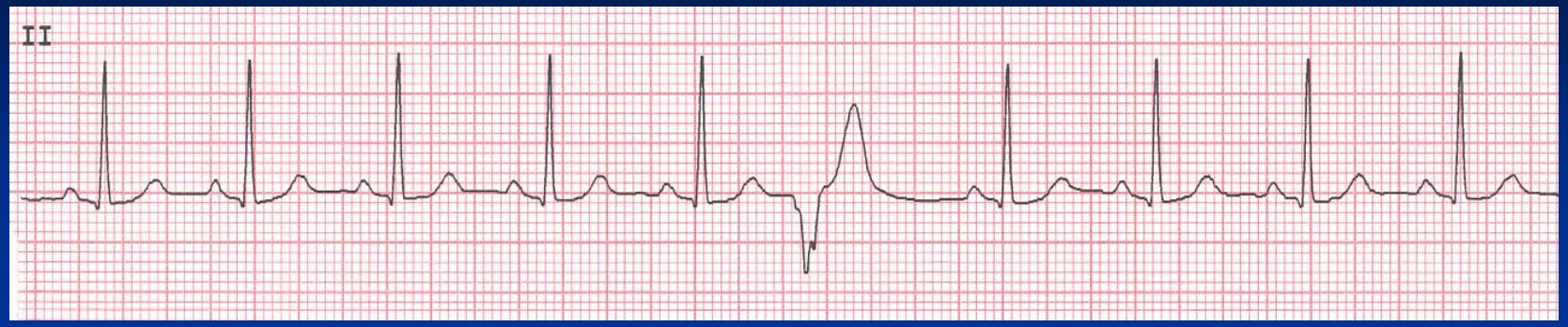
PVC와 NSVT의 임상적 의의와 치료

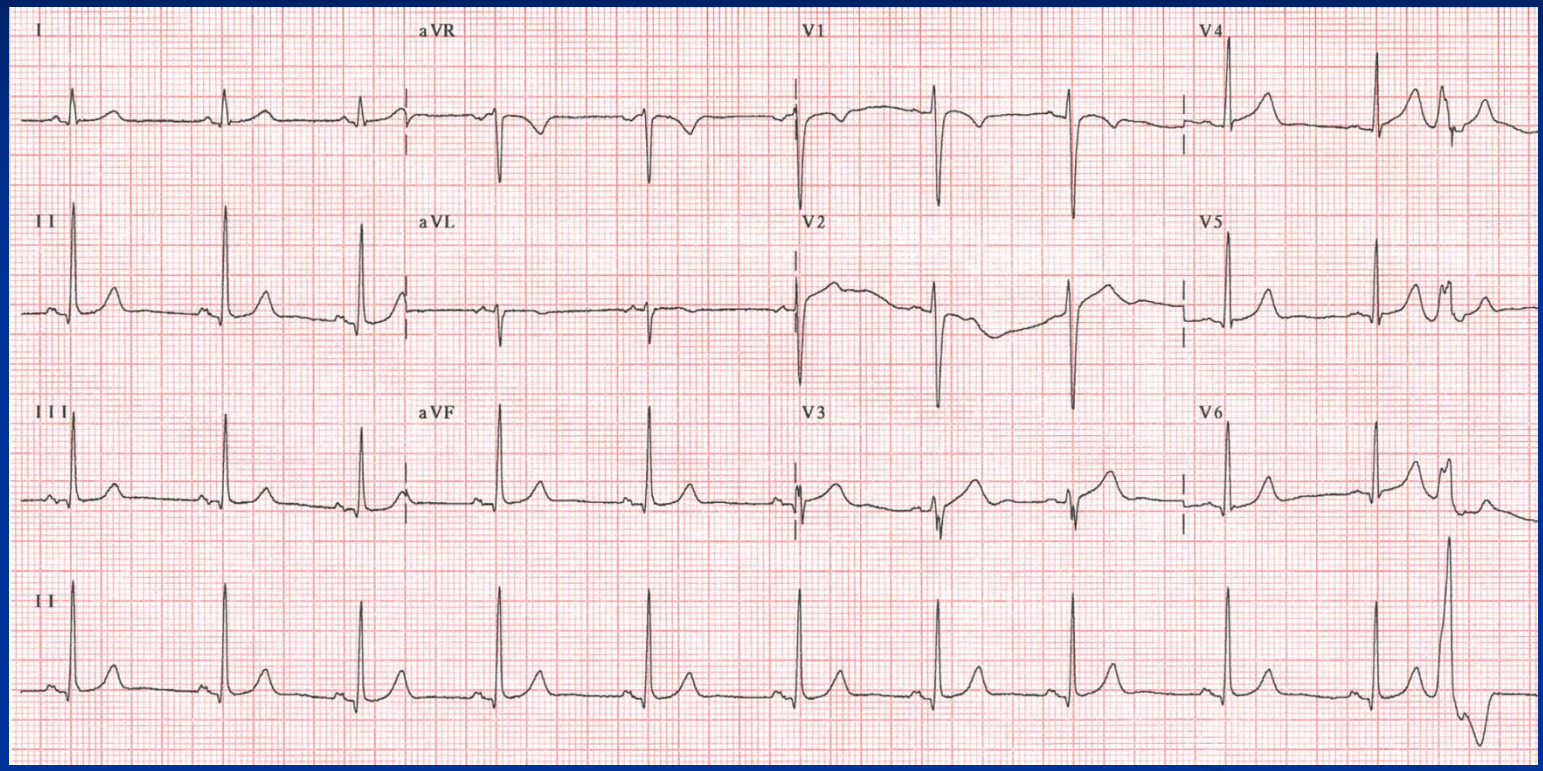
경북대의전원 조용근

Premature ventricular contraction



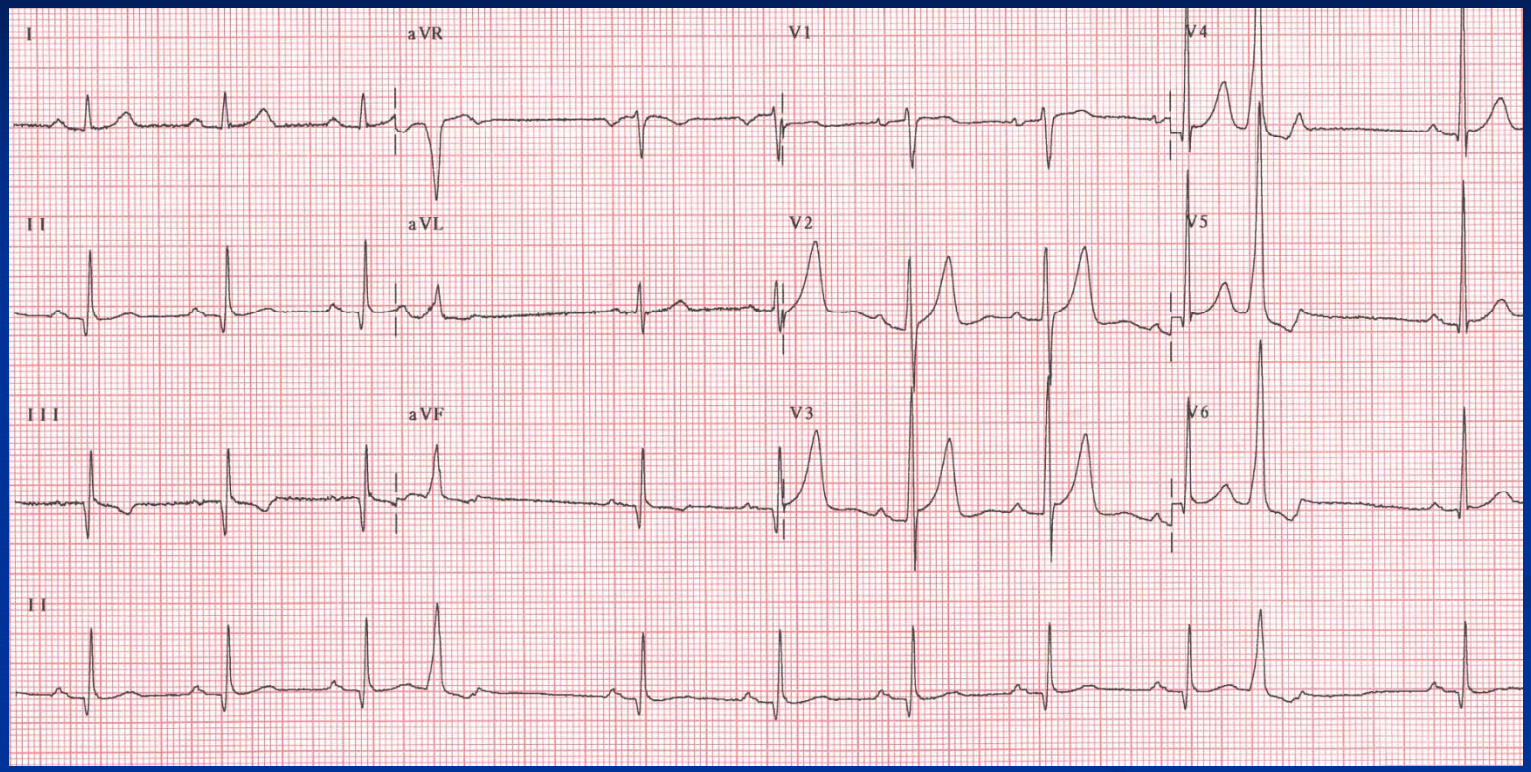
- Isolated PVC are the most common arrhythmia that physicians often see during patient examination.
- PVC have been described in ≈ 1% of clinically normal persons as detected by standard ECG, and in 40 - 75% of apparently healthy persons as detected by 24 - 48 h of continuous ambulatory ECG.
- Both the incidence and the frequency of PVCs increase with age , and even frequent (>60/hr) and complex PVCs occur in apparently healthy subjects.

