	ns
LV dyssynchrony			
Phase: SD*	61.9±18.8	56.7±19	ns
Phase: BW**	192.5±79	145±79	ns

* normal SD = 18° ± 11°

** normal BW = 46° ± 30°

Cardiac events

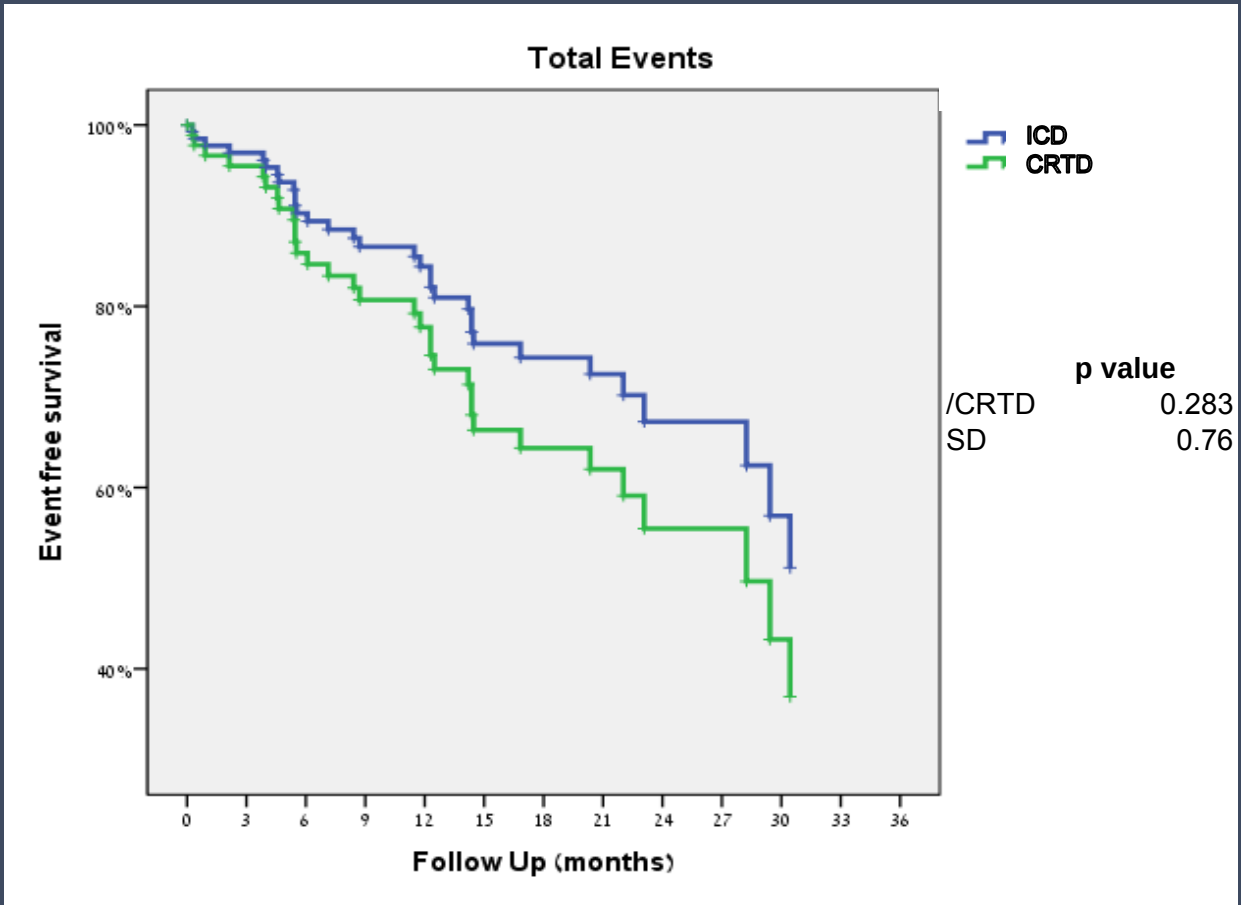
	ICD N=58	CRTD N=50	p value
Cardiac death	4 (6.9%)	10(20%)	0.05
HF deterioration	4 (6.9%)	8 (16%)	0.2
VT/VF/ATP	5 (8.5%)	1 (2%)	0.1
Total events	13 (22.4%)	19 (38%)	0.093

