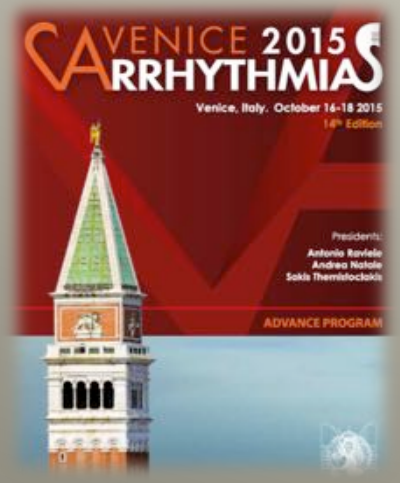
Satellite symposium
"Focus On: Customizing CRT"

Multi Area Pacing to enlarge CRT effect

Clinical Case



Zingarini Gianluca, MD
Ospedale S. Maria della Misericordia
Perugia (Italy)

October 16 - 18
14th EDITION 2015

MY CONFLICTS OF INTEREST:

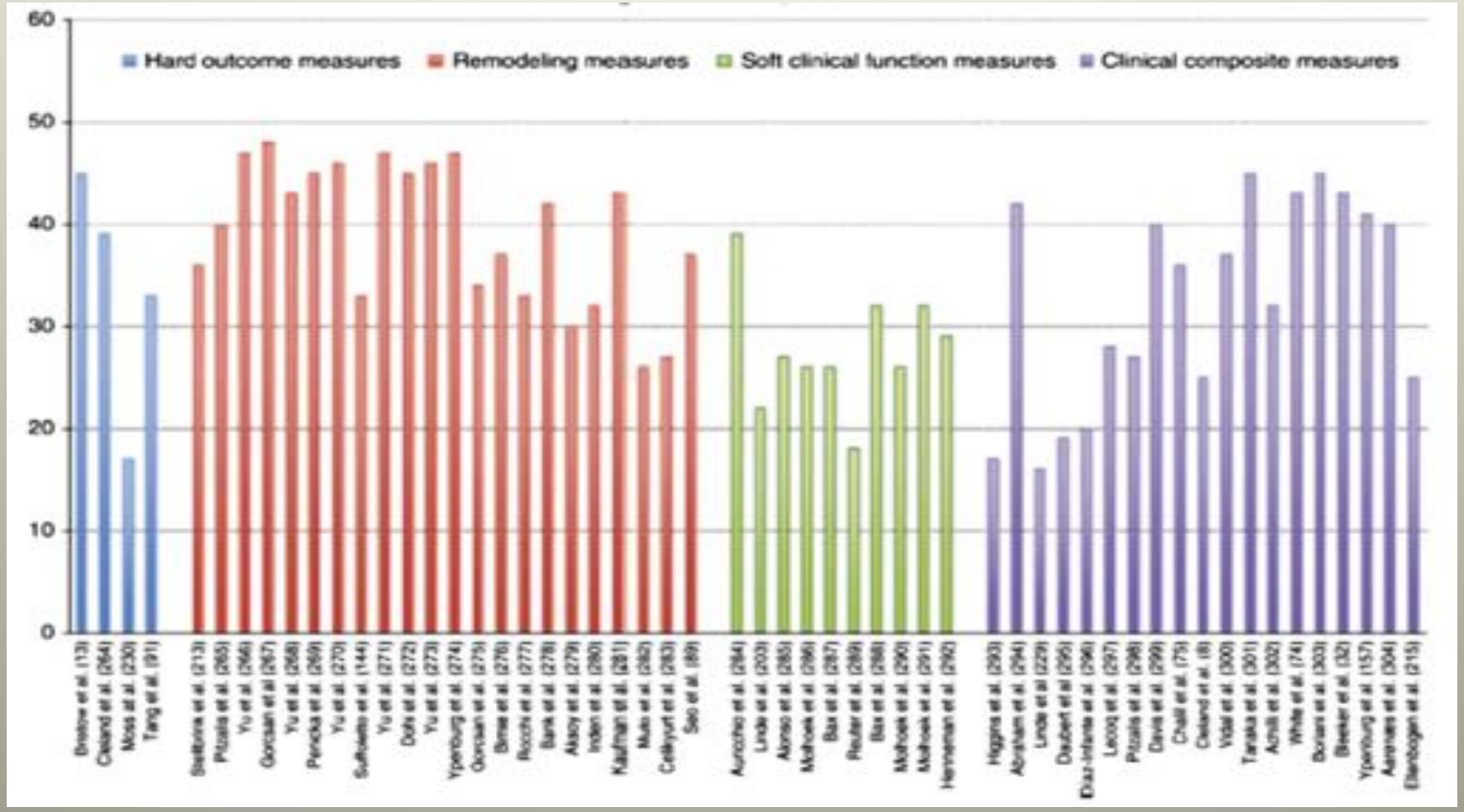
Sorin Group
Medtronic
St Jude Medical

CRT effect

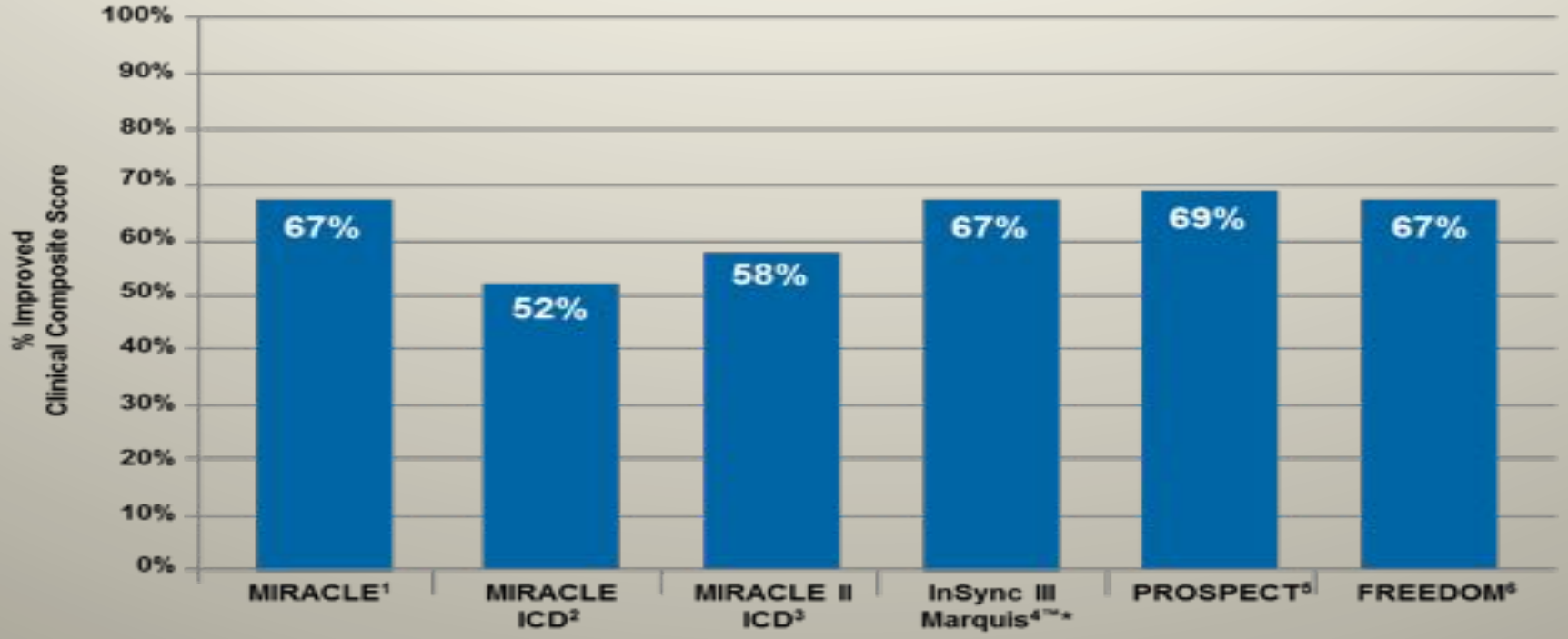
	Mortality	HF or CV Hospitalisations	Cardiac Function/ Structure	QoL or NYHA
CARE-HF[1,2]	+	+	+	NA
COMPANION[3]	+	+	NA	NA
MIRACLE[4]	NA	NA	+	+
MIRACLE ICD[5]	NA	NA	NA	+
REVERSE[6]	NA	+*	+	=
RAFT[7]	+	+	NA	NA
MADIT CRT[8]	+*	+	+*	NA

[1] Cleland J, et al. *N Engl J Med*. 2005;352:1539-1549.
[2] Cleland J, et al. *Eur Heart J*. 2006;27:1928-1932.
[3] Bristow M, et al. *J Card Fail.* 2000;6:276-285.
[4] Abraham W, et al. *N Engl J Med*. 2002;346:1845-1853.
[5] Young J, et al. *JAMA*. 2003;289:2685-2694.
[6] Linde C, et al. *JACC*. 2008;52:1834-1843.
[7] Tang A, et al. *N Engl J Med*. 2010;363:2385-2395.
[8] Moss A, et al. *N Engl J Med*. 2009;361:1329-1338