Premature ventricular contraction → benign?



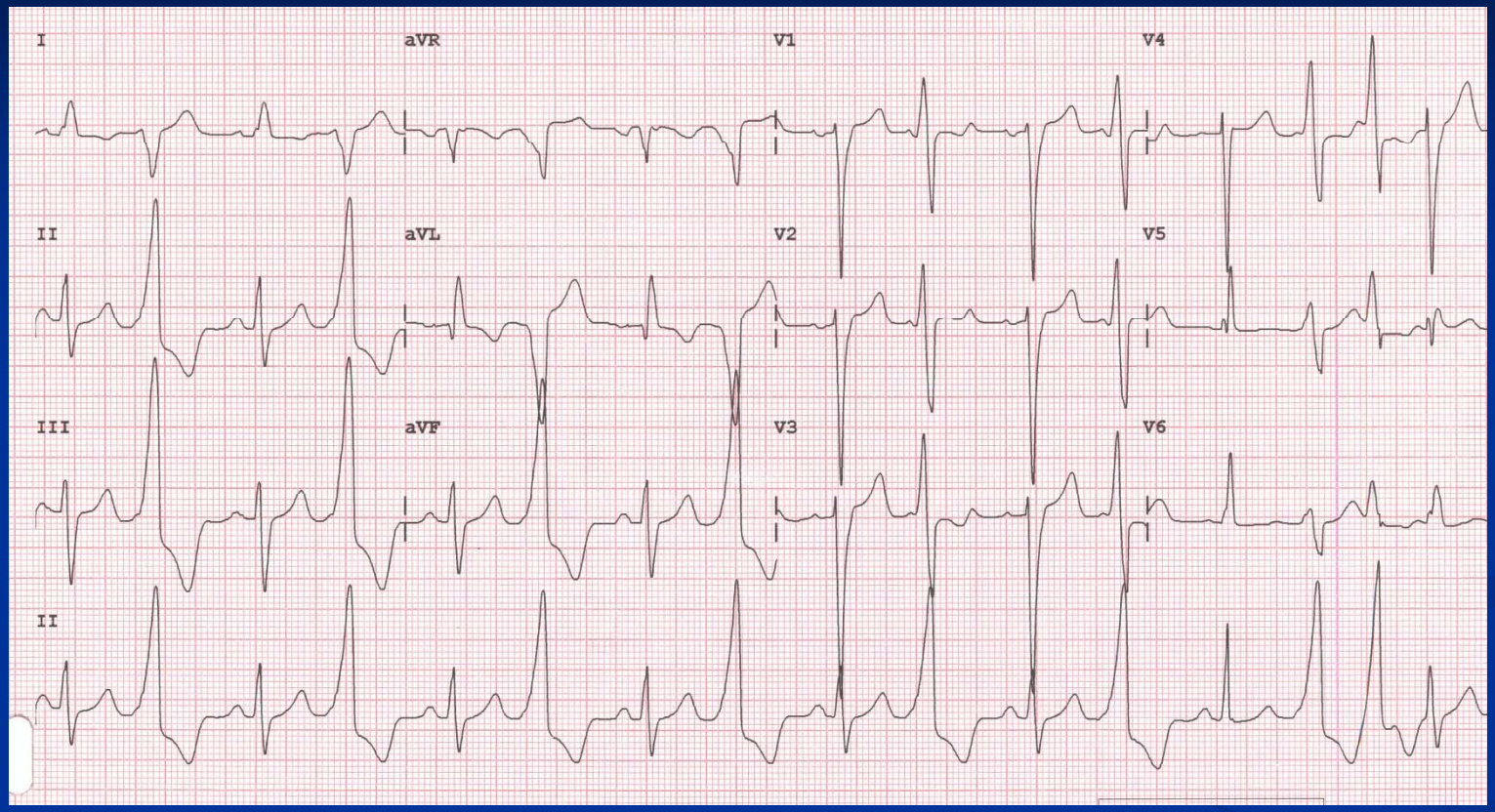
- PVC in an asymptomatic young otherwise healthy lady = benign