Results

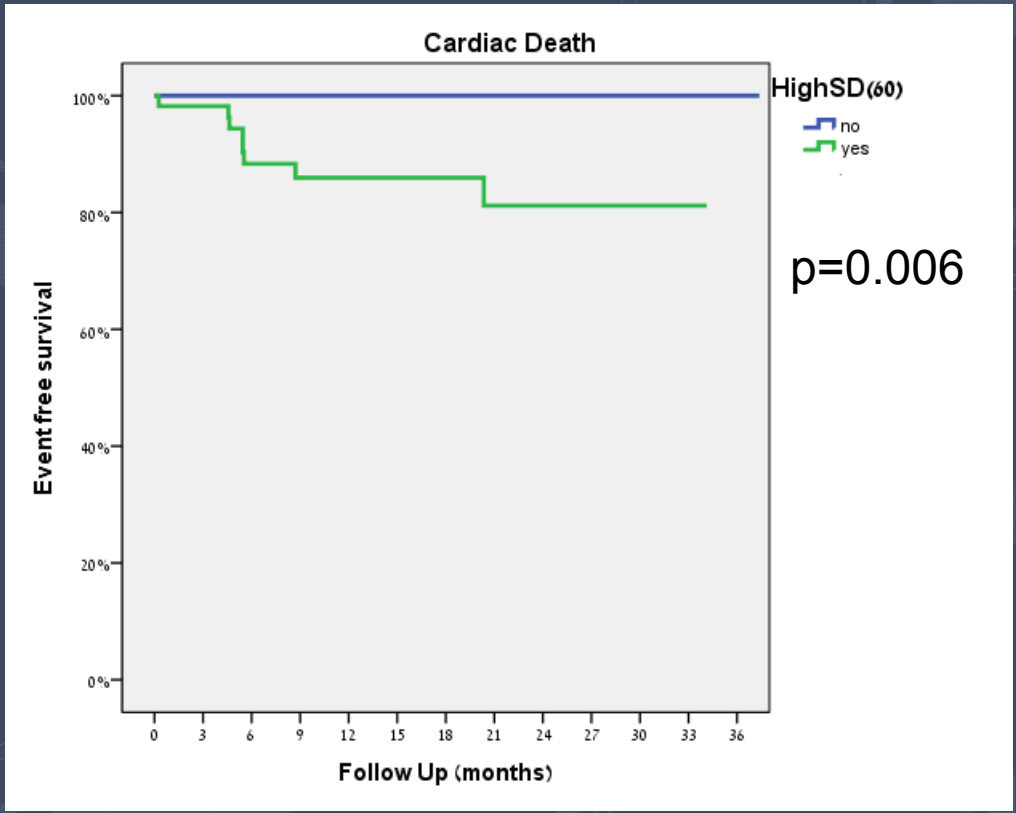
Univariate analysis for cardiac events

	HR	CI 95%	P
NYHA	1.505	1.002 -2.260	0.049

Cardiac events in patients with ICD and CRTD



LV dyssynchrony with phase SD >60° predicts cardiac death in ICD and CRTD patients



Limitation

- Preliminary results in a small cohort

Conclusions

- LVEF, infarct size, LV dyssynchrony were similar in ICD post MI and CRTD patients
- NYHA class and QRS width were significantly higher in patients with CRTD vs patients with ICD

- Cardiac death was significantly higher in patients with CRTD vs patients with ICD only.
- NYHA class prior procedure was the only predictor for cardiac death in patients with ICD or CRTD

- Patients with LV dyssynchrony (SD>60°) had significantly more cardiac events and cardiac deaths

THANK YOU !!