CRT response

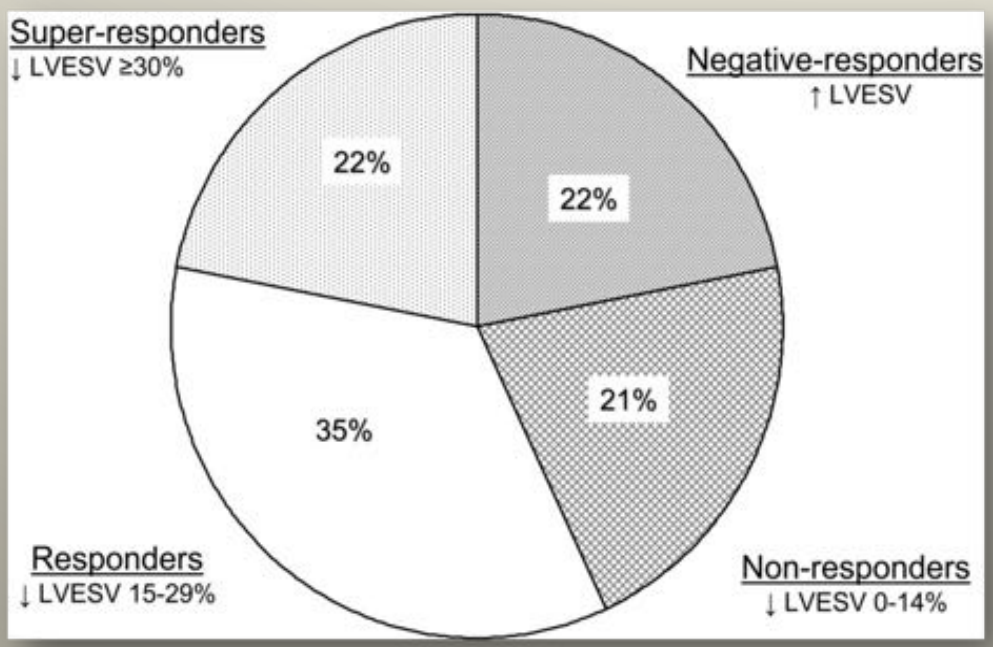


CRT response

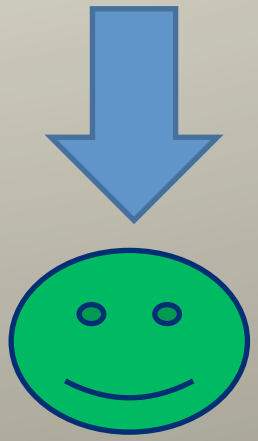


More than 30% pts are identified as non-responder to CRT

CRT response



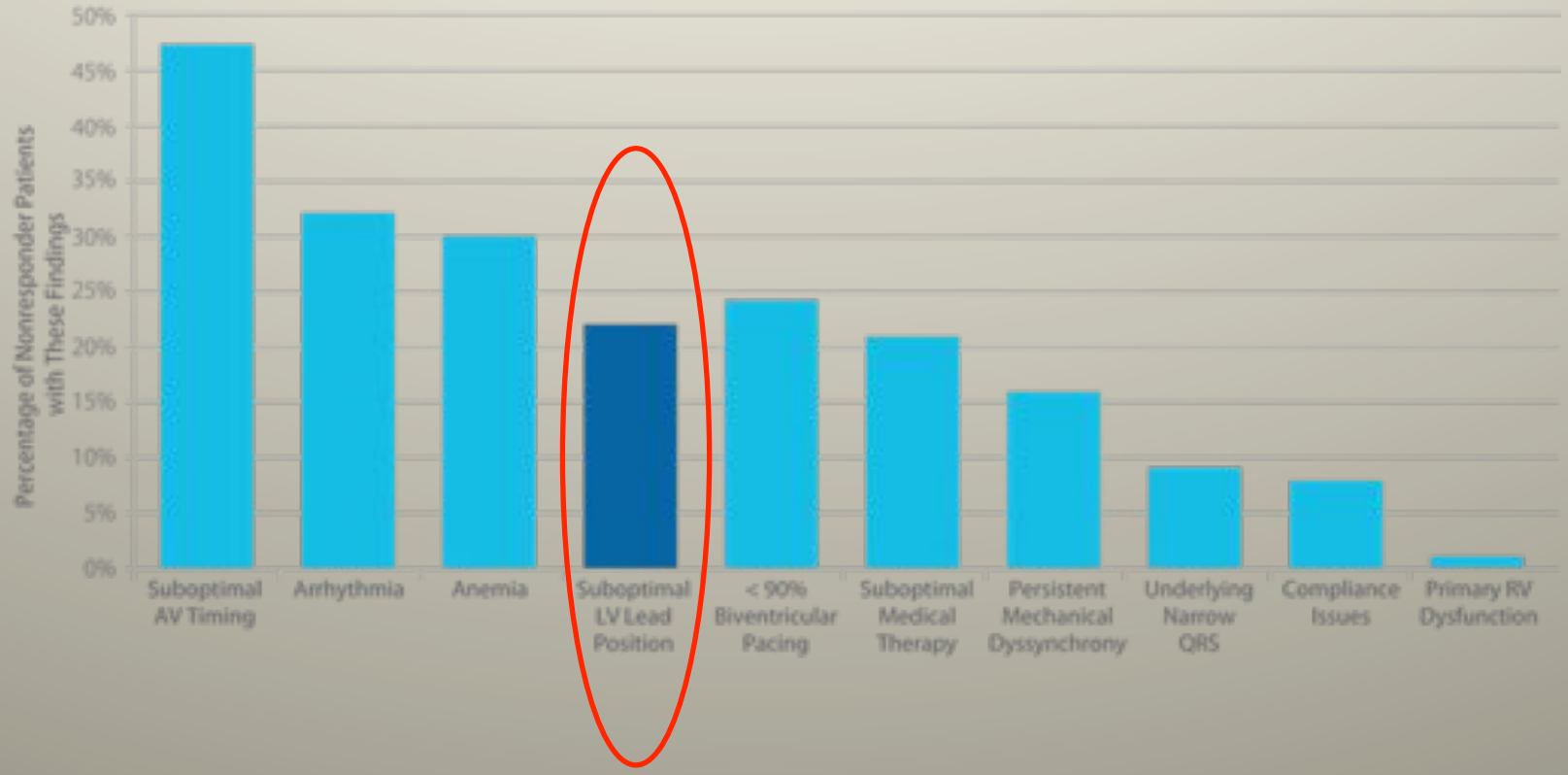
- **QRS > 150 ms**
- **Female gender**
- **Non ischemic CMP**
- **True LBBB**



Good outcome

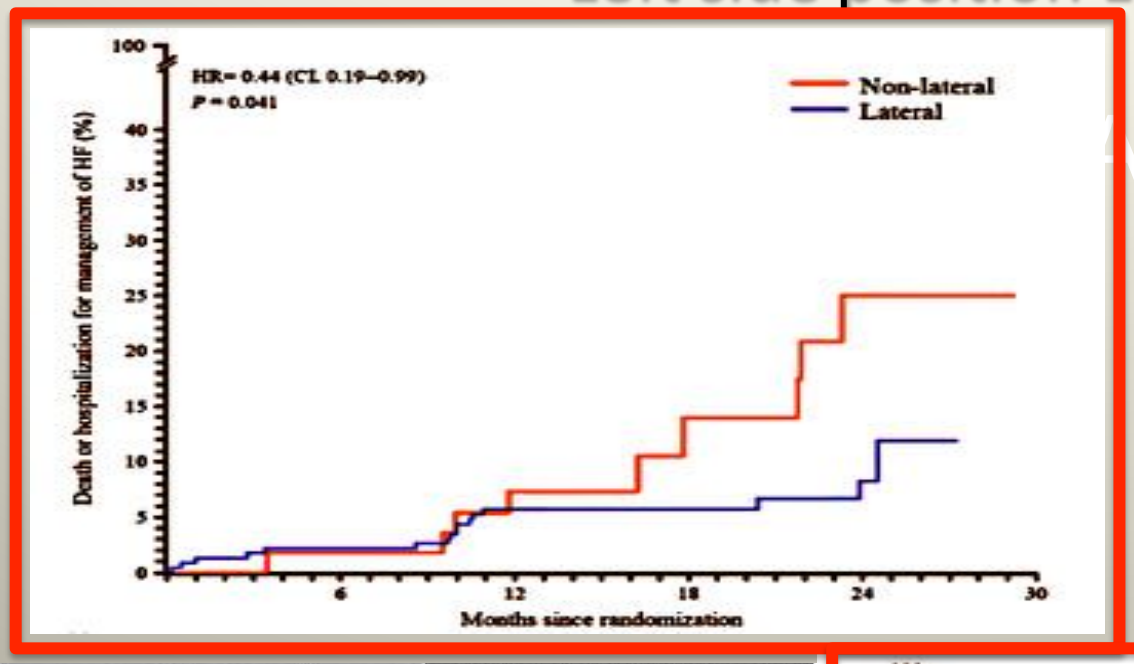
Ypenburg et al. Long-Term Prognosis After Cardiac Resynchronization Therapy Is Related to the Extent of Left Ventricular Reverse Remodeling at Midterm Follow-Up. JACC 2009

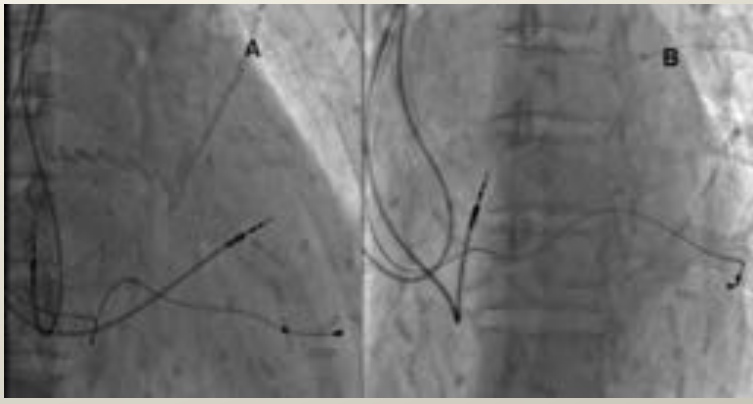
Sub-optimal CRT response: impact of LV site

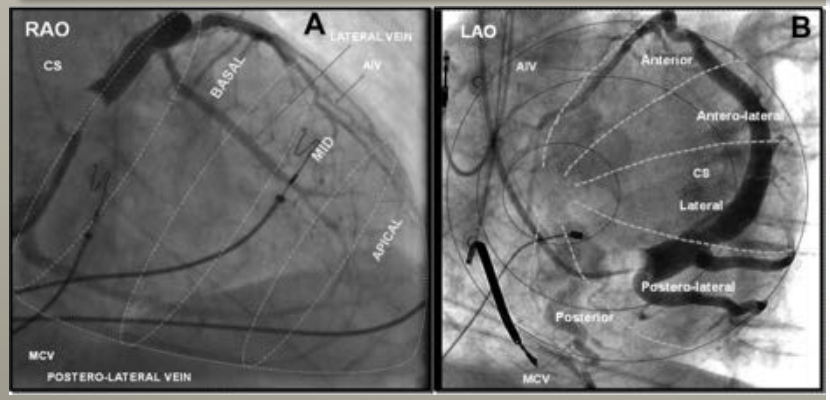


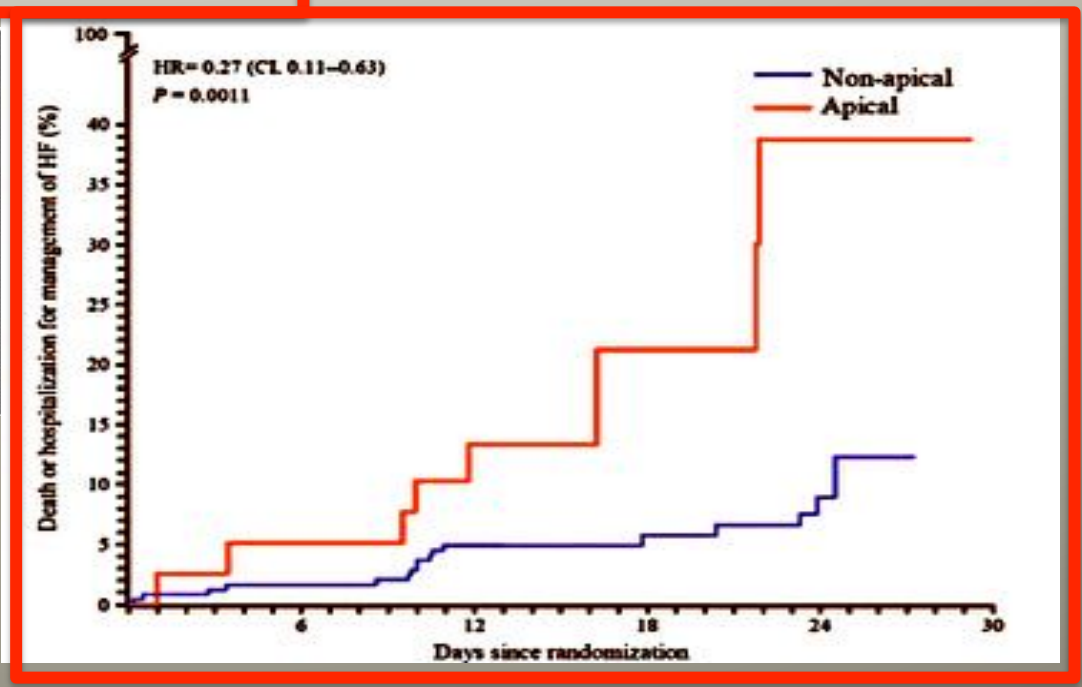
Mullens W, et al. *J Am Coll Cardiol*. 2009;53:765-773.

Left side position LV lead



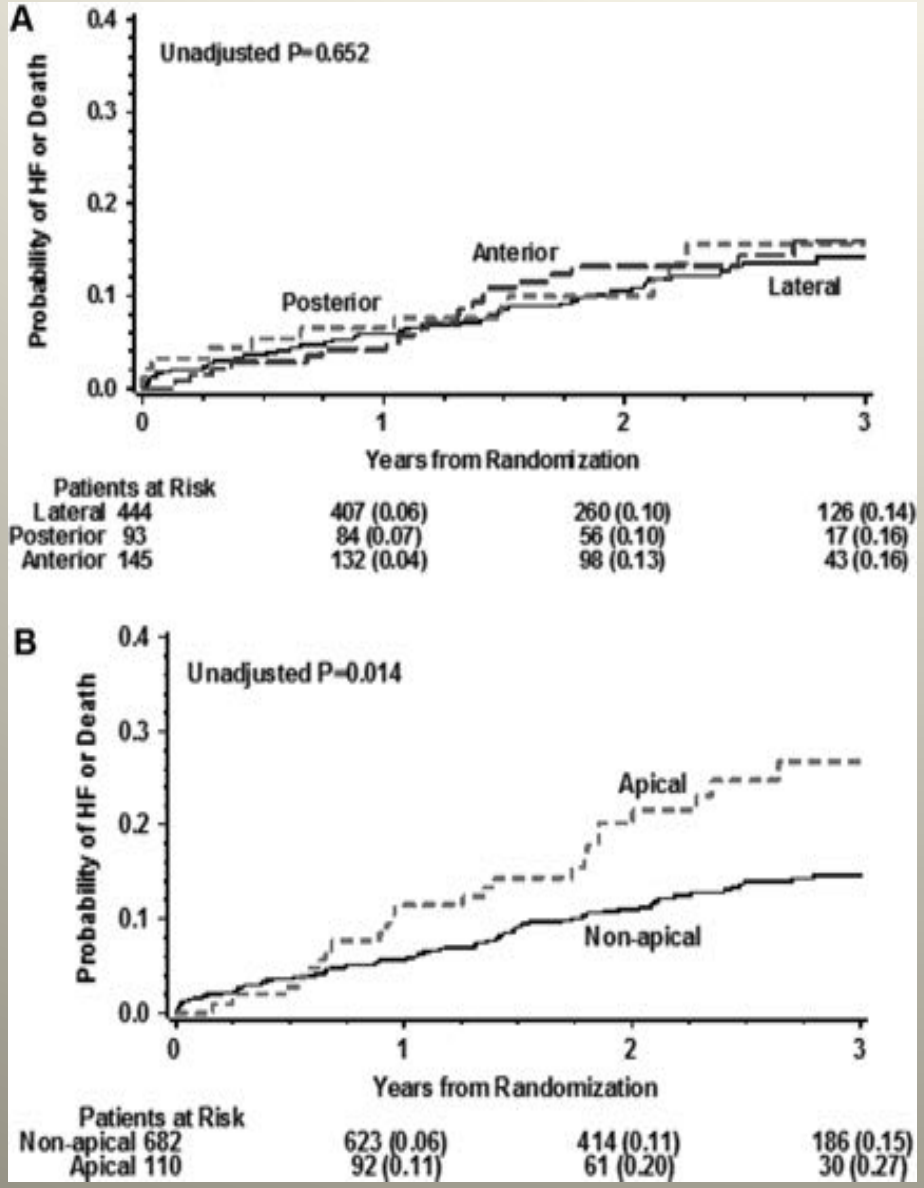






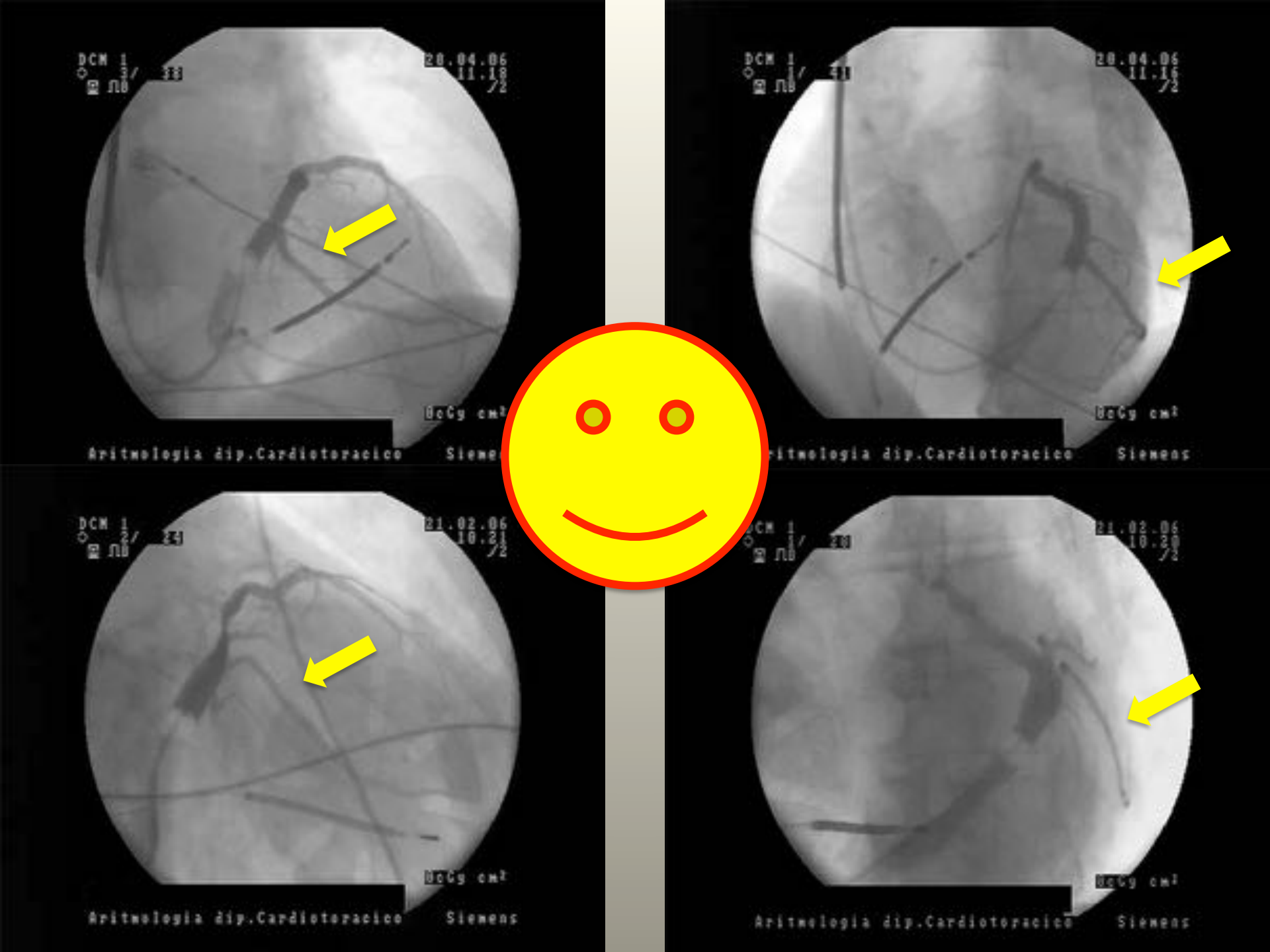
Thebault C et al, Reverse Study Group, Eur Heart J 2012
Singh J P et al. Circulation 2011; 123:1159-1166

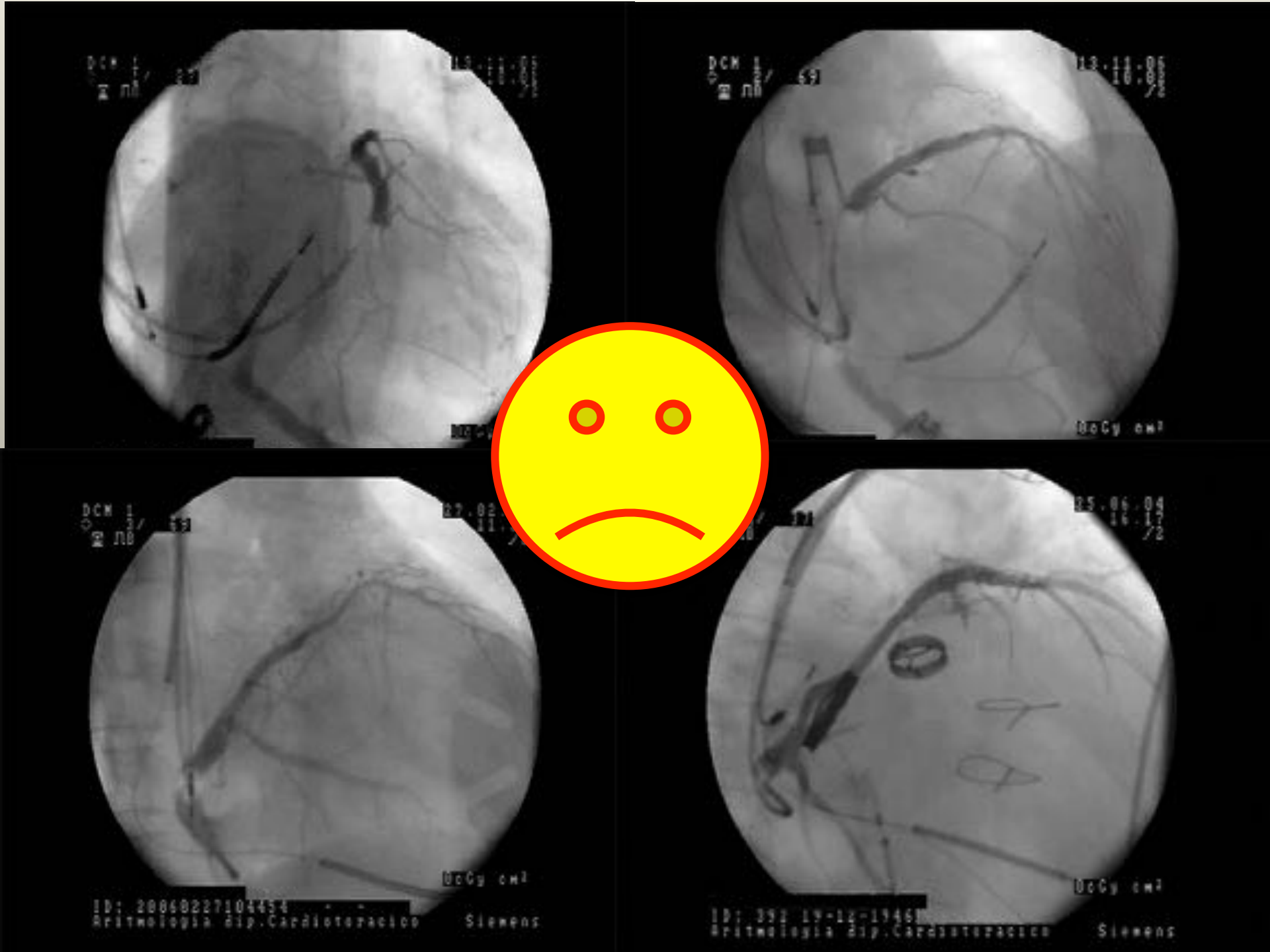
Left side position LV lead



In LBBB the apical region is activated before other segment.
The apical position of the left lead results to be close to the right side lead: that configuration may reduce the efficacy of CRT

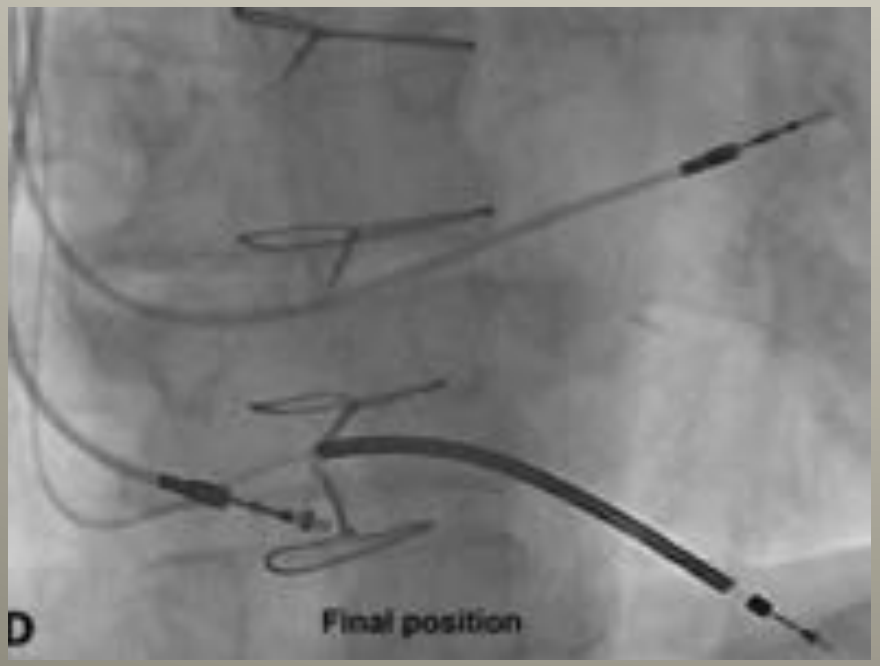
MADIT CRT

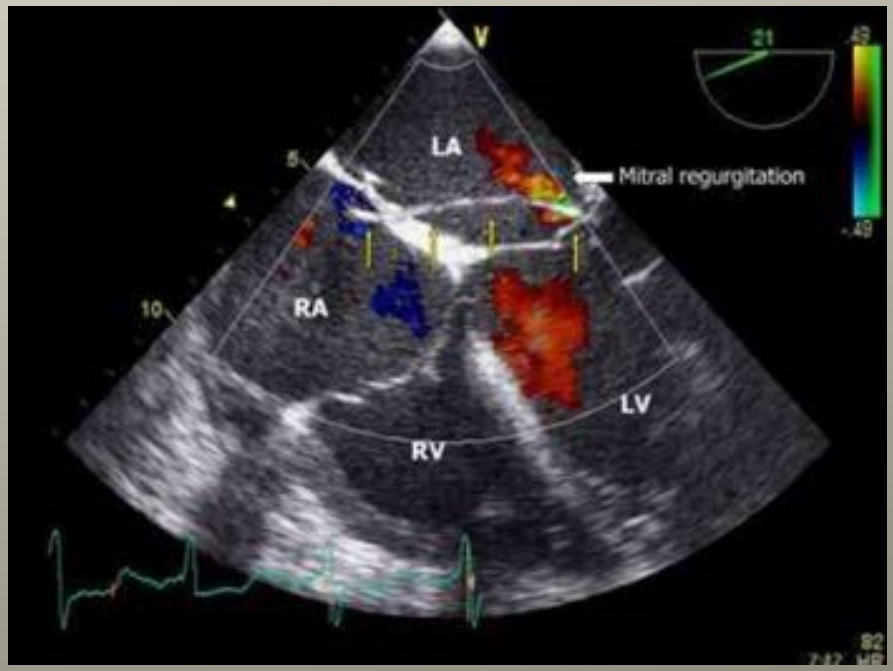

DCM 1
20.04.06
11.18
Aritmologia dip.Cardiotoracico
Siemens
DCM 1
20.04.06
11.16
Aritmologia dip.Cardiotoracico
Siemens
DCM 1
21.02.06
10.21
Aritmologia dip.Cardiotoracico
Siemens
DCM 1
21.02.06
10.20
Aritmologia dip.Cardiotoracico
Siemens