Premature ventricular contraction → benign?



- PVCs in an asymptomatic middle-aged male with a previous history of inferior myocardial infarction ≈ benign.

Premature ventricular contraction → benign?



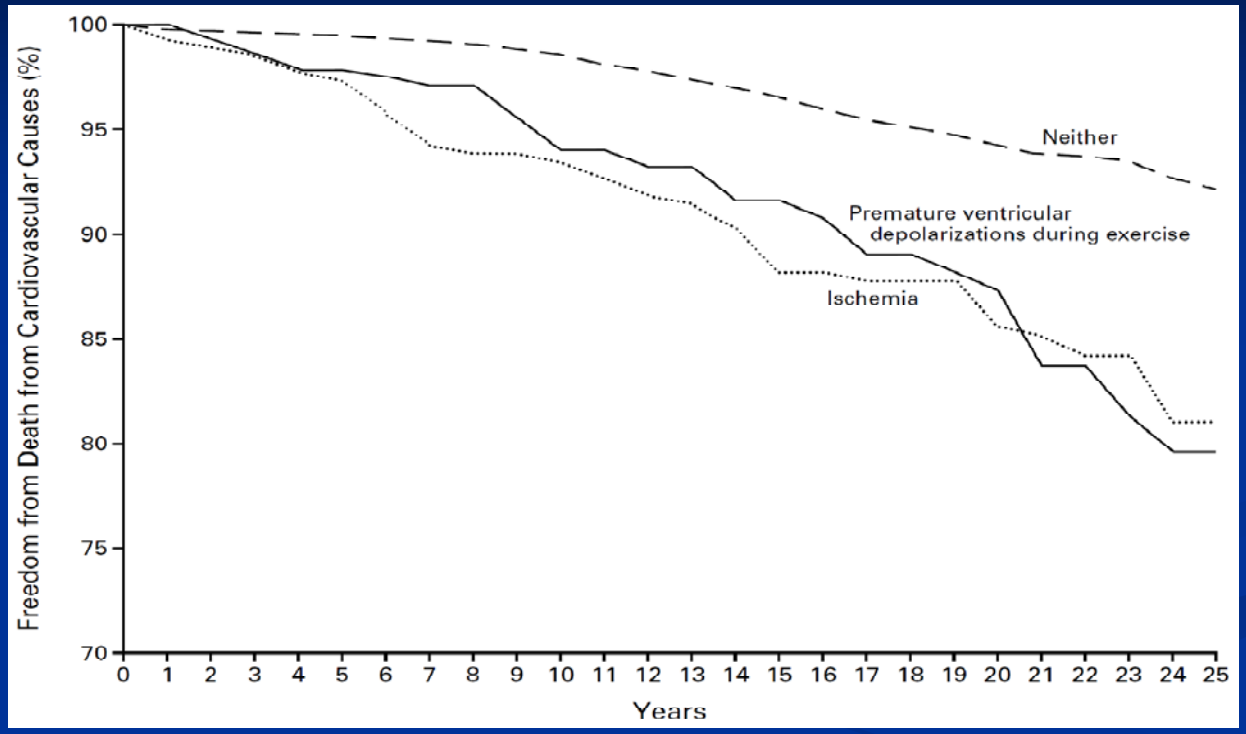
- PVCs in an elderly lady with uncompensated dilated cardiomyopathy ≠ benign.

PVCs in structurally normal heart

- These was no consistent relationship between the presence or number of PVCs/24 hours and sex, BP, weight, height, BMI, serum K^+ or Ca^{++}, cholesterol and triglyceride, hemoglobin, the ingestion of coffee, tea or alcohol, and cigarette smoking. (n=101, Kostis et al, Circulation 1981).

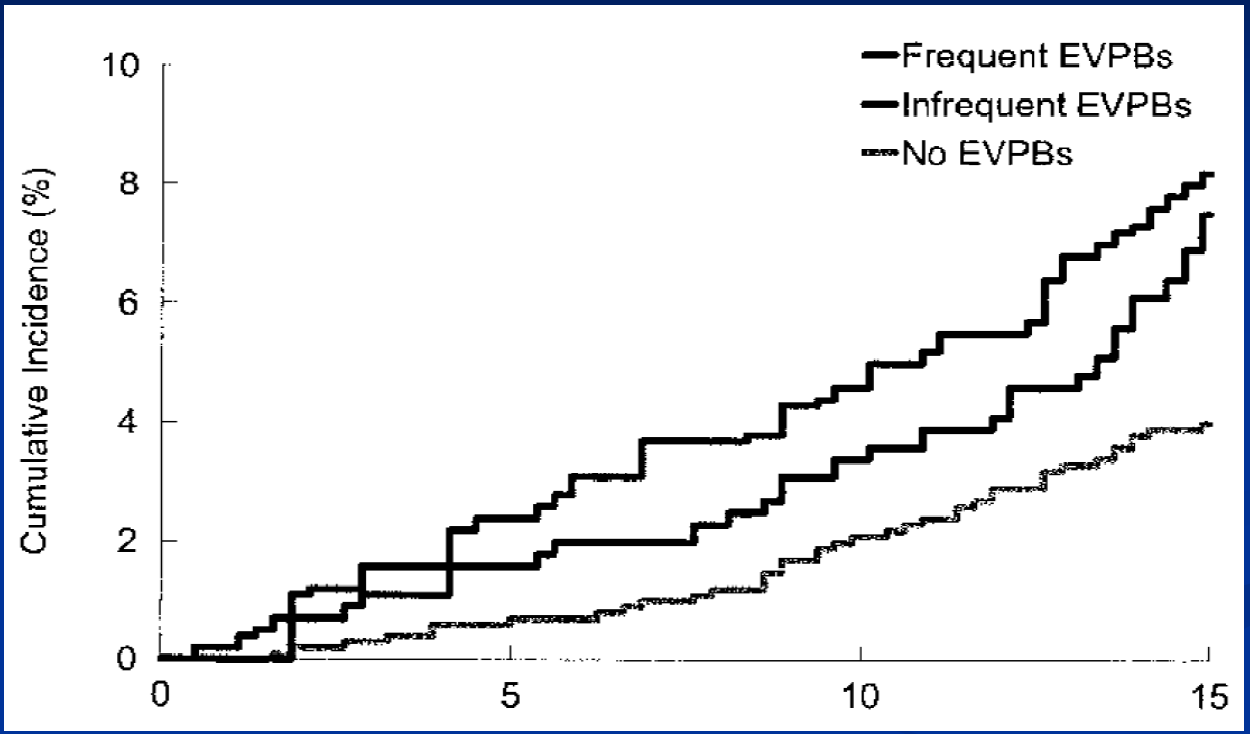
- The long-term (mean 6.5 years) prognosis in asymptomatic healthy subjects with frequent and complex ventricular ectopy is similar to that of the healthy U.S. population and suggests no increased risk of death (n=73, Kennedy et al, NEJM 1985).

Long-term outcome in asymptomatic men with exercise-induced PVCs



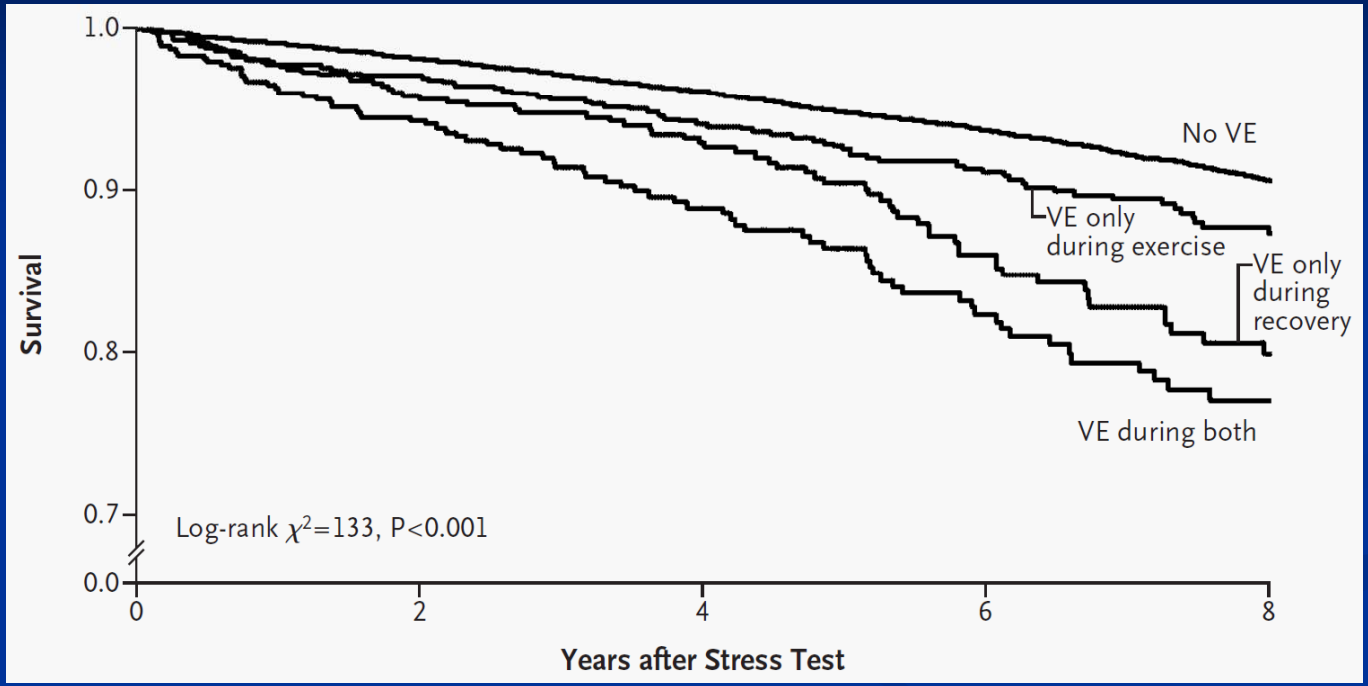
- Data from the Paris Prospective Study I (n=6,101, age 42-53, 23 years follow-up).
- The occurrence of frequent PVCs (run of ≥2 consecutive or >10% of all ventricular depolarizations) during exercise in asymptomatic middle-aged men is associated with a long-term increase in the risk of death from cardiovascular causes (Jouven et al, NEJM 2000).

Prognostic significance of exercise-induced PVCs in the community



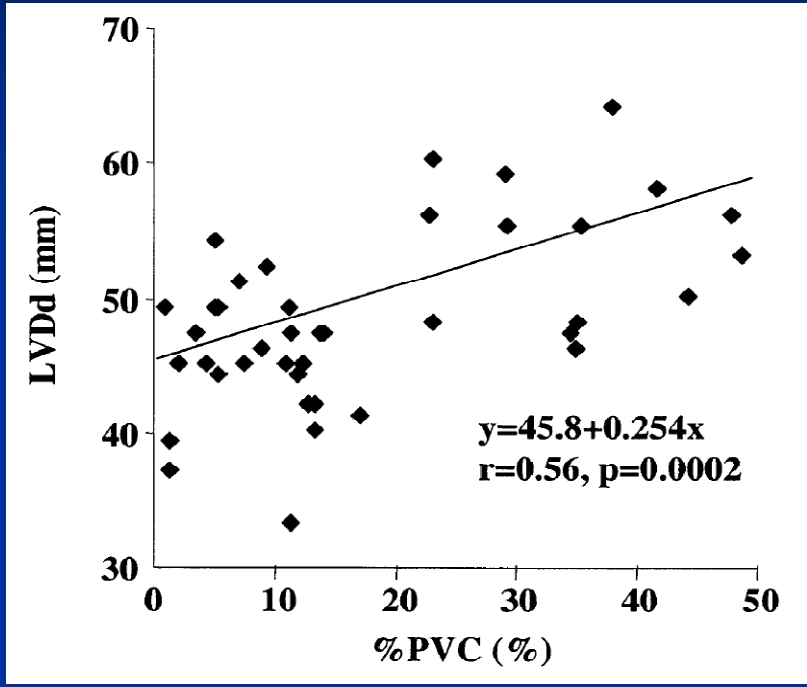
- Framingham Offspring Study participants (n=2,885, mean age 43, mean follow-up 15 years)
- 792 (27%) had development of exercise-induced PVCs (median 0.22/min of exercise).
- Frequent (>median) exercise-induced PVCs were associated with an increased risk of death over 15 years of follow-up (Morshedi-Meibodi et al, Circulation 2004).

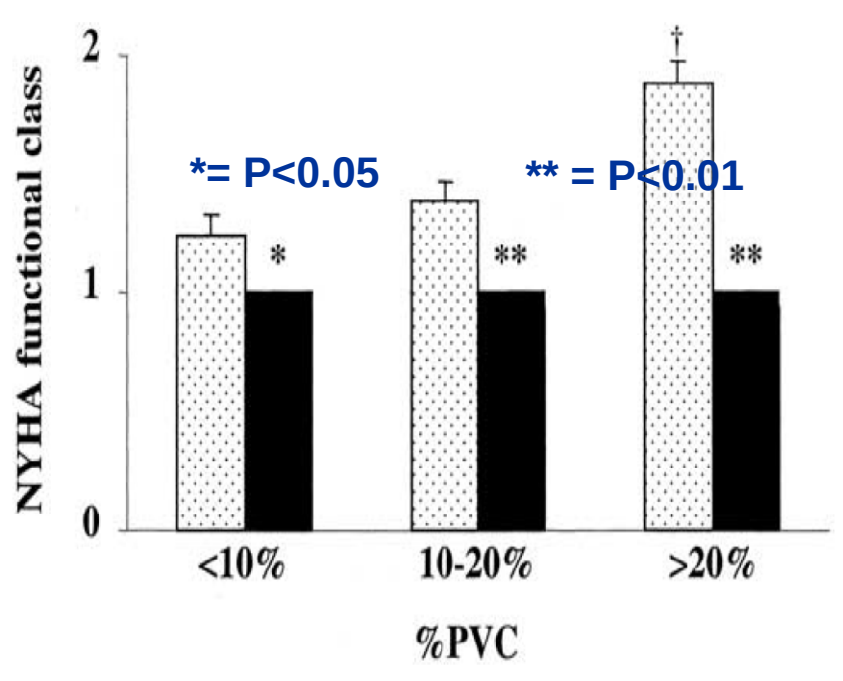
Frequent ventricular ectopy after exercise → predictor of death



- N=29,244, mean age 56, 5.3 years follow-up
- Frequent ventricular ectopy was defined by the presence of ≥7 PVCs/min, ventricular bigeminy or trigeminy, ventricular couplets or triplets, VT, or VF.
- Frequent ventricular ectopy during recovery after exercise is a better predictor of an increased risk of death than ventricular ectopy occurring only during exercise (Frolkis et al, NEJM 2003).

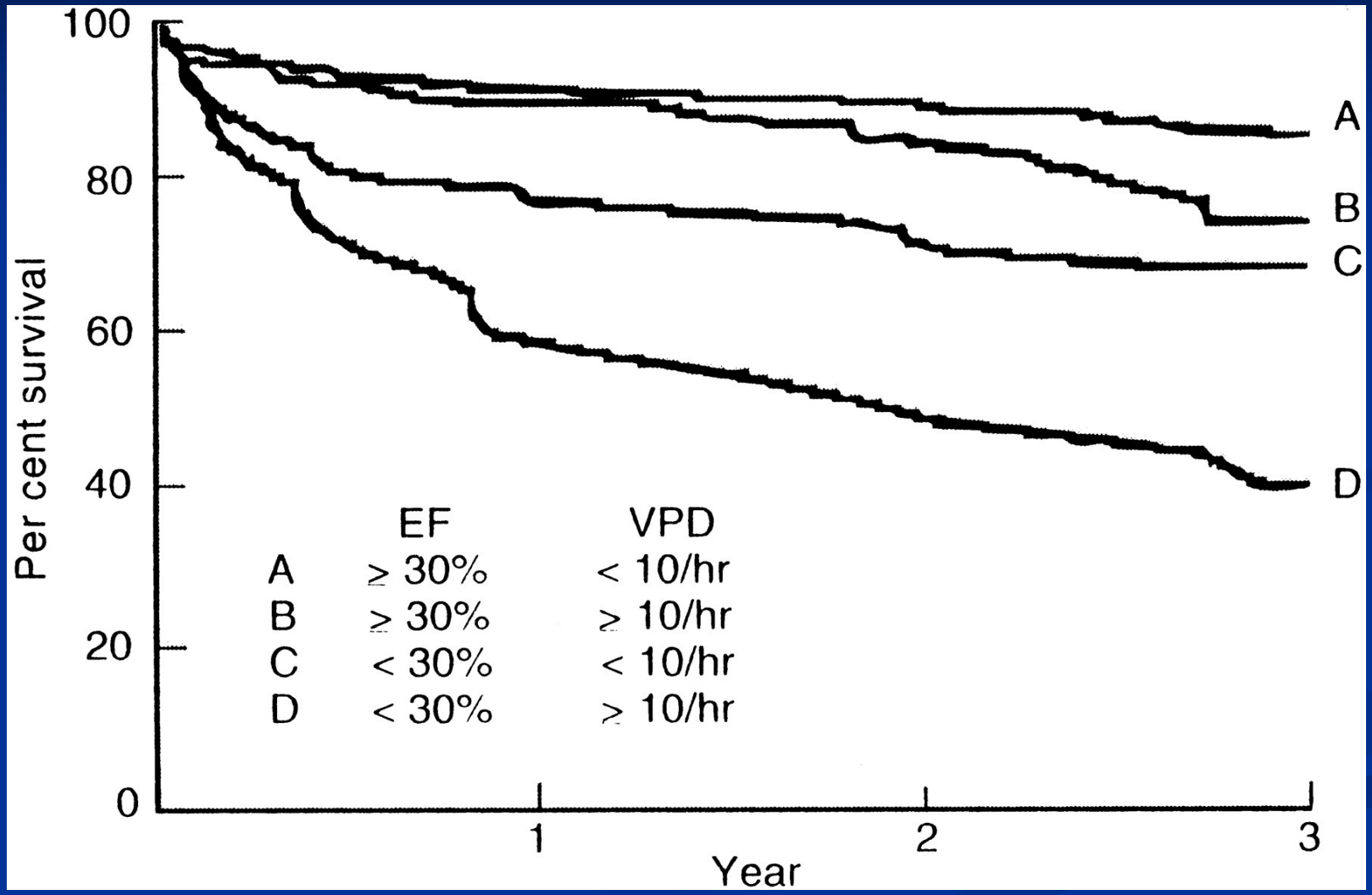
Frequent PVC and LV dysfunction





- 40 patients (50±2 years old) with RVOT-PVC without structural heart disease.
- Frequent (>20%) RVOT-PVC may be a possible cause of LV dysfunction and/or heart failure, and RF ablation produces clinical benefