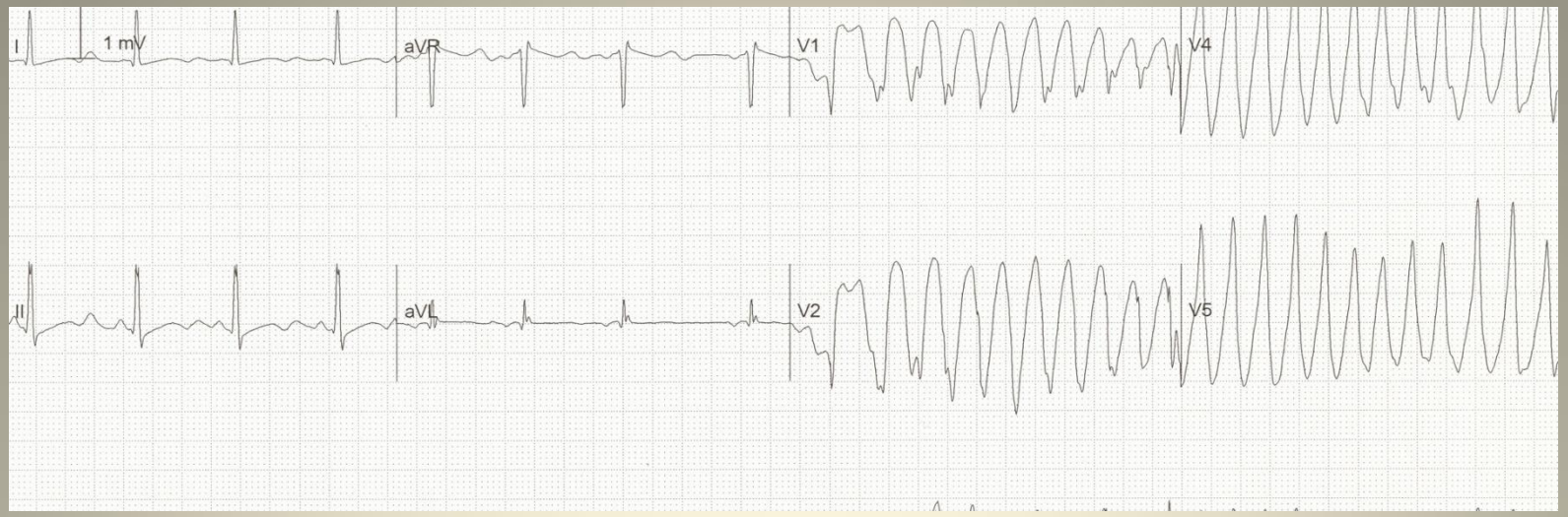


ECG on discharge as a prognosticator of sudden cardiac death

Dr. Gregory Golovchiner

Rabin Medical Center

Israel

RABIN MEDICAL CENTER
BEILINSON • HASHARON

Sudden death after AMI

- SD is a catastrophic complication of AMI
- Ventricular arrhythmias are a major cause of death in the early phase AMI
- This is largely the basis for the success of CCU in reducing mortality from AMI[1]

[1] Killip T, Kimball JT. Am J Cardiol 1967;20: 457–64.

Sudden death after AMI

- Risk is greatest in the first few hours
- Scar post-AMI may provide the substrate for ventricular arrhythmia and as a result - cardiac arrest even in the absence of active ischemia

Why do we need to predict SD post MI?

ICD

- ICD is well established therapy for prevention of SD
- Important to predict SD in post-AMI patients to advise ICD

ICD

- Based on current evidence guidelines recommend ICD at least 40 days after AMI
- The decision is based solely on EF

MADIT, MADIT-II, MUSTT, DINAMIT, BEST+ICD

On the other hand

- Risk of SD post AMI is highest in 30-45 days
  - VALIANT
    - 1 month after MI
    - Particularly in patients with LV dysfunction

Yap YG. Eur Heart J 2005
Solomon SD – VALIANT. NEJM 2005

On the other hand

- Majority of SD occurs in subjects with relatively preserved LF function

Gorgels AP. The Maastricht Circulatory Arrest Registry. Eur Heart J 2003.
Makikallio TH. Eur Heart J 2005

Predictors of outcome

- Several ECG findings are known to be predictors of outcome after AMI
  - Q wave at presentation
  - ST segment deviation and it’s resolution
  - Ventricular arrhythmias in the course of MI
  - QRS duration and BBB
  - Etc.

But what about sudden death ?

SD predictors after AMI

- No reliable well established ECG predictors

QRS

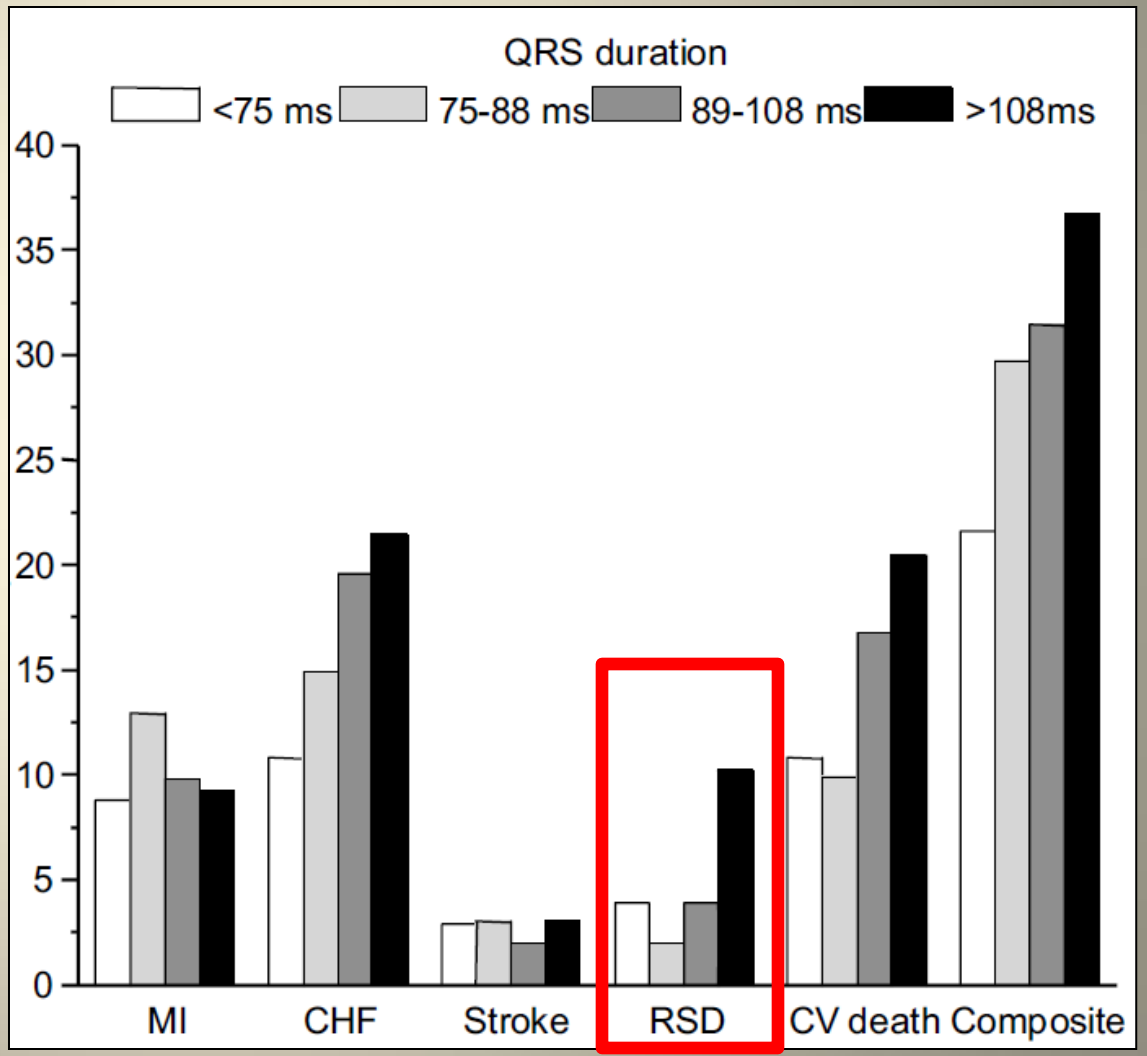
QRS-MUSTT

- CAD p-s with EF<40%, NSVT
- 647 patients
- Median follow-up 39 months
  - LBBB or IVCD : RR 1.46 for SD

Buxton AE. JACC 2007

QRS-VALIANT

- AMI, HF and/or LVD
- 407 p-s from ECHO sub-study)
- Median follow-up 24.7 months



Yerra L. Heart Rhythm 2006

QRS

- 1455 AMI patients
- 98%- PCI
- **EF (median) 56%**
- Follow up to 24 months (min 12)
- QRS > 120 ms
  - Predictor of all-cause mortality (especially with low EF)
  - **Not a predictor of SD**

Bauer A. Eur Heart J, 2006

QRS - conclusion

- Probably QRS can be an additional predictor for SD in patients with reduced EF

Ventricular arrhythmias

PVC's

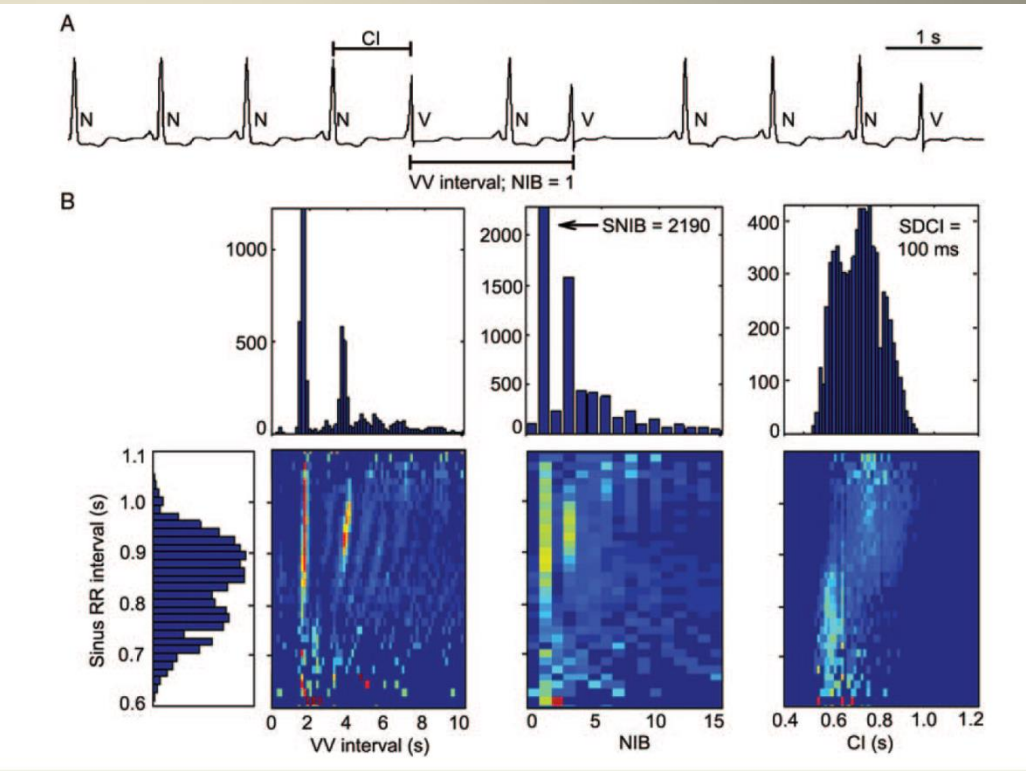
- GISSI-2. Follow up 6 months[1]
- 575 MI survivors. Follow up 24 months [2]
  - >10 PVC's/h not a predictors of arrhythmic death (only NSVT)>10 PVC's/h - OR 4.07 for SD

[1] Maggioni AP. Circulation 1993

[2] Hartikainen JE. JACC 1996

PVC's

- Sophisticated analysis of Holter recordings
- Potential risk factors
  - High ectopy
  - Prevalence of repeating forms of PVCs
  - Low coupling interval variability



"Heart print"

Lerma C, Europace 2013

NSVT

- 575 MI survivors. Follow up 24 months[1]
  - NSVT was a predictors of arrhythmic death
- 1003 MI survivors. 94%-Primary PCI, 5%-CABG EF > 40%. Follow up 32 ± 14 months [2]
  - HR 3.3 for SD

[1] Hartikainen JE. JACC 1996

[2] Ikeda T. JACC 2006

Ventricular arrhythmias- conclusion

- No definite answer
- Probably useful in combination with other risk factors

Early repolarization

Early repolarization

- Recent studies showed possible relation of early repolarization and SD in general population[1–2]
- 30 AMI patients with VF at presentation matched to AMI patients with no VF
  - ER was more frequent in VF patients (47% vs 13%, $P<0.005$)[3]

[1] Haissaguerre M. NEJM 2008
[2] Rosso R. JACC 2008
[3] Rudic B. Heart Rhythm 2012

Early repolarization - conclusion

- Probably early repolarization is a substrate for ventricular arrhythmias in context of ACS

Other ECG based markers

- Heart rate variability
- Heart rate turbulence
- T wave alternance
- SA-ECG

Combinations

- Promising results
  - REFINE
  - ISAR-Risk
- Ongoing trials
  - DETERMINE
  - REFINE-ICD

What to do?

- In the absence of definite ECG prognosticators post-MI it is important to follow strictly current guidelines
  - MISSION! Median follow up 32 months- No SCD

What to do?

- Careful follow patients
  - Sustained arrhythmias in acute phase of MI
  - Non-sustained ventricular arrhythmias during hospitalization
  - Wide QRS
  - Low EF till 30-40 days post-discharge (ICD-vest??)

Thank you