DCM 1
DcCy cm²
DcCy cm²
DcCy cm²
Aritmologia dip.Cardiotoracico
Siemens
Aritmologia dip.Cardiotoracico
Siemens

Left Ventricular Endocardial Pacing Techniques as an Alternative for Ineffective Cardiac Resynchronization Therapy and the Role of Acute Hemodynamic Evaluation

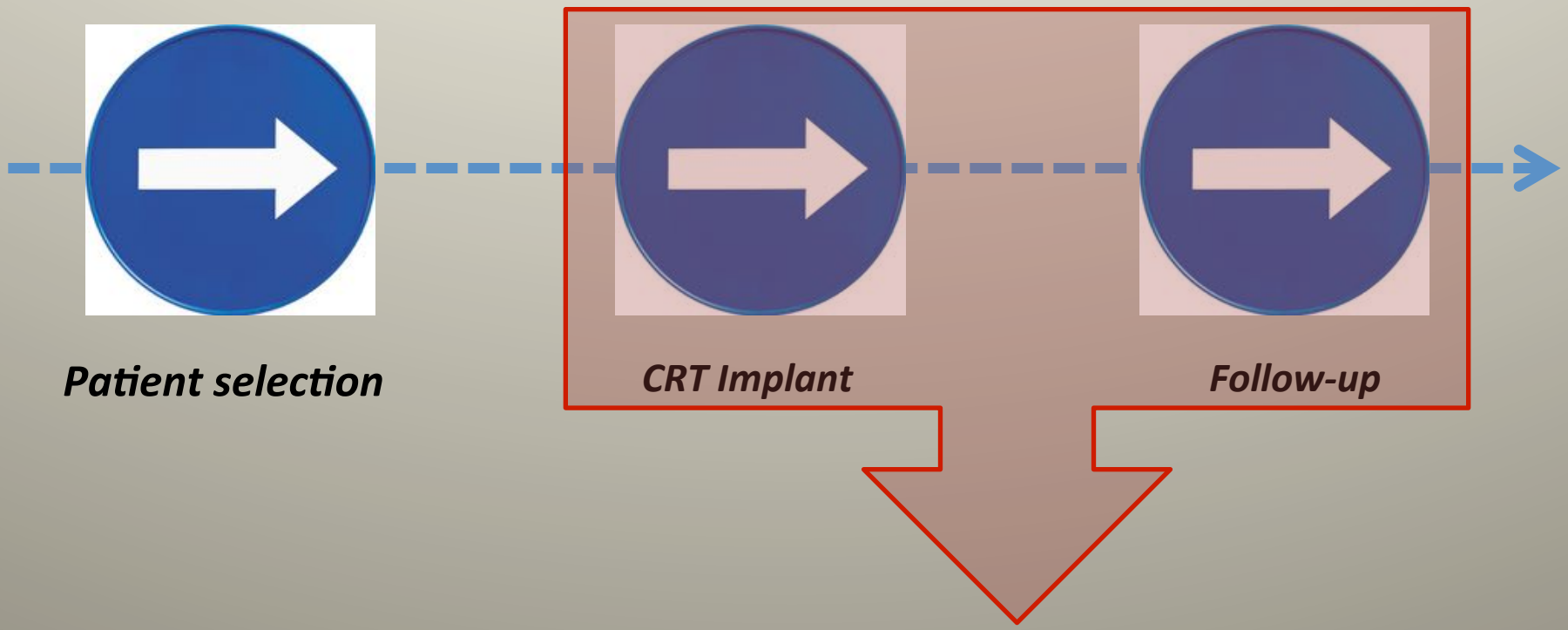
Berry M. van Gelder[1], Patrick Houthuizen[1], Mike G. Scheffer[2], Lukas Dekker[1] and Frank A. Bracke[1]
[1]*Catharina hospital, Eindhoven*
[2]*Maasstad hospital, Rotterdam*
The Netherlands





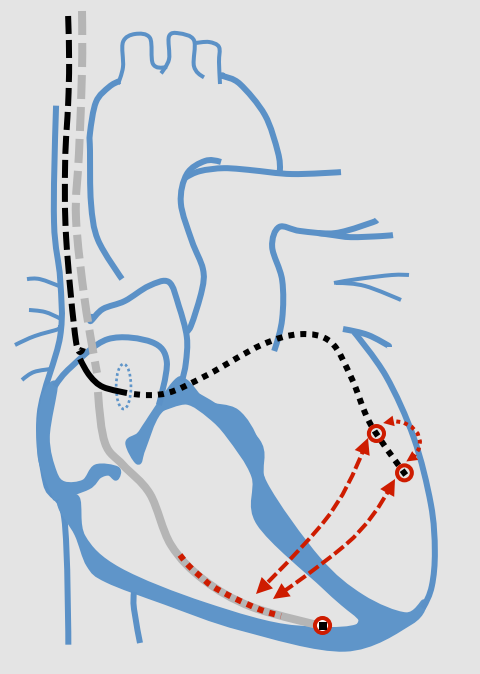
How to improve CRT response rate ?

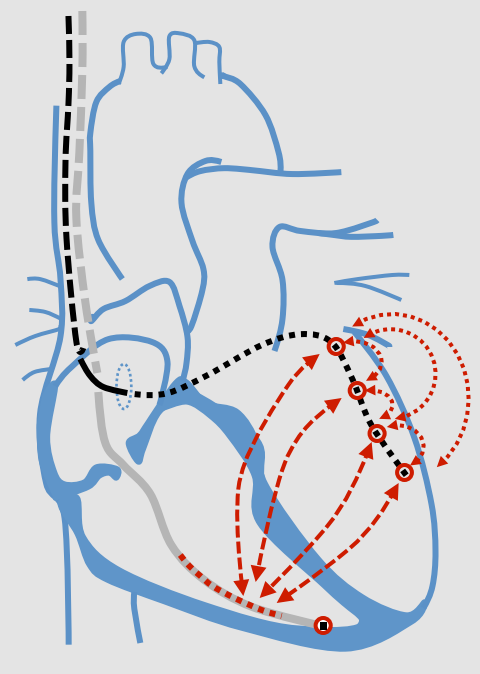
3 levels of action:

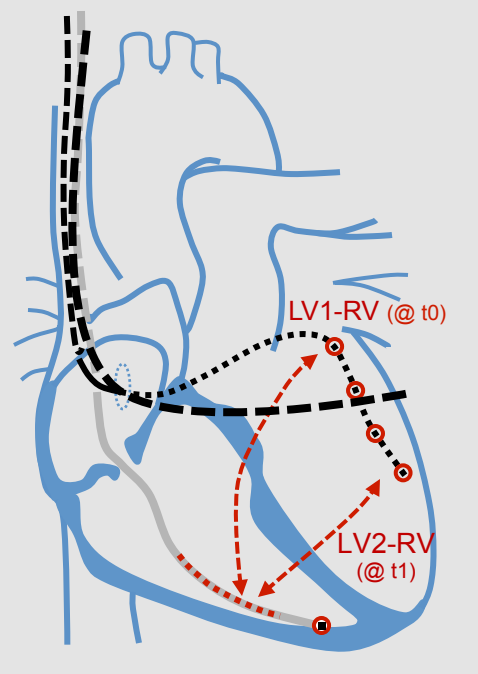


Focus on post selection phase:
A "desperate" need of optimization

History of CRT:
from initial experience to Multi Area ventricular Pacing







1st CRT generation
Simultaneous Bi-V pacing

2nd CRT generation
Sequential Bi-V pacing
(V-V timing)

3rd CRT generation
Sequential Bi-V pacing
with programmable vectors

4th CRT generation
QuadriPolar
Sequential Bi-V pacing

Last generation
1. QuadriPolar selectable

2. Multi-Area V pacing

Multi Area Pacing

first experiences

CLINICAL RESEARCH

First experience of intraoperative echocardiography-guided optimization of cardiac resynchronization therapy delivery

Première expérience d'optimisation de la thérapie de resynchronisation cardiaque par une échocardiographie peropératoire

Ghassan Moubarak[a,*], Philippe Ritter[b], Jean-Claude Daubert[c], Serge Cazeau[a]

Table 1 Final pacing configuration.

	BiV std	BiV ottim	MAP
	Final pacing configuration		
	Standard biventricular	Optimized biventricular	Triple-site ventricular
First implantation ($n = 46$)	5	16	25
Upgrade from dual-chamber pacemaker ($n = 31$)	10	6	15
Biventricular reoperation ($n = 14$)	0	0	14
Total ($n = 91$)	15 (17%)	22 (24%)	54 (59%)

Multi Area Pacing gives the best hemodynamic performance (***echo LPEI***) in:

- 54% first BiV implantation
- 48% upgrading DC → CRT
- 100% of CRT biV ri-operations *(ERI, Non-R, disloc. LV, complications etc.)*

Author	Journal, year (Title)	Leads	HF Pts	Outcome
Yoshida K	Eur H J **2007** (Triangle-pacing)	**2 RV + 1 LV**	**n=21**	**TriV > BiV > Baseline**
Lenarczyck R	Europace **2007**	**1 RV + 2 LV**	**n=26**	**Response Rate 95%**
Leclercq C	JACC **2008** (Trip-HF)	**1 RV + 2 LV**	**n=40**	**TriV > BiV**
Ogano M	Europace **2013**	**1 RV + 2 LV**	**n=58**	**Reduced V arrhythmia**
Rogers D	EJHF **2012**	**Both config**	N=43	**TriV> Biv**
Anselme F	Hearth Rhythm **2014**	**2 RV + 1 LV**	**n=40**	**Increase of responder rate**

Standard CRT indications
TRIPLE-SITE PACING (HRS 2014): 2 RV + 1 LV

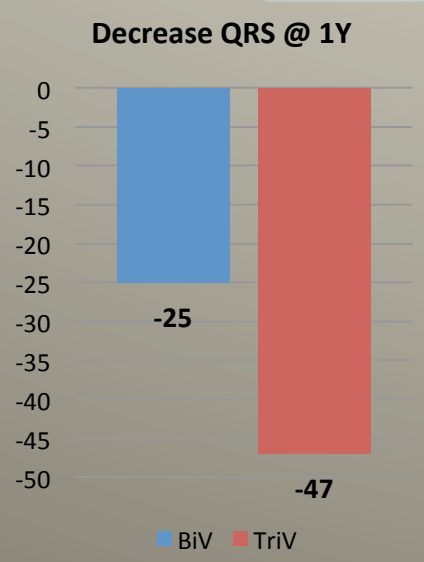
AB17-01 - Increase of Responder Rate at one year with Triple Site Ventricular Stimulation as compared to Conventional Cardiac Resynchronization

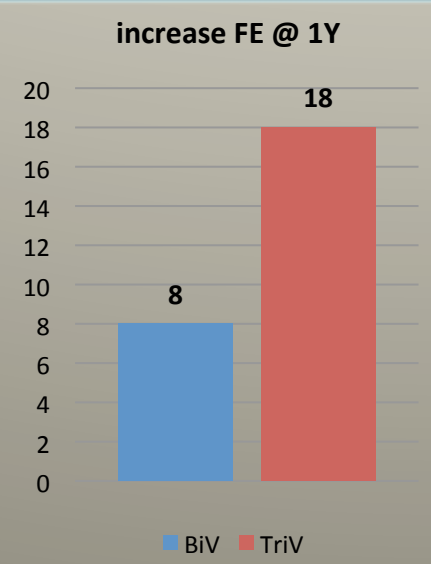
Frederic Anselme, MD, Arnaud Savoure, MD, Benedicte Godin, MD, Nathanael Auquier, MD and Fanny Bouchinet, MD. Hopital Charles Nicolle, Rouen, France

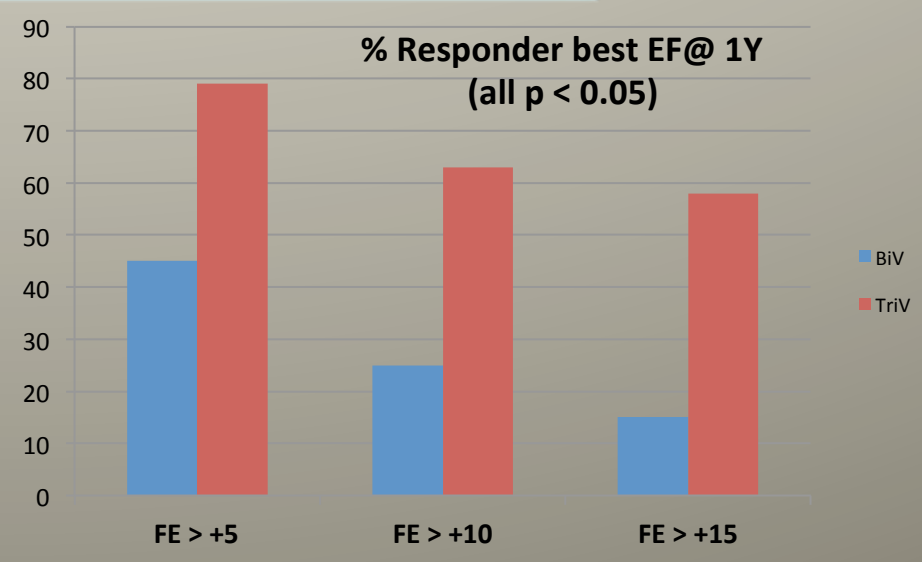
Monocentric pilot study

Conclusion: CRT with triple site ventricular stimulation seems to provide significant benefits over conventional CRT 12 month after implant. This warrants larger clinical studies to confirm these preliminary results.

Endpoint @ 1Y
Pts Responder , Δ(NYHA) > 1, Δ(EF) > 5/10/15



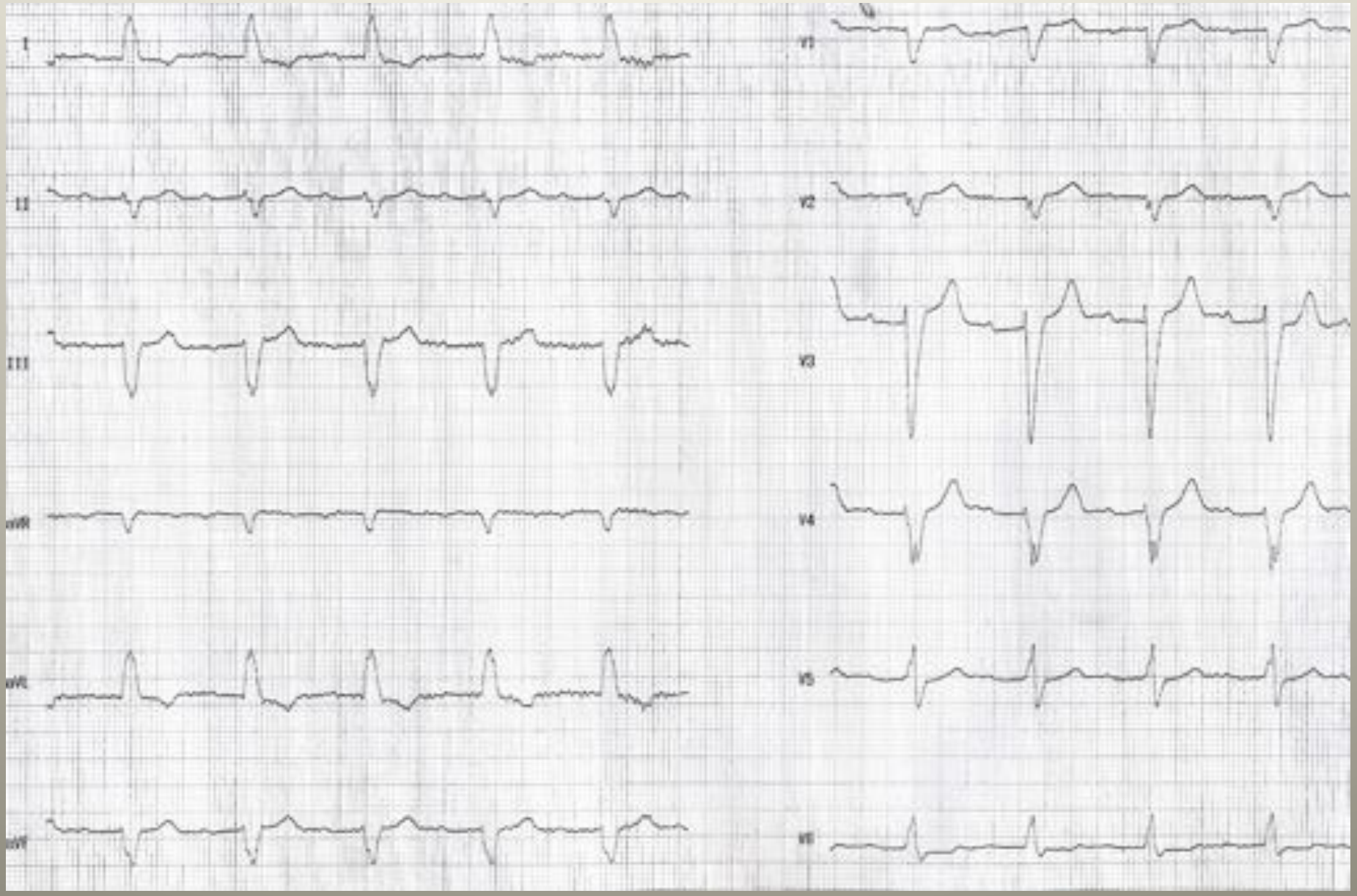




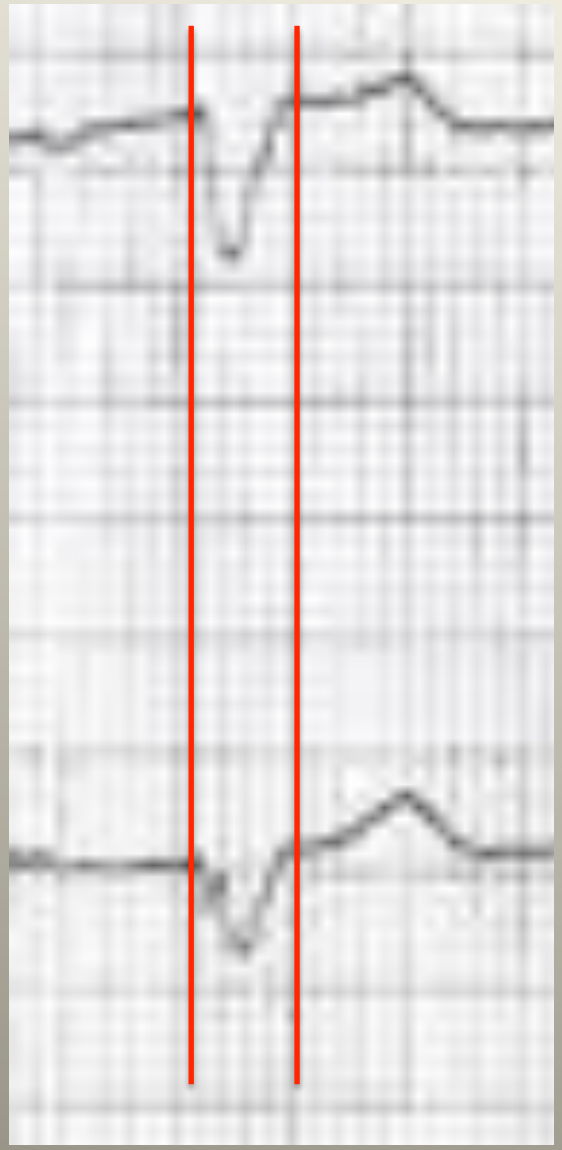
Clinical Case

- Male, 55 ys
- Idiopathic dilated cardiomiopathy, (diagnosed 2 years before)
- EF 25%
- NYHA class III
- OMT since 6 month (Bisoprolol 5 mg/qd, potassium canrenoate 25 mg/qd, Furosemide 25 mg/qd, Ramipril 2,5 mg/bid)

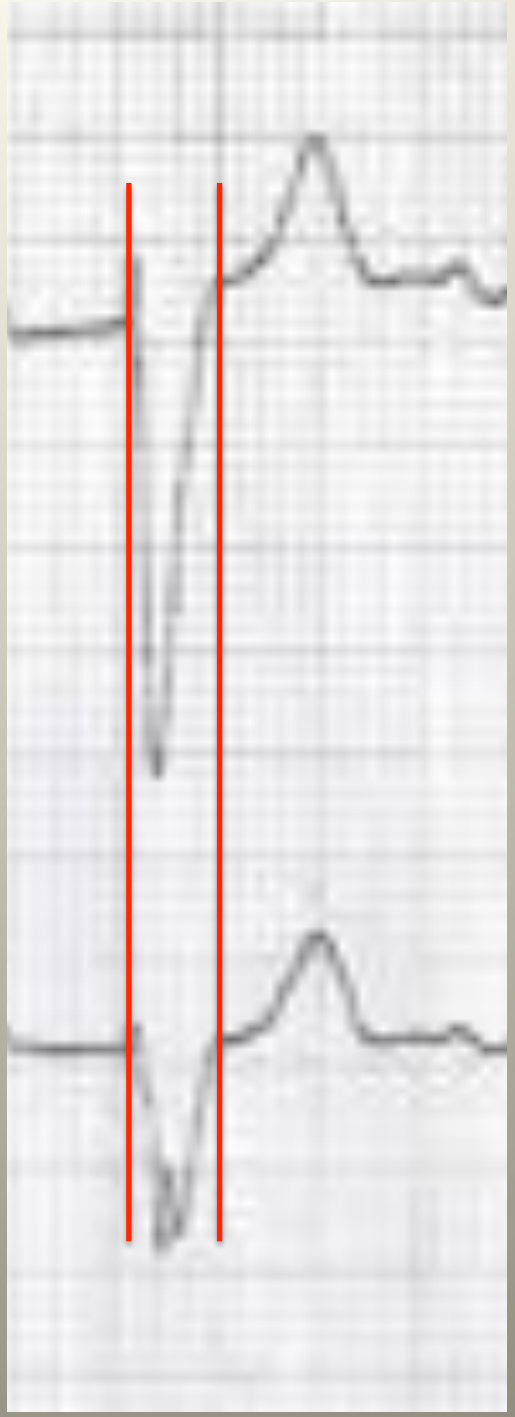
ECG at rest



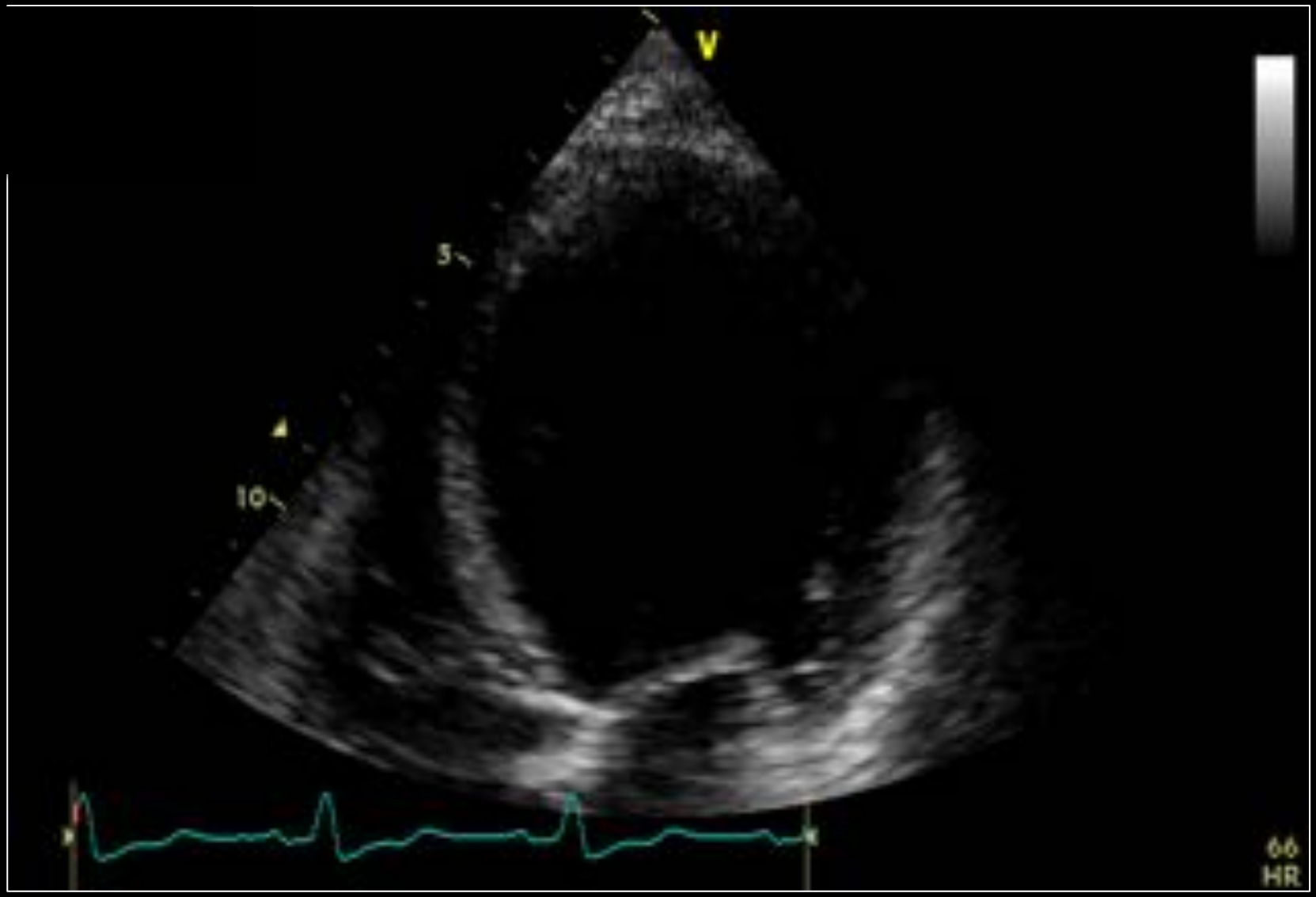
QRS duration



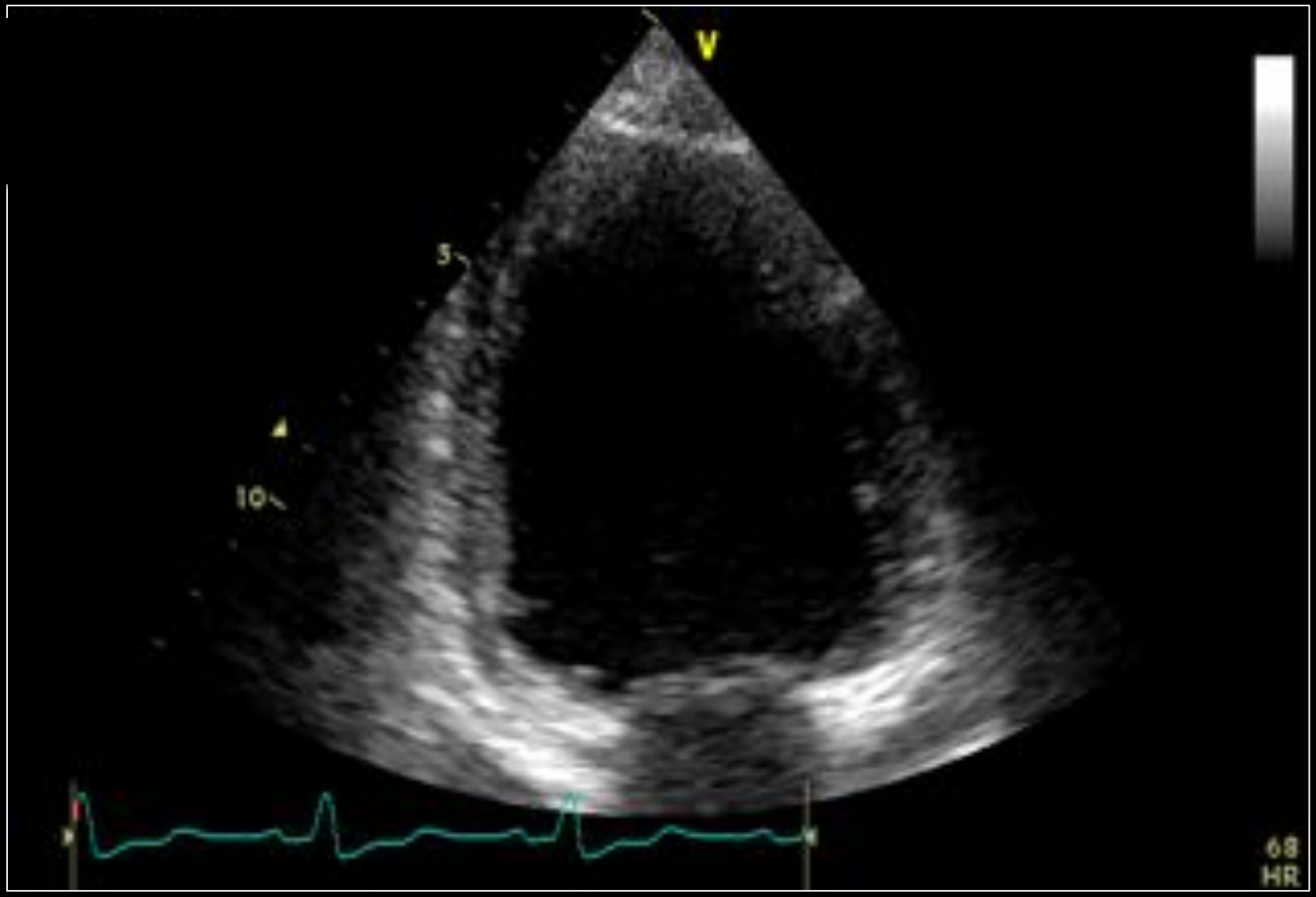
QRS duration: 180 ms



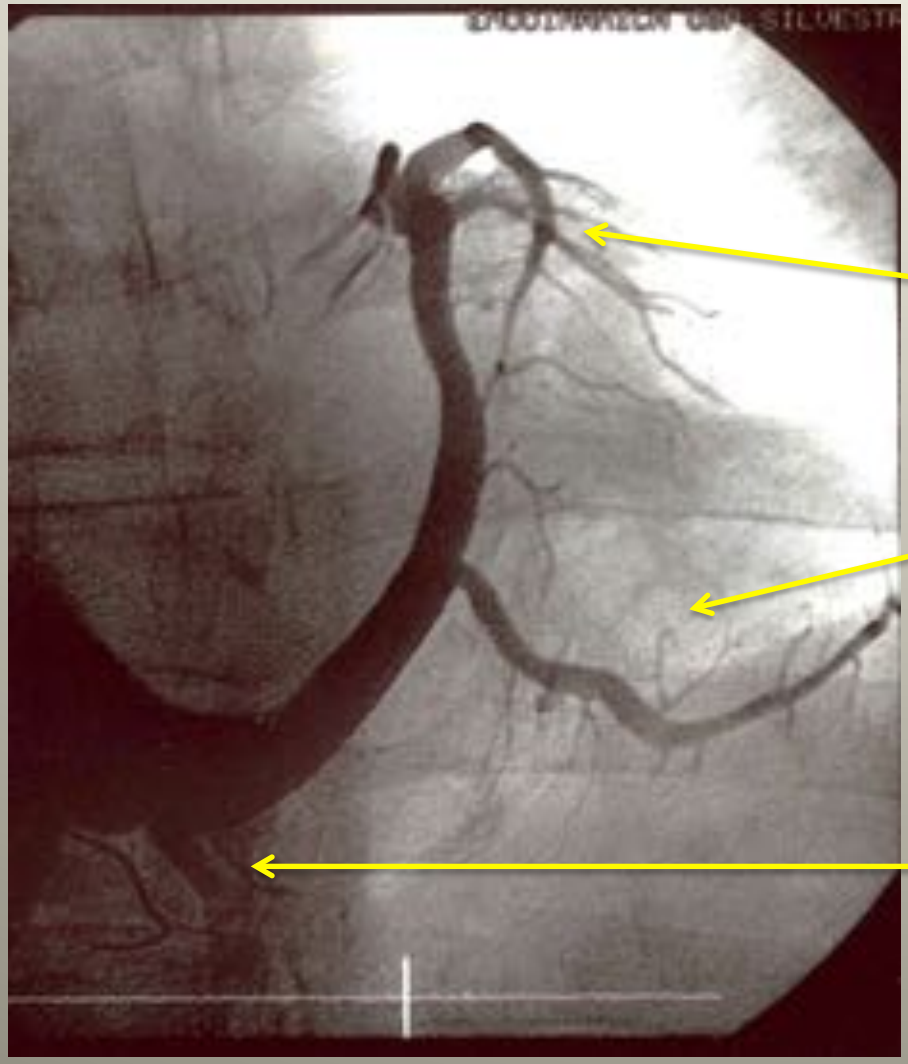
ECHO pre-implant



ECHO pre-implant



Indication for CRT-D system



Coronary sinus angio in LAO view

Great vein
(interventricular anterior vein)

Postero-lateral vein

Posterior vein

Indication for CRT-D system

We positioned a quadripolar LV lead* in a postero-lateral vein to obtain:

stable position (distal part)

Optimal position?

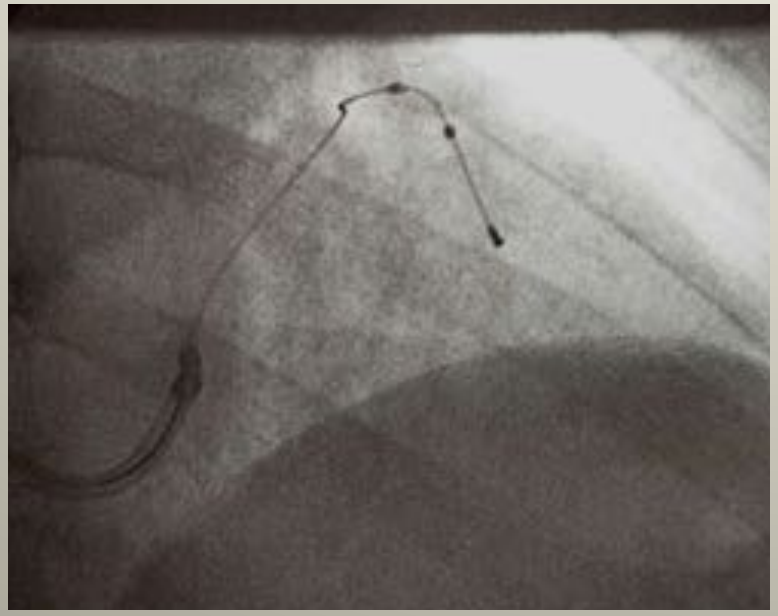
basal stimulation

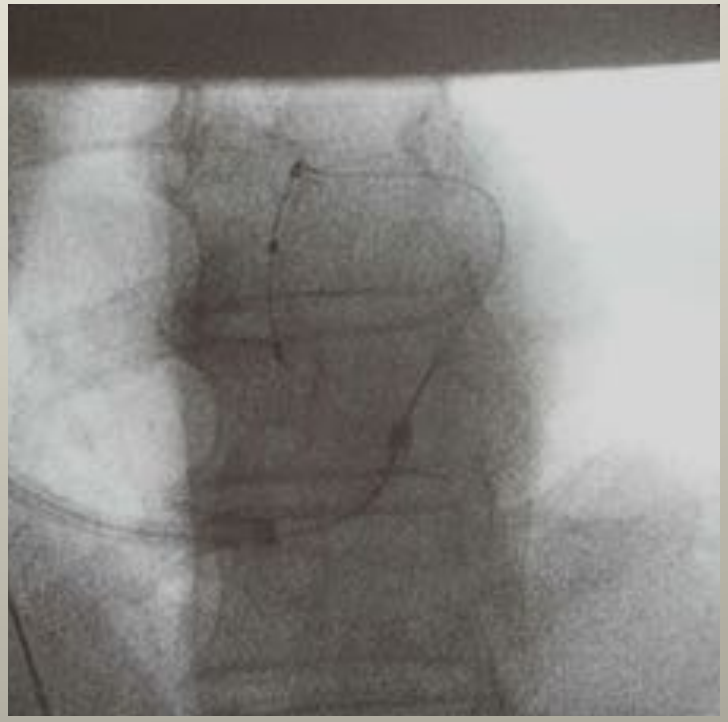
However: high pacing threshold and phrenic nerve stimulation from all poles

* Attain performa, Medtronic

Indication for CRT-D system

Our approach: dual site stimulation in LV



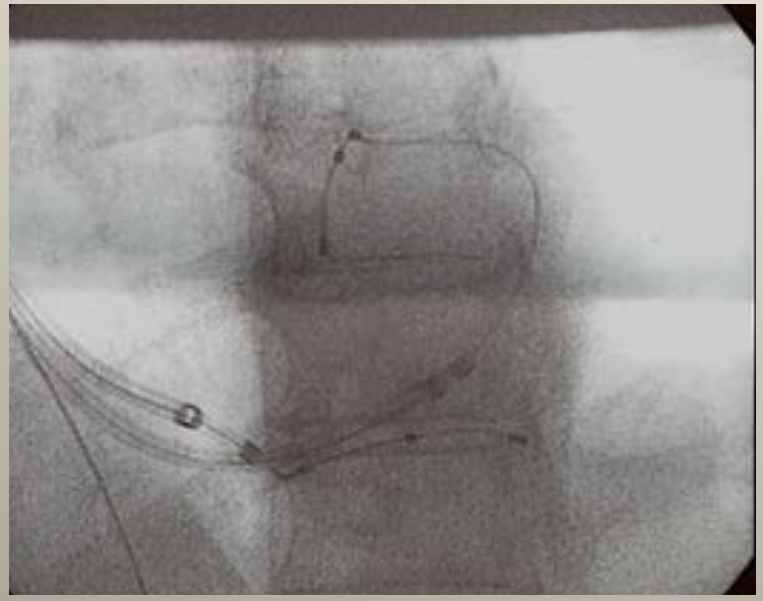


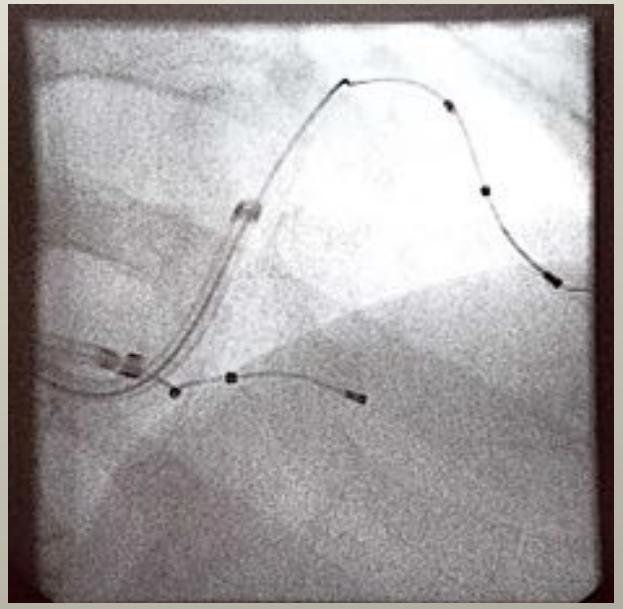
First LV lead* in the Great cardiac vein

* Attain stability, Medtronic

Indication for CRT-D system

Our approach: dual site stimulation in LV



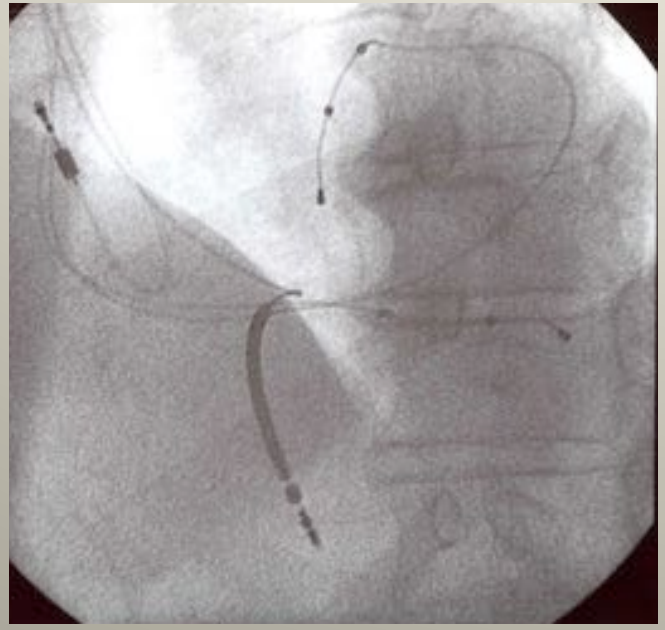


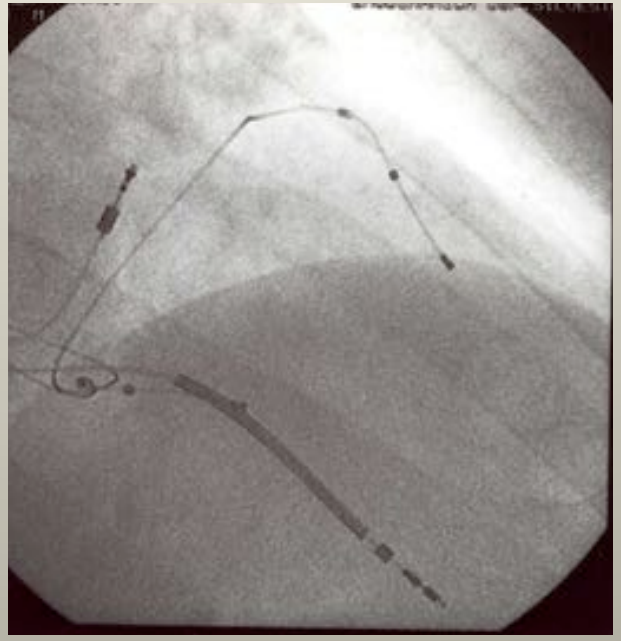
Second LV lead* in the posterior vein

* Attain stability, Medtronic

Indication for CRT-D system

Our approach: dual site stimulation in LV





RV lead in the apex, atrial lead in the right appendage*

* Vigila and SonRtip, Sorin Group

Indication for CRT-D system

Our approach: dual site stimulation in LV

B

Figure 2. *Electrode and helix*
resynchronization therapy pat

298

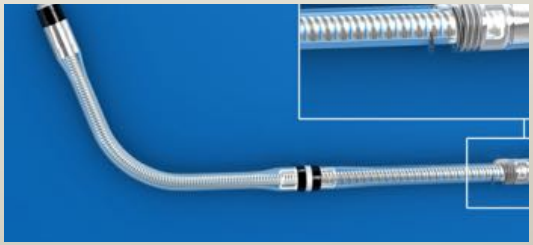
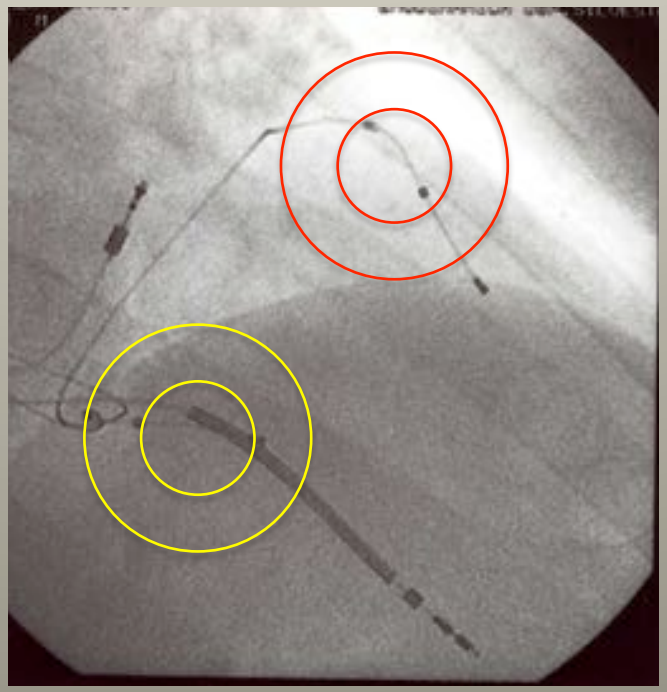


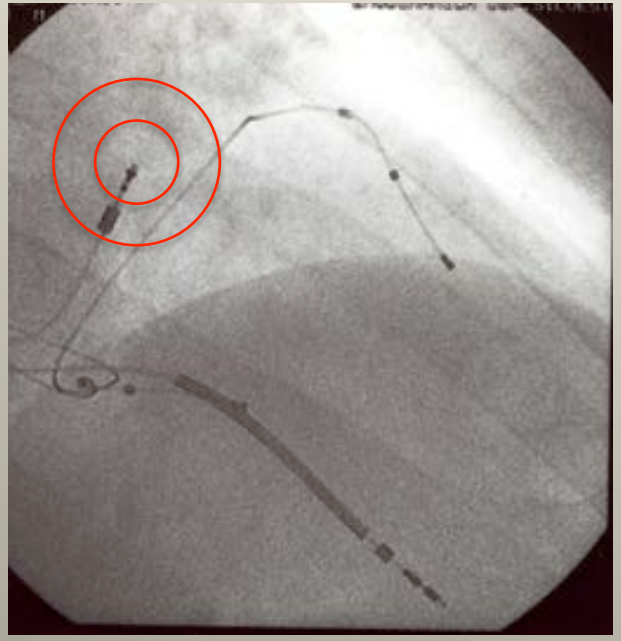
Figure 1 Model 20066 left ventricular lead along with a close-up of

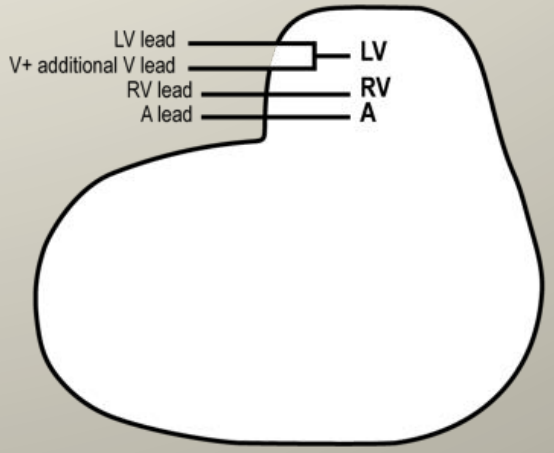
Use active fixation
of left side leads
for basal stimulation



Indication for CRT-D system

Our approach: dual site stimulation in LV

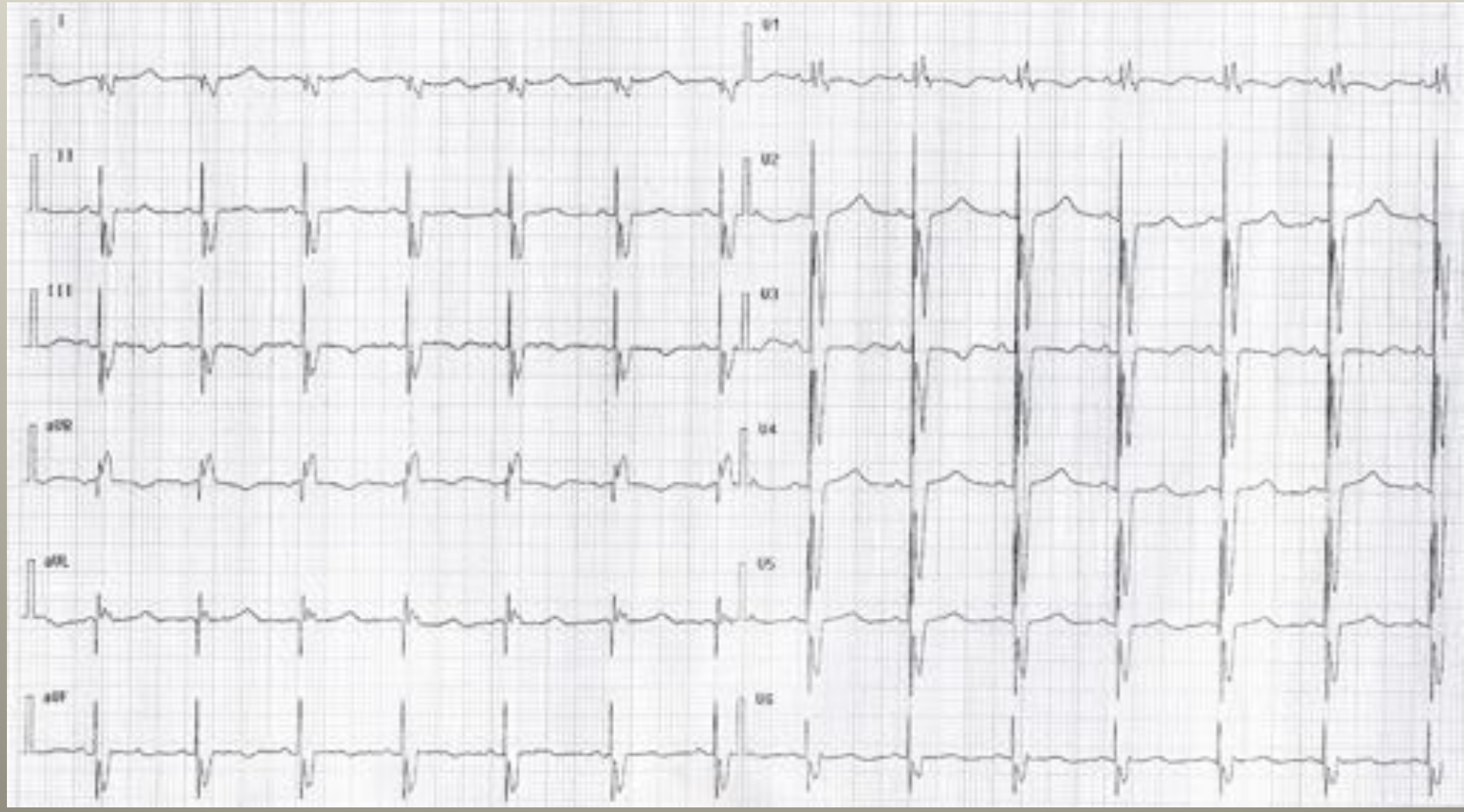




Use atrial lead with hemodynamic sensor for the automatic optimization of A-V and V-V intervals (SonR ICD-TriV system*)

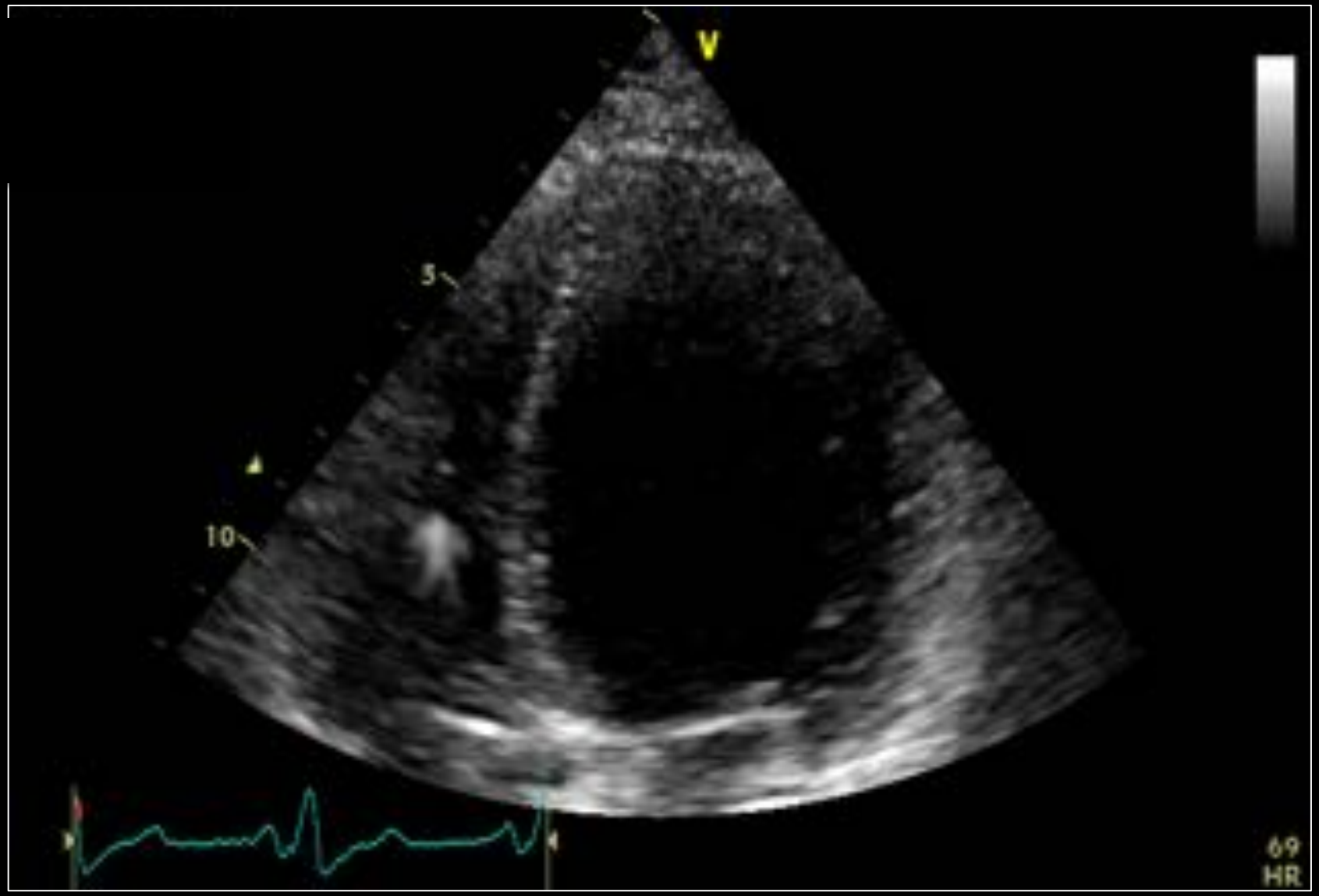
* Sorin Group

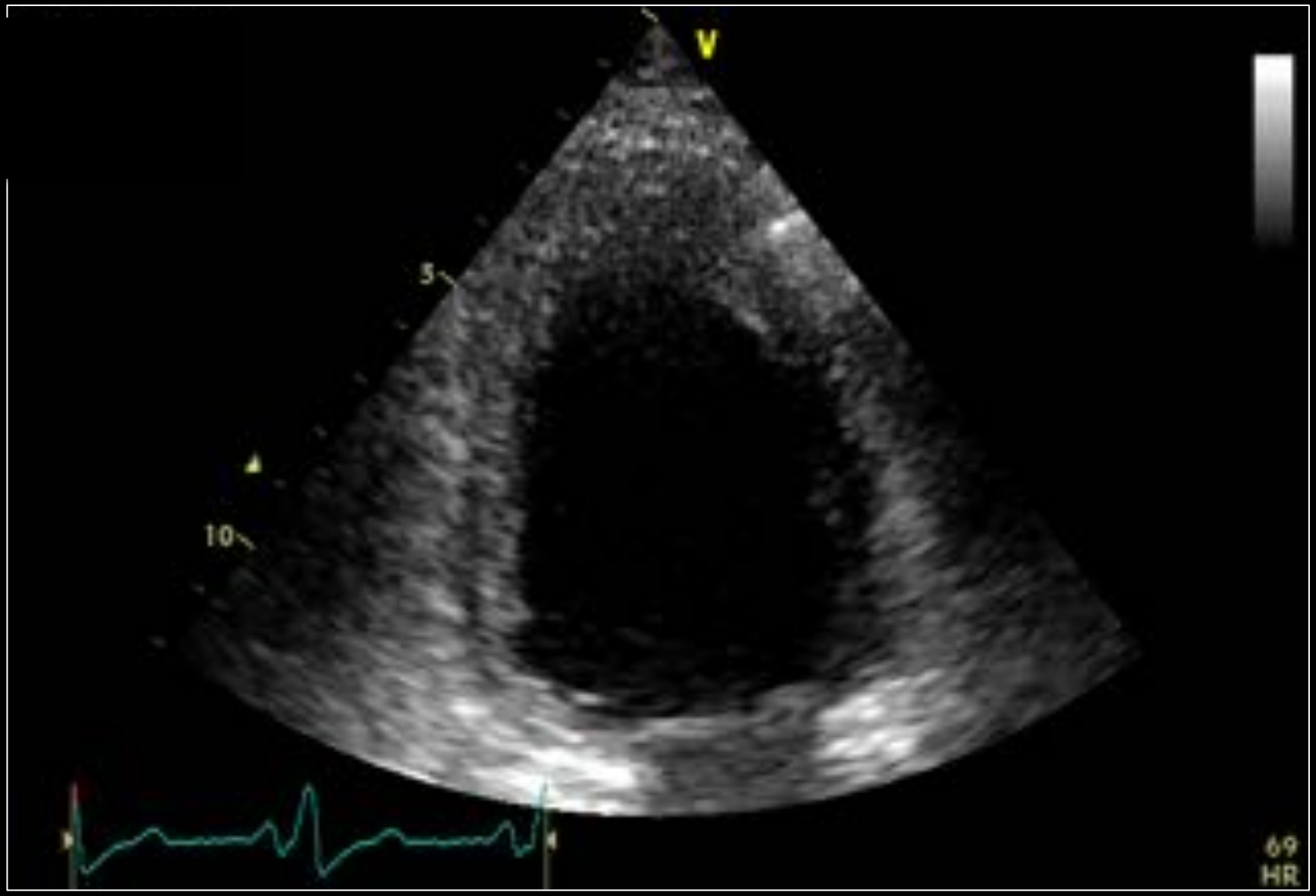
Post CRT-TRIV ECG



Post CRT-TRIV ECG

QRS width 110 ms

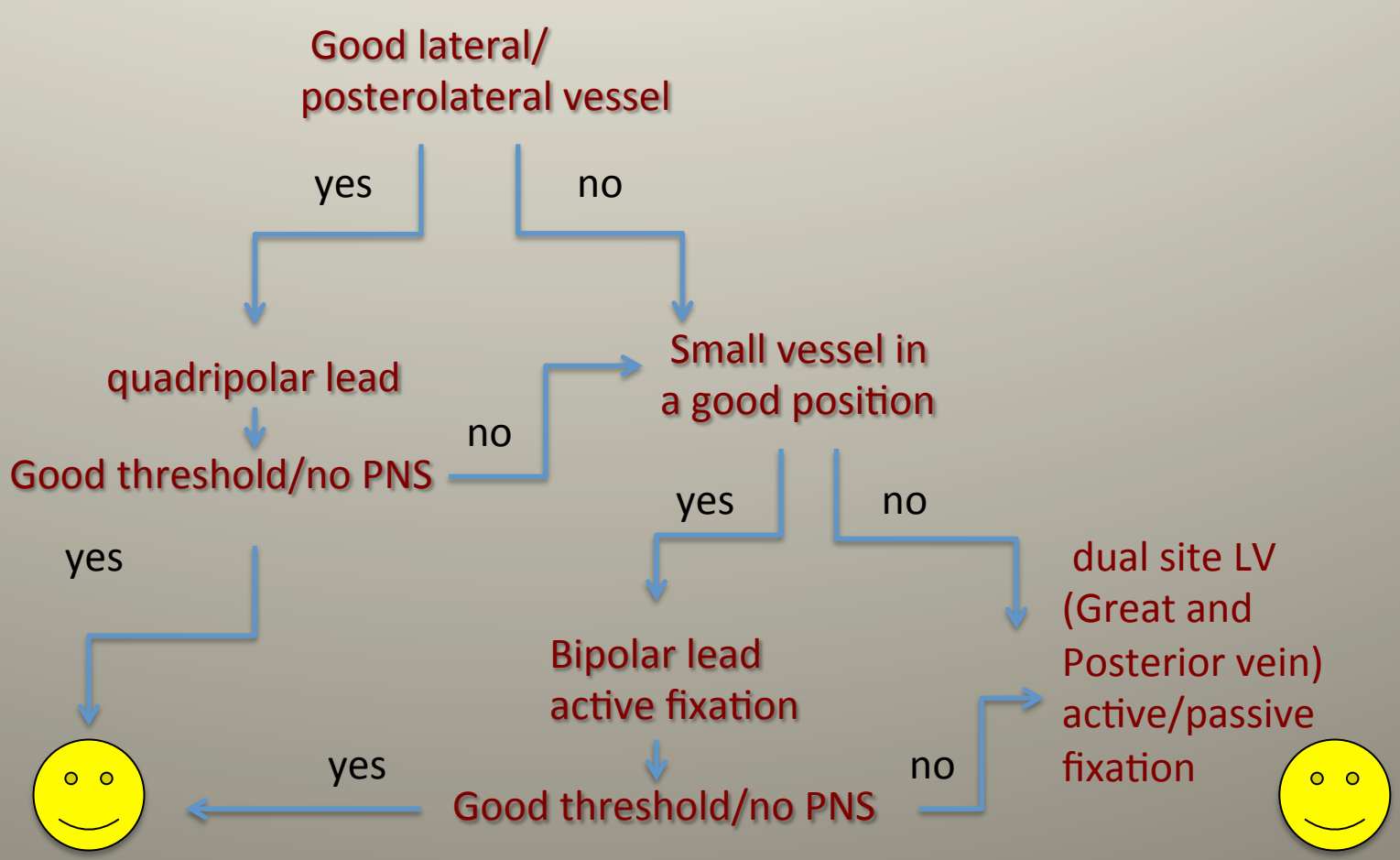

V
5
10
69
HR


V
5
10
69
HR

Several factors influence CRT response

One of these is the optimal lead position

In our practice we perform a stepwise approach:




Thanks for your attention!