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# Optimalizace CRT v roce 2018

Rostislav Polášek
Kardiologické oddělení
Krajská nemocnice Liberec a.s.

# Možnosti optimalizace CRT

1. **Před implantací**
   – selekční kritéria

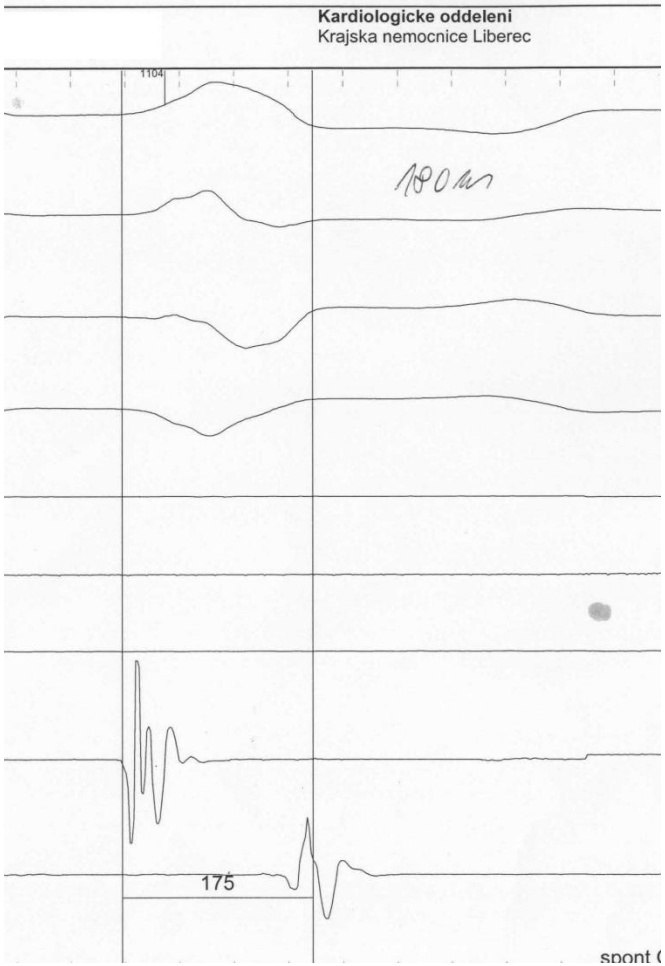
2. **Při implantaci**
   – poloha elektrod

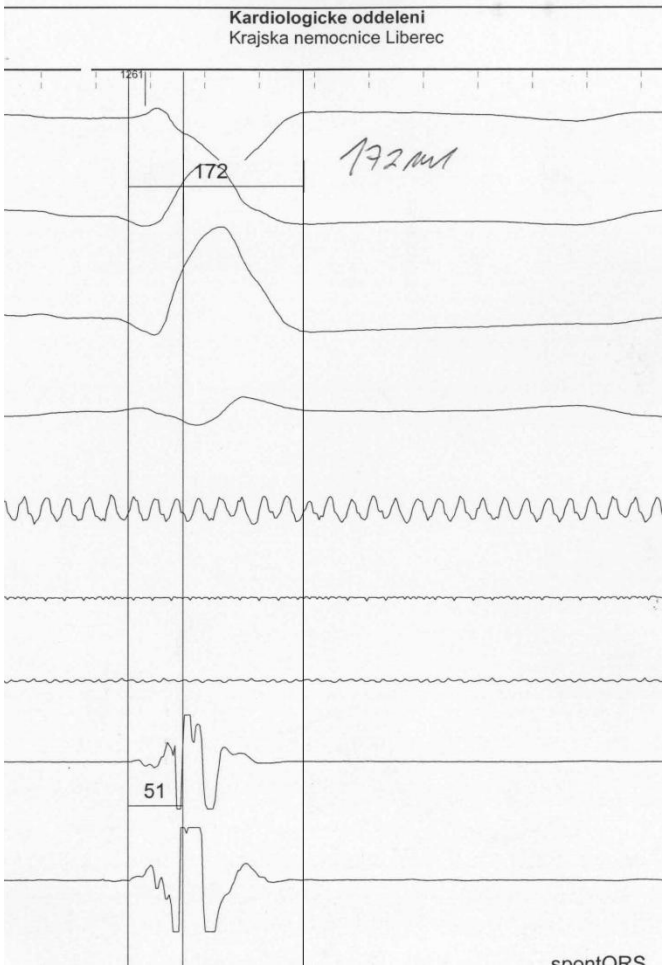
3. **Po implantaci**
   – Individualizace AVD, VVD
   – Maximalizace %VP
   – Farmakoterapie

# LBBB X RBBB

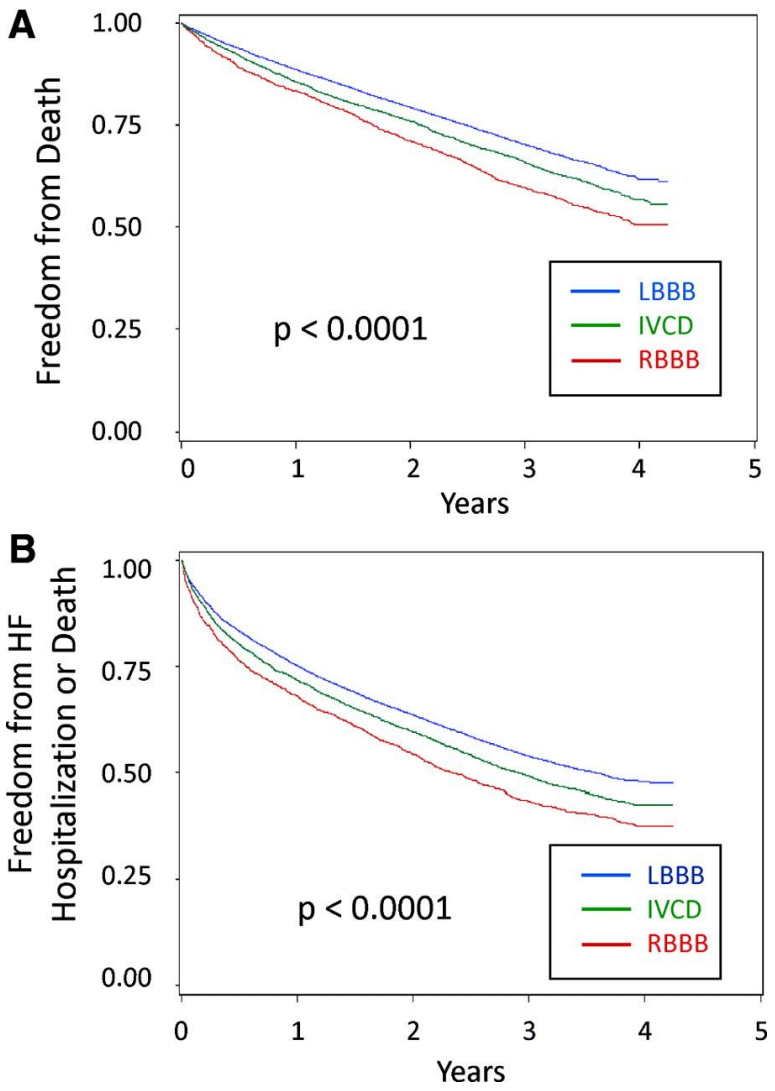
RV

LV



# 1. selekční kritéria CRT – non LBBB?




Bilchick, K. C. et al. Circulation 2010;122:2022-2030

# Morbidita a mortalita v RCT

**Table 5** Hazard ratios for CRT-D vs ICD for occurrence of the primary endpoint (first hospitalization for heart failure or death) in the MADIT-CRT study by QRS morphology

| QRS category | Hazard ratio (n) | *P* value |
|---|---|---|
| LBBB | 0.45 (1281) | <.05 |
| RBBB | 0.96 (228) | NS |
| IVCD/other | 1.42 (309) | NS |

CRT = cardiac resynchronization therapy; ICD = implantable cardioverter defibrillator; IVCD = nonspecific interventricular conduction defect; LBBB = left bundle branch block; RBBB = right bundle branch block.

Modified from Zareba et al.[17]

Bilchick, K. C. et al. Circulation 2010;122:2022-2030

# Cardiac resynchronization therapy implantation in patients with heart failure (1)

| Recommendations | Class | Level |
|---|---|---|
| CRT is recommended for symptomatic patients with HF in sinus rhythm with a QRS duration ≥150 msec and LBBB QRS morphology and with LVEF ≤35% despite OMT in order to improve symptoms and reduce morbidity and mortality. | I | A |
| CRT should be considered for symptomatic patients with HF in sinus rhythm with a QRS duration ≥150 msec and non-LBBB QRS morphology and with LVEF ≤35% despite OMT in order to improve symptoms and reduce morbidity and mortality. | IIa | B |
| CRT is recommended for symptomatic patients with HF in sinus rhythm with a QRS duration of 130–149 msec and LBBB QRS morphology and with LVEF ≤35% despite OMT in order to improve symptoms and reduce morbidity and mortality. | I | B |
| CRT may be considered for symptomatic patients with HF in sinus rhythm with a QRS duration of 130–149 msec and non-LBBB QRS morphology and with LVEF ≤35% despite OMT in order to improve symptoms and reduce morbidity and mortality. | IIb | B |


European Heart Journal (2016) **37**, 2129-2200 - doi:10.1093/eurheartj/ehw 128

# 1. selekční kritéria CRT – non LBBB?

## Poznámky z praxe

- Neléčíme CRT non LBBB pacienty pokud nejsou indikováni k ICD, pacienty s QRSd > 150 individuálně zvažujeme
- Při indikaci k ICD zvažujeme CRT i non LBBB (pravděpodobný upgrade)
- Zvažujeme aktivaci/deaktivaci biv. stimulace podle klinické odpovědi

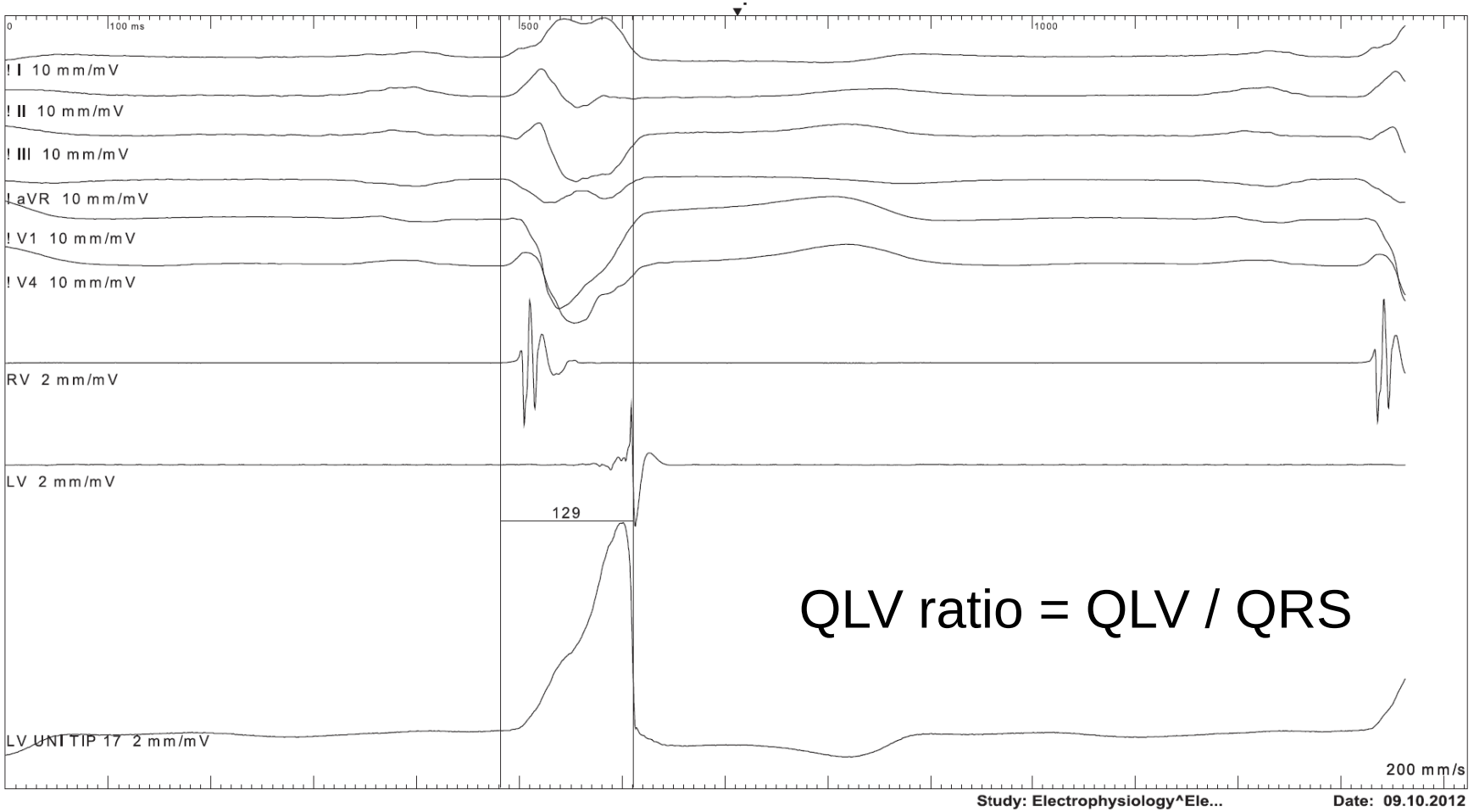
# 2. poloha elektrod

**Jak optimalizovat polohu LV elektrody**

- Anatomicky – non apical
- Elektricky
- Echokardiograficky

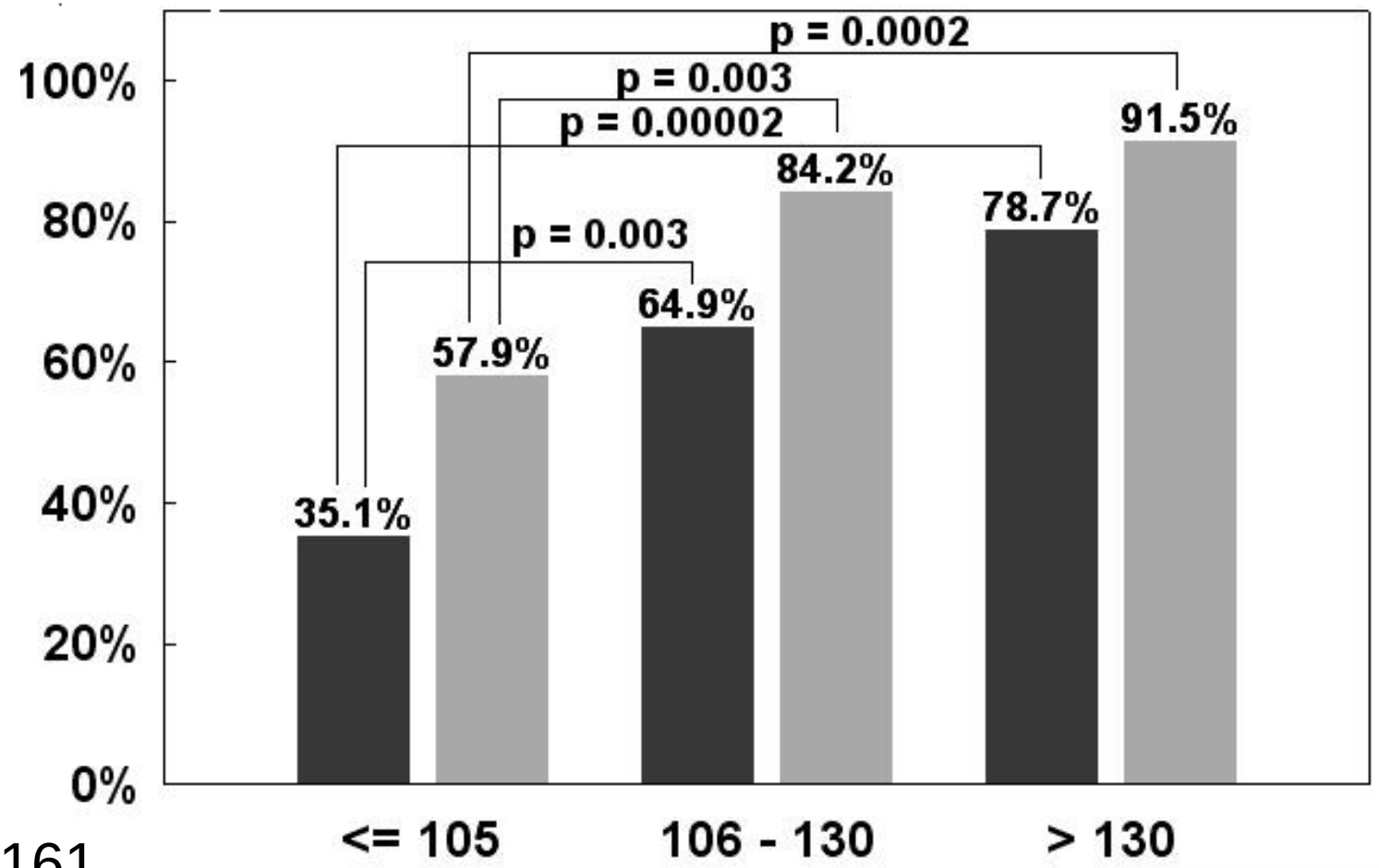
# 2. poloha elektrod

## Elektrická poloha LV elektrody: QLV




QLV ratio = QLV / QRS

# 2. poloha elektrod




n = 161

Polasek R, BMC Cardiovasc Dis, 2012

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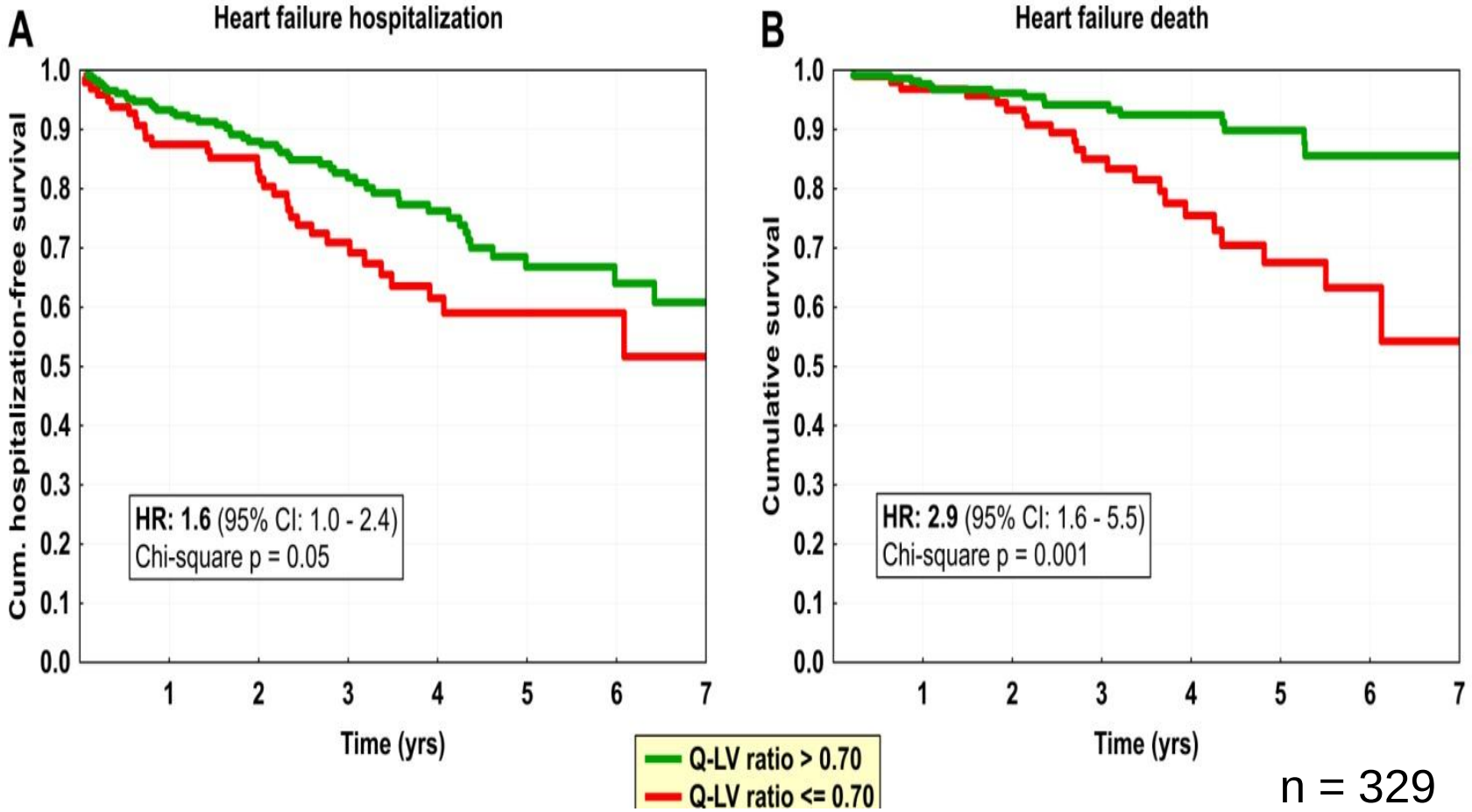
# Q-LV ratio: Heart failure morbidity and mortality




n = 329

Roubicek T, Circulation AE, 2015

# ECHO poloha LVel – TARGET trial

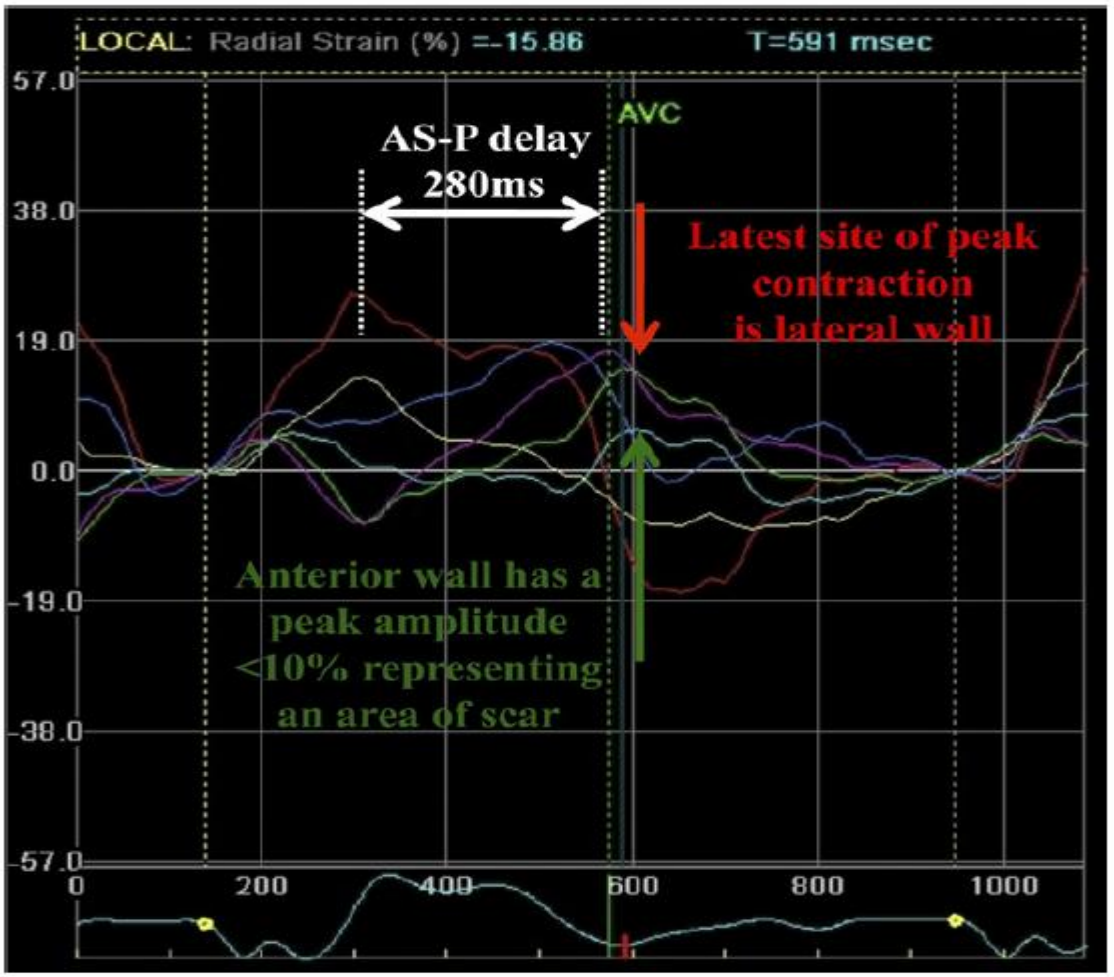



**Figure 1** Speckle-Tracking Echocardiography to Determine Optimal Sites

Khan FZ et all, JACC 2012

# TARGET

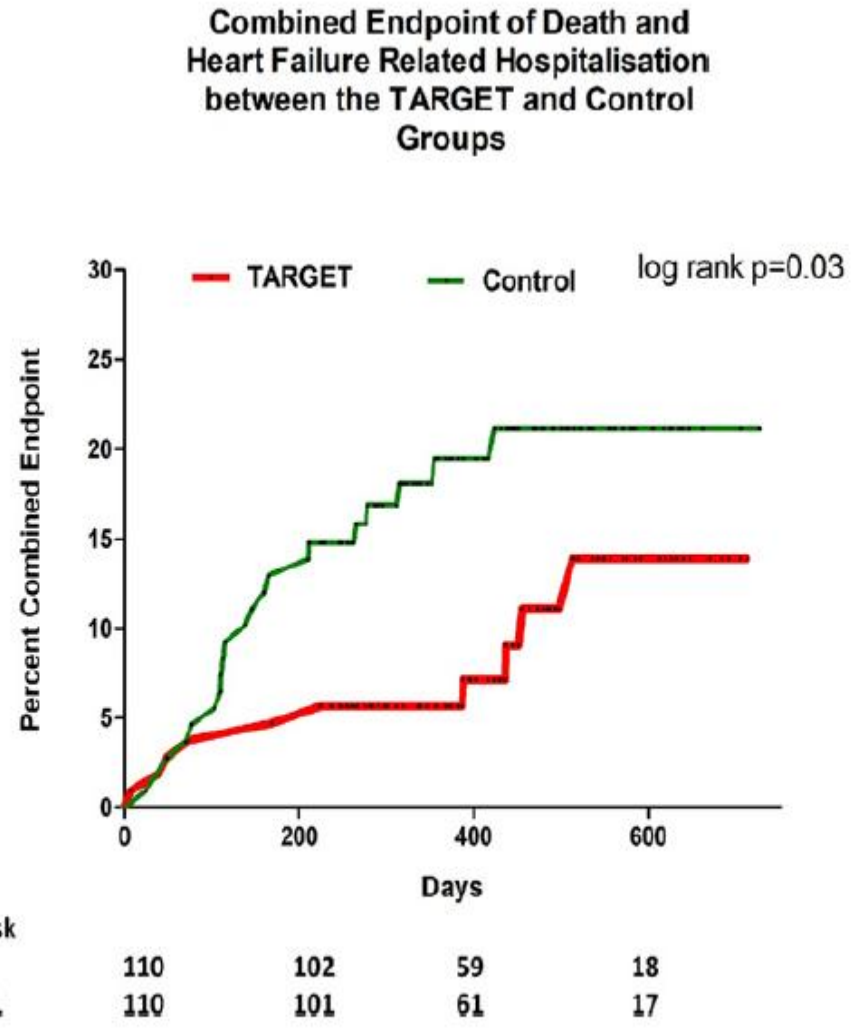



**Figure 4** Kaplan-Meier Curves Comparing Both Randomized Groups

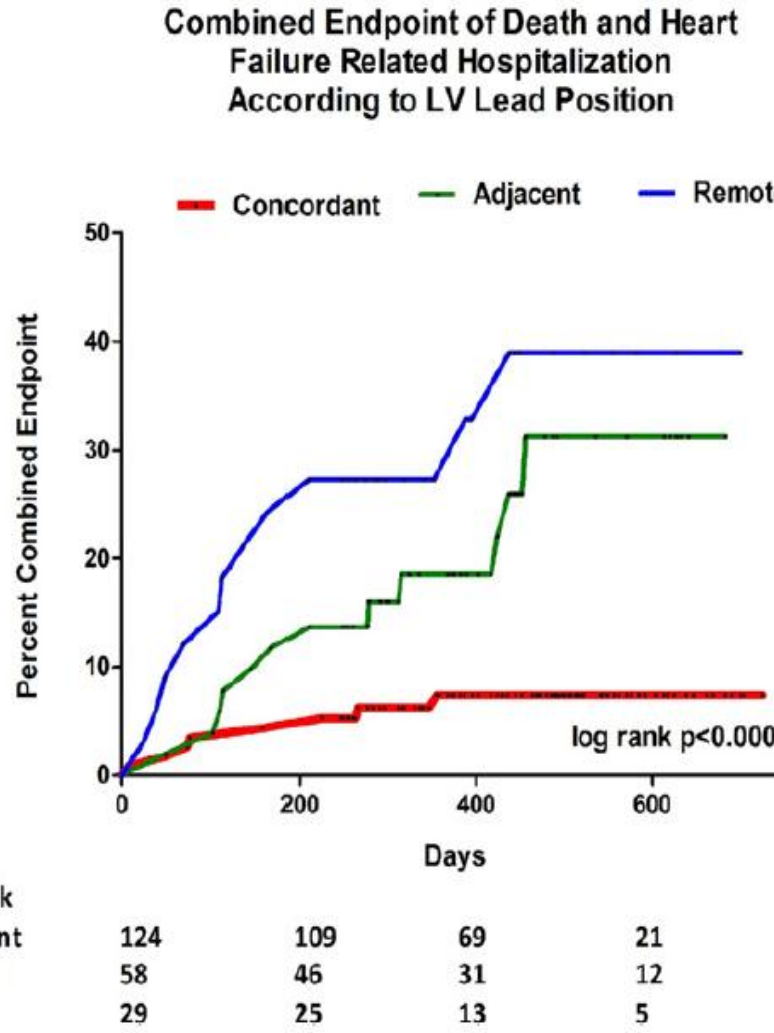
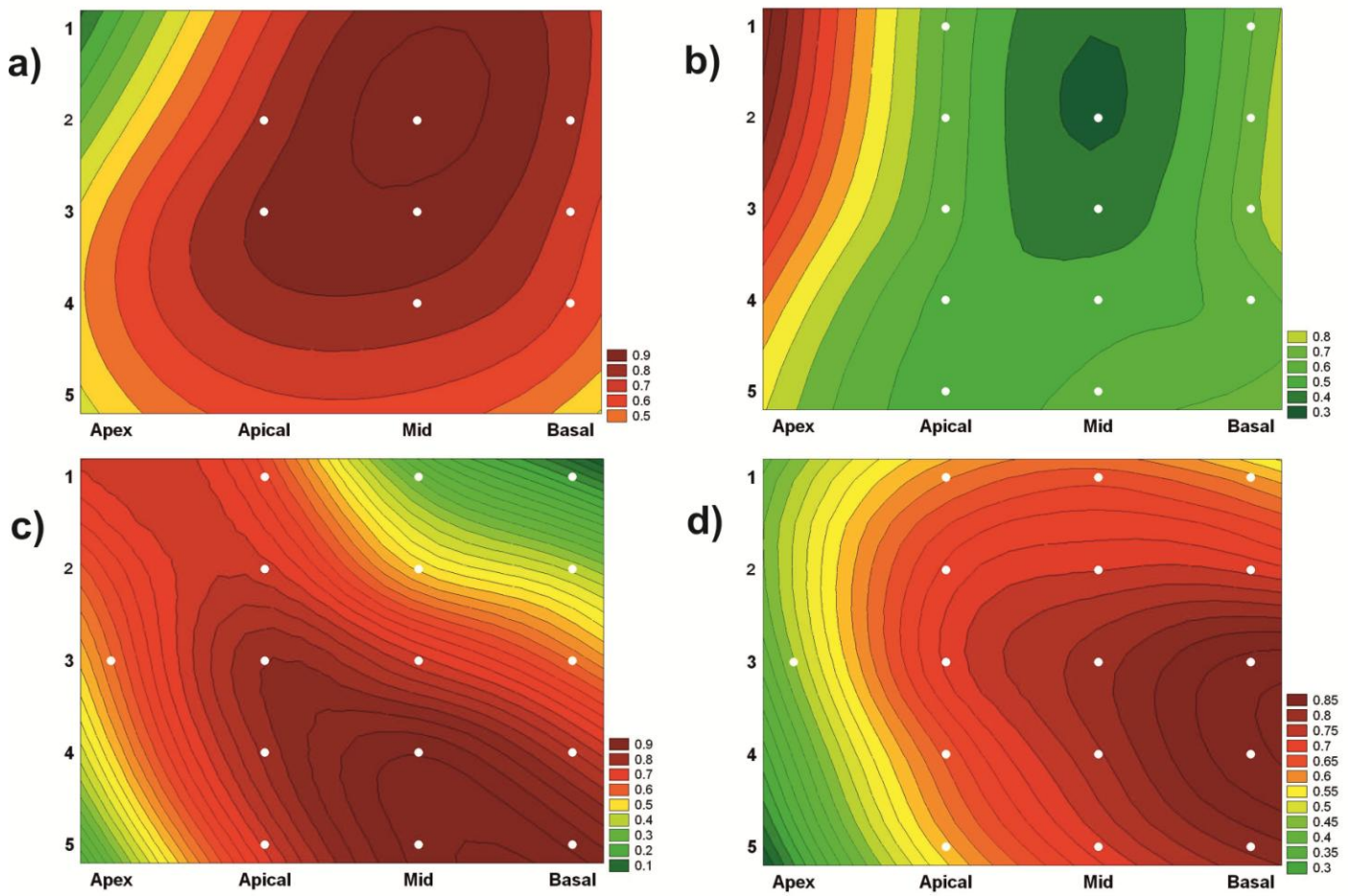



**Figure 5** Kaplan-Meier Curves Comparing Groups According to LV Lead Position

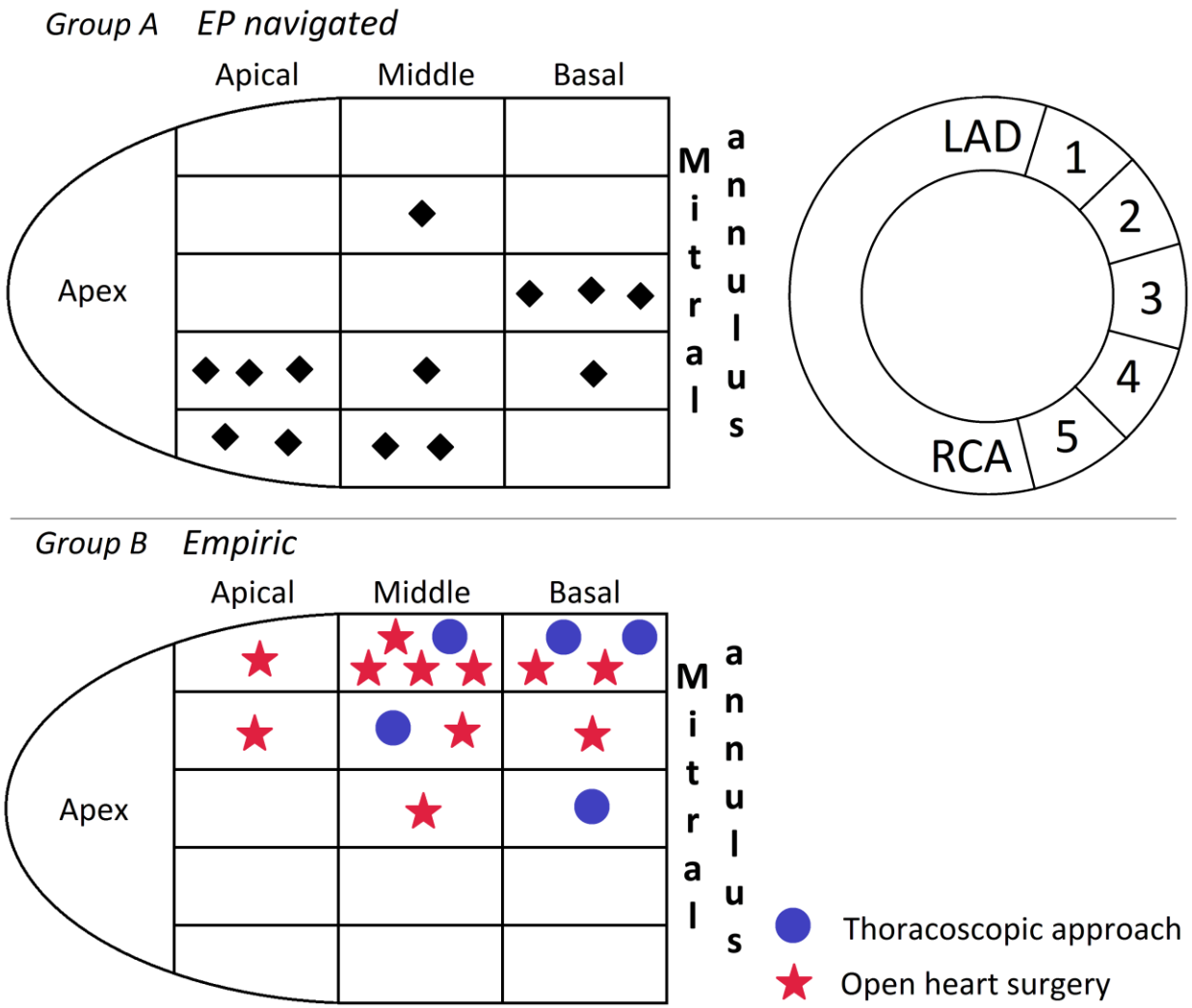
# 2. poloha elektrod

Aktivace LV u LBBB/IVCD je variabilní – epikardiální aktivační mapy



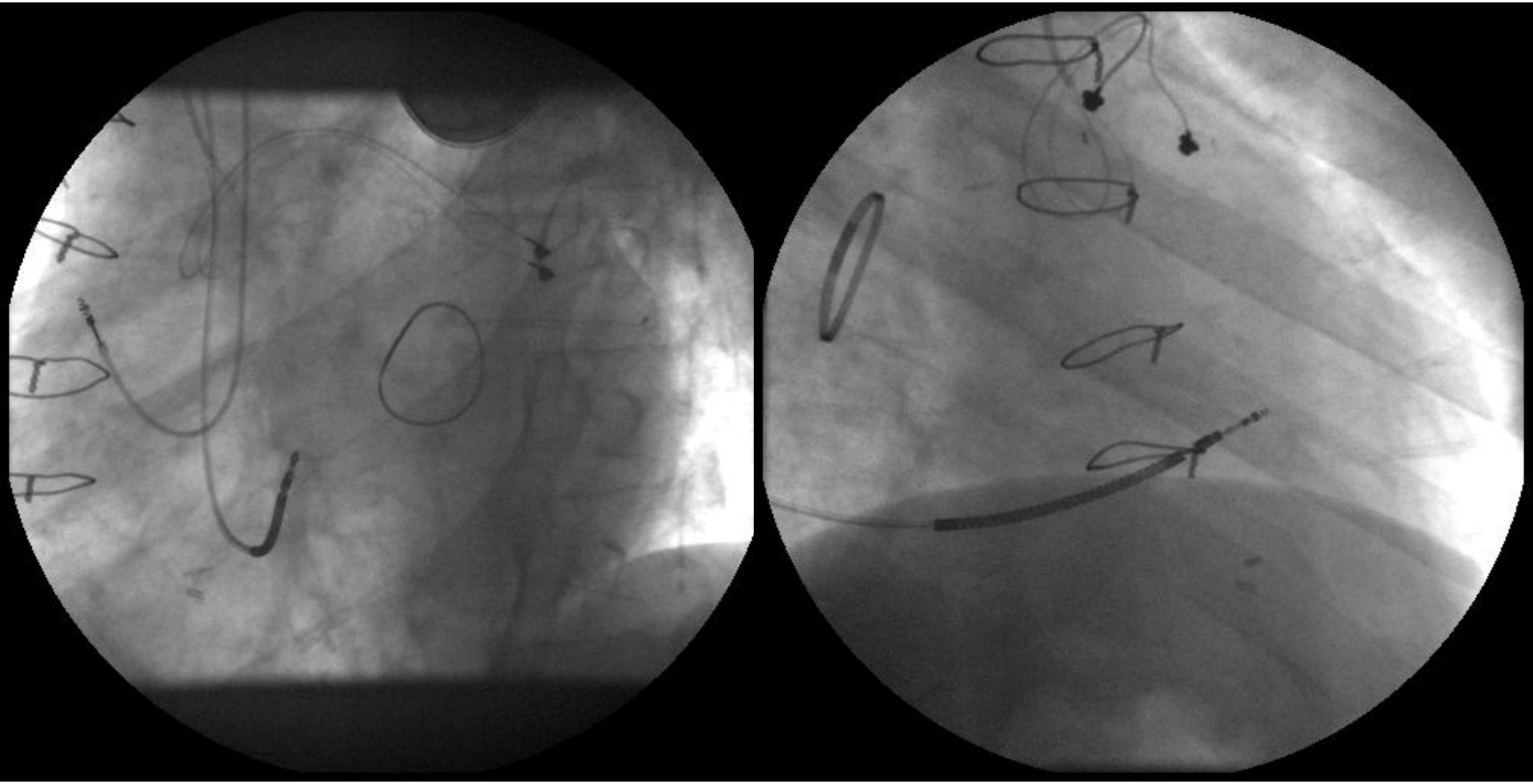

Polasek R. et al, JCE, 2014

# Porovnání polohy chirurgicky zavedené LVel navigované vs empirické




Polasek R, Hanuliakova, Skalsky, HRS Denver 2015 abstract

# Toto není laterální poloha LVel.



# Poznámky z praxe

- LVel. – cílem je QLVratio > 0,70
  - Hledáme jinou větev
  - Zvažujeme chirurgickou implantaci (navigovanou)

- Poloha RV elektrody
  - RCT negativní
  - volíme septální pozici

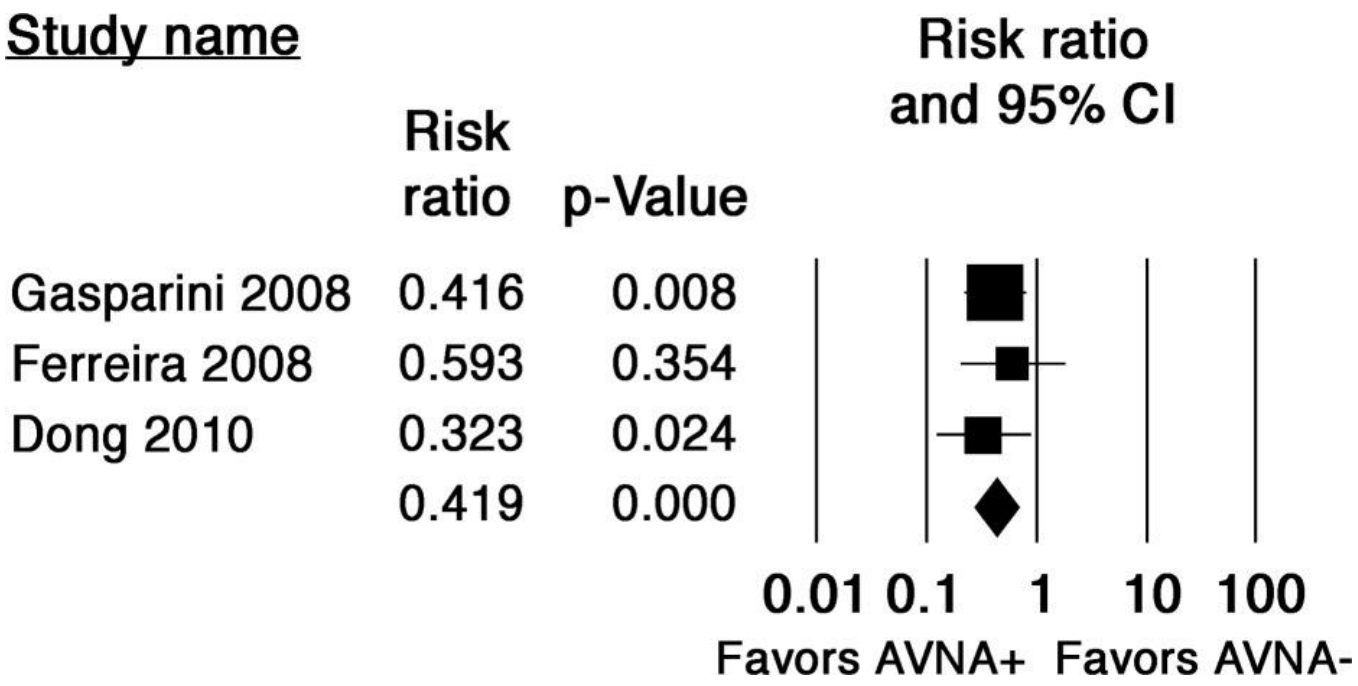
# 3. Po implantaci - farmakoterapie

- Titrace blokátorů RAAS
  - ACE-I
  - MRA
  - BB
- Diuretika – úprava podle symptomů
  - Snížení FSM
  - Záměna FSM za Hydrochlorothiazid?
- U dále symptomatických ARNI

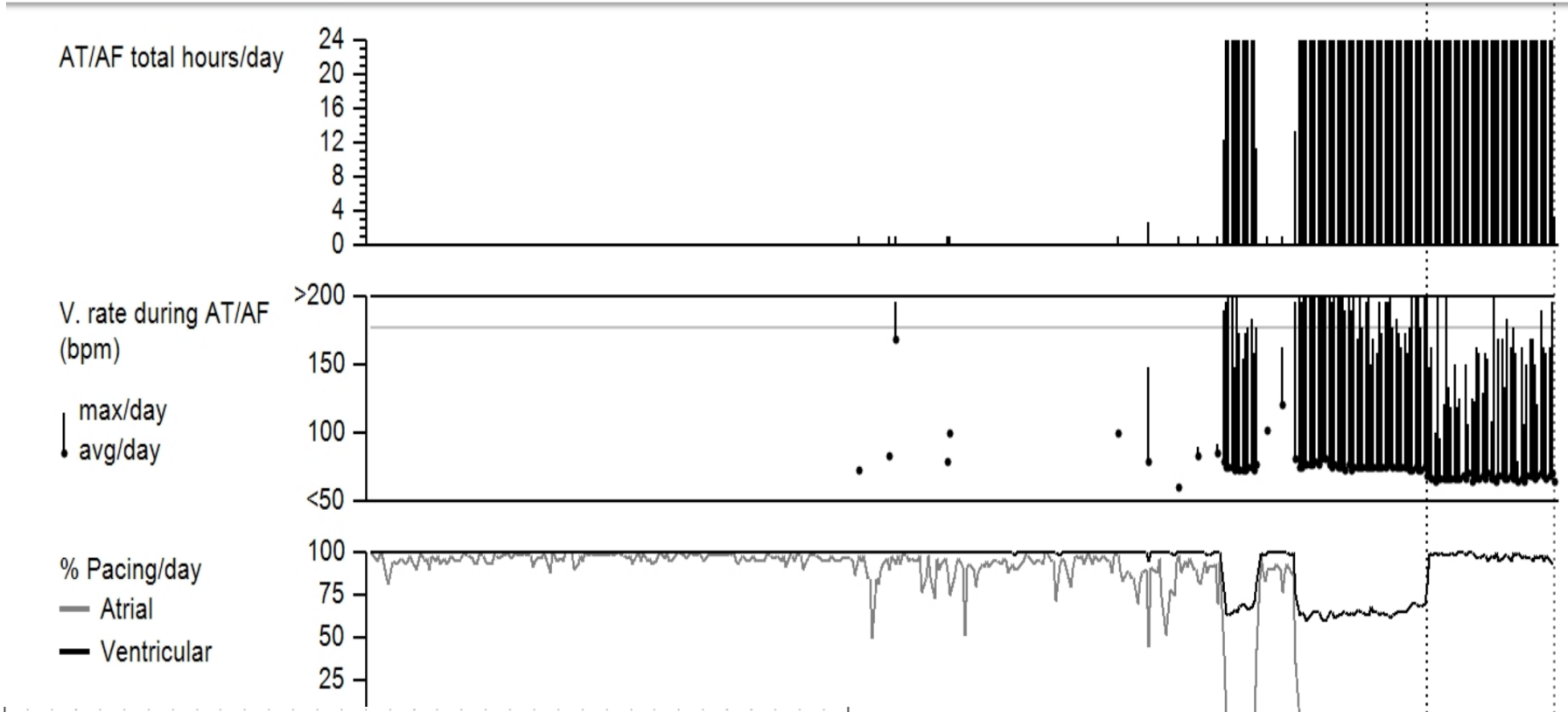
# 3. Po implantaci – maximalizace BivP paced

- Nedostatečný podil BivP
  - AF
  - VPC
- Podhodnocení čítači přístroje – (trigger modes)
- Role dálkové monitorace
- Časná RFA AV junkce u FS a “incomplete BivP”

# maximalizace BivP paced



# 3. Po implantaci – dálková monitorace





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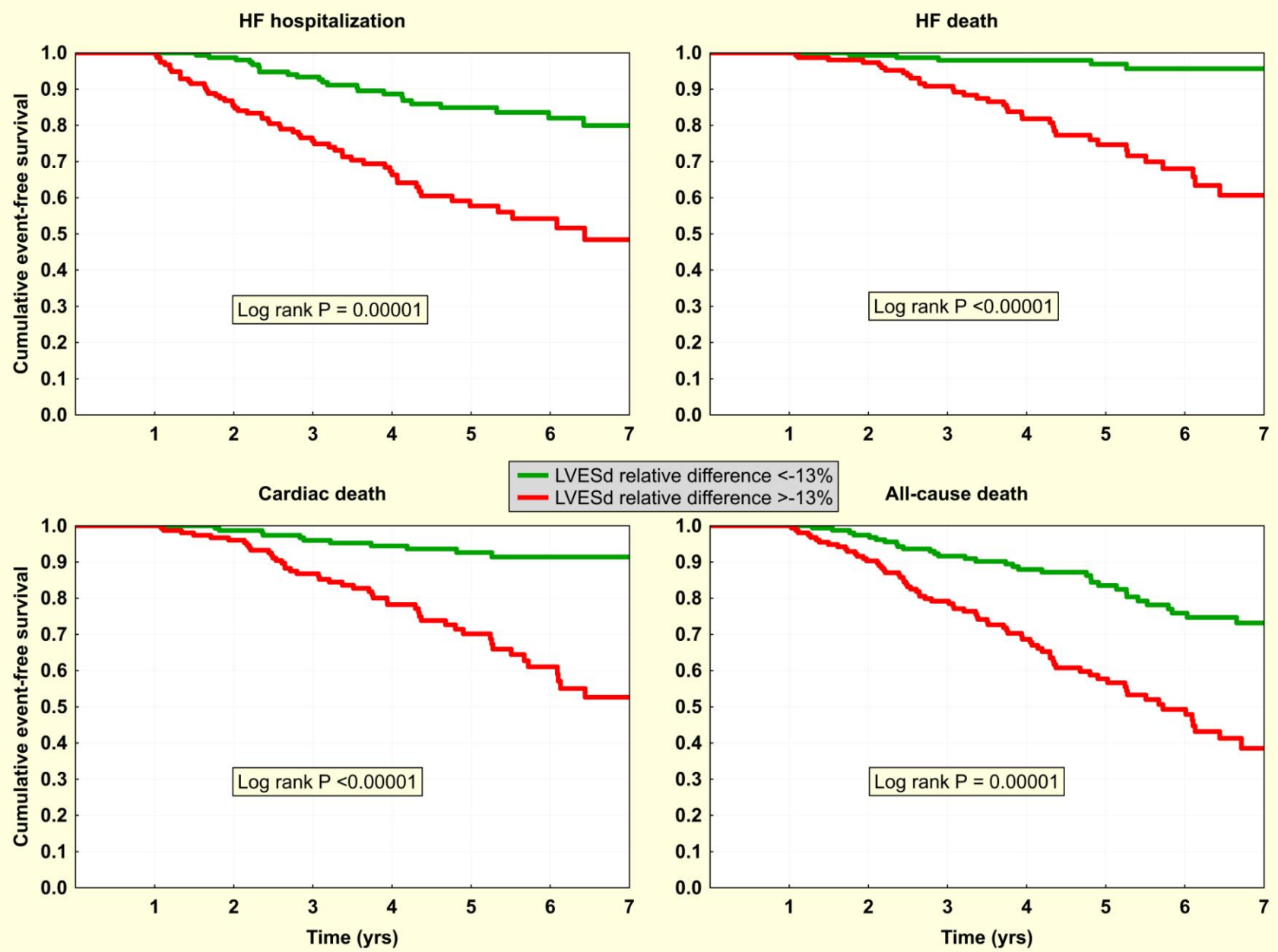
# 3. Optimalizace po implantaci

## Co dále?

Stačí rutinní nastavení? AVD 100-120ms, VVD 0ms

# HF morbidita/mortalita podle reversní remodelace LK v 1 roce



# 3. Optimalizace po implantaci

## Co dále?

**Stačí rutinní nastavení** AVD 100-120ms, VVD 0ms

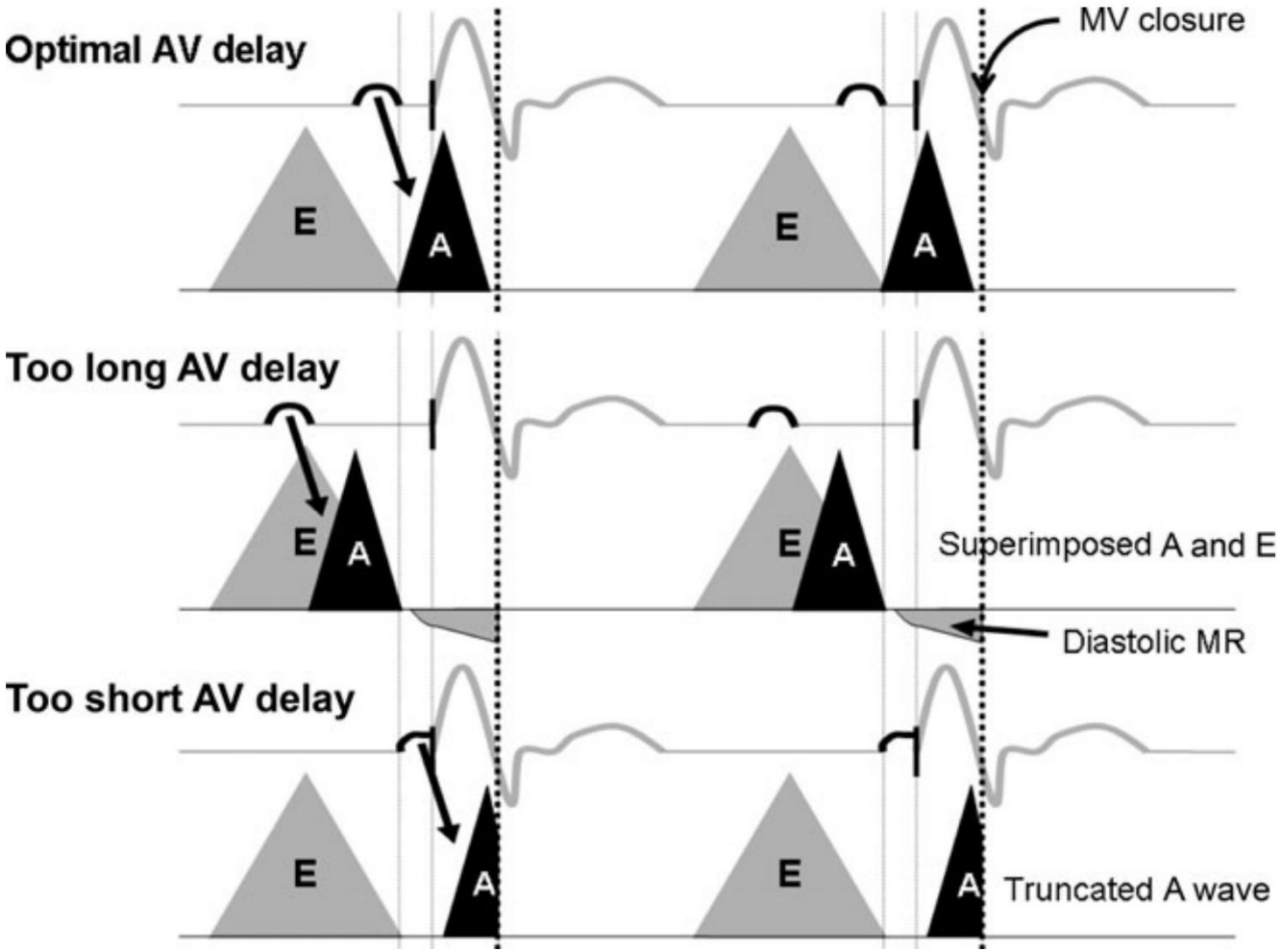
## Rozhodnutí podle ECHO odpovědi

Individualizace AVD, VVD

Automatické algoritmy pro AVD, VVD

MPP, AdaptiveCRT

# 3. Po implantaci – individuální AVD




Barold S., Europace (2008) 10, iii88–iii95

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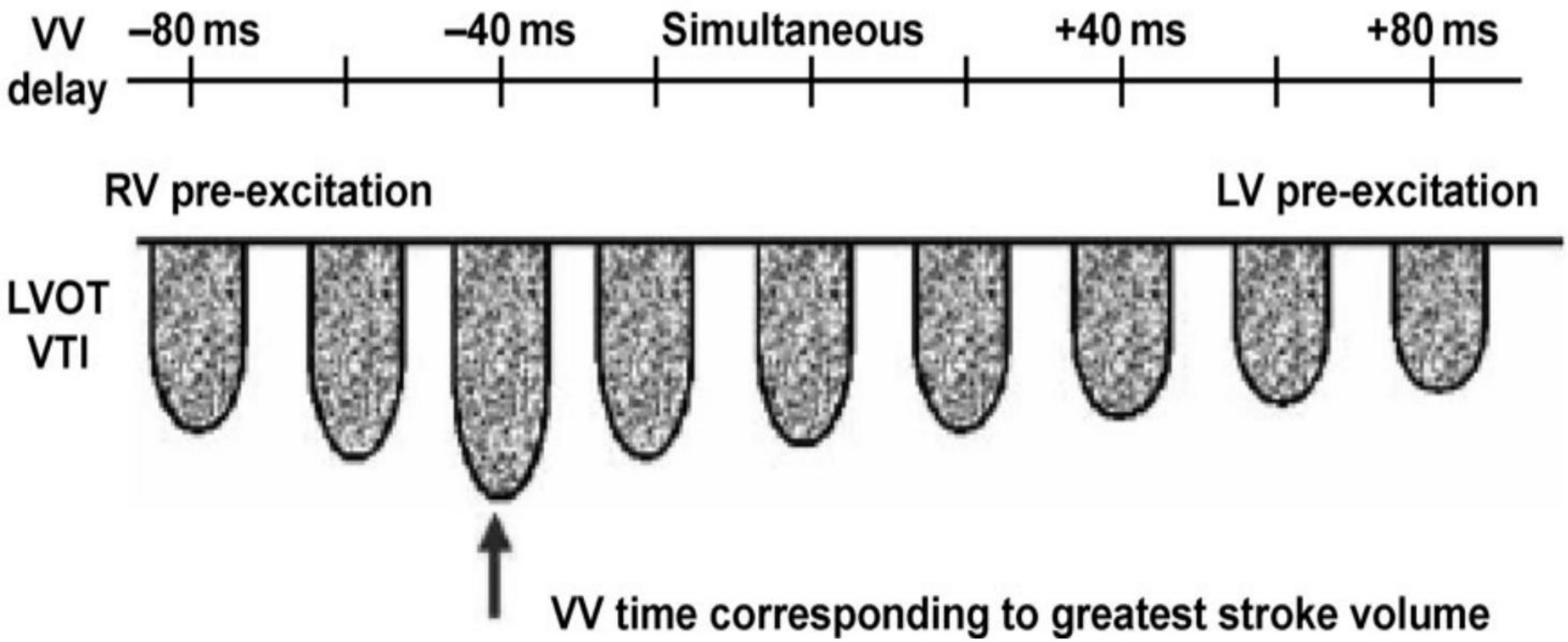
# 3. Po implantaci – VV optimisation




Barold S., Europace (2008) 10, iii88–iii95

# 3. Po implantaci – electrogram based AVD optimisation

- QuickOpt  (St Jude Medical)
- AdaptivCRT (MEDTRONIC)
- EEHF + (BOSTON SCIENTIFIC)

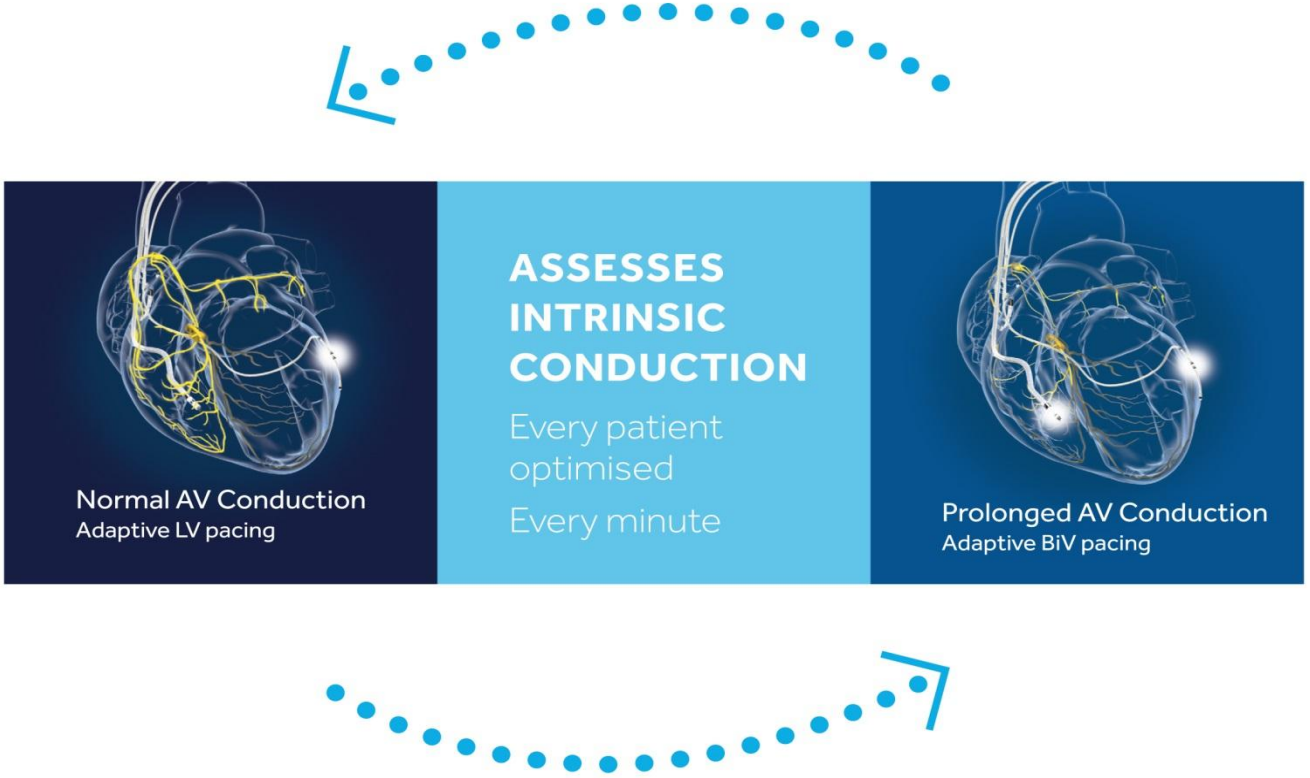
- Výsledky těchto algoritmů vzájemně nekorelují
- Nekorelují s hemodynamickou optimalizací

- Nedoporučujeme provádět rutinně!!

Wichterle D., unpublished

# ADaptivCRT™

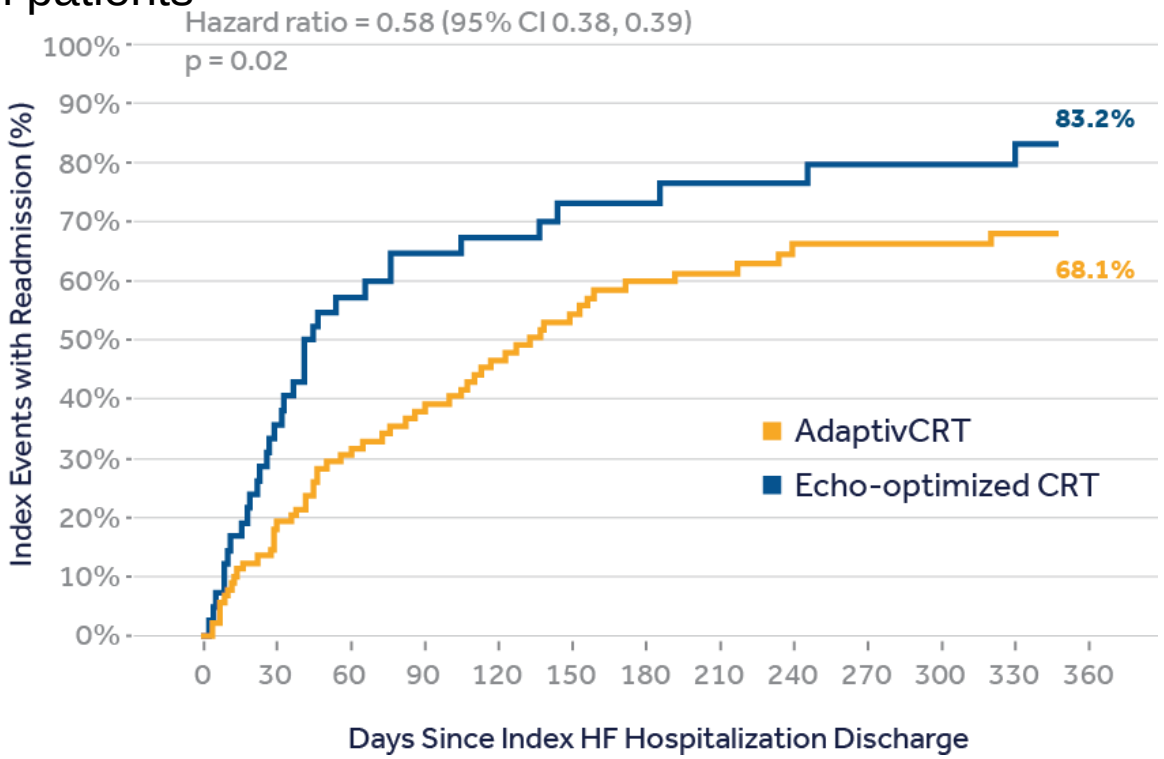
## Algorithm Operation



# Adaptivcrt™ improves patient outcomes by…

## Reducing a patient's odds of a 30-Day HF Readmission* by 59%[1]

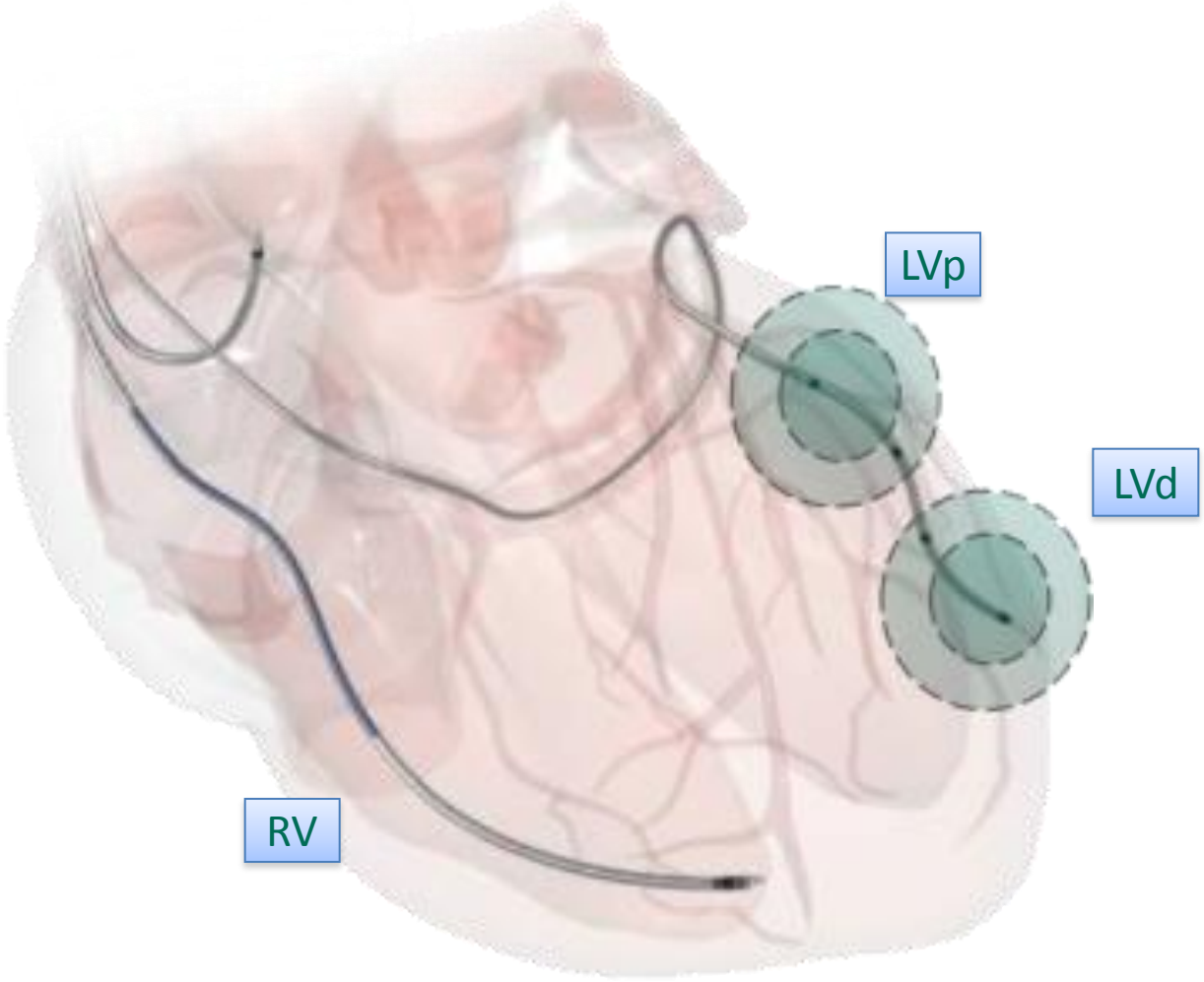
For all patients




* Readmissions following an HF hospitalization.

[1] Starling RC, Krum H, Bril S, et al. Impact of a Novel Adaptive Optimization Algorithm on 30-Day Readmissions: Evidence From the Adaptive CRT Trial. JACC Heart Fail. July 2015;3(7):565-572.

# MultiPoint™ Pacing (MPP)



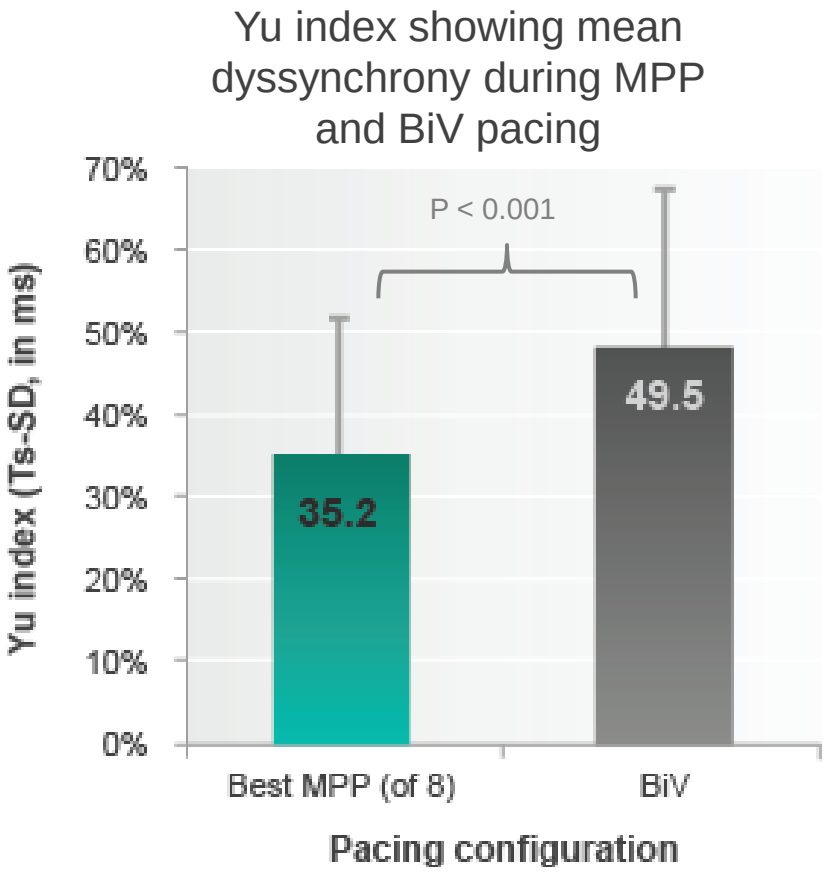
# MultiPoint™ Pacing Improves Mechanical Dyssynchrony

Methods:

•Acute pacing protocol consisting of BiV simultaneous pacing and a set of 8 MultiPoint Pacing interventions covering a range of LVLV and LVRV delay combinations.

Results:

•In 67% of patients, at least one MultiPoint Pacing intervention exhibited a significant reduction (≥20%) in dyssync




Rinaldi et al. Multisite left ventricular pacing improves acute mechanical dyssynchrony in heart failure patients. ACC 2012.

# Závěr

- K optimálnímu výsledku CRT je nezbytná
  - Správná indikace – LBBB, RVS
  - Optimální poloha LVel
  - OMT
  - Max. %BivP

# Závěr

- Ostatní metody optimalizace – individualizovaný AVD, VVD, MPP,  AdaptiveCRT mají své místo u nemocných, u kterých nedojde ke strukturální odpovědi na CRT, jejich účinnost je ale omezená

- Nedořešenou otázkou je reimplantace LVel.  u její suboptimální polohy

# Děkuji za pozornost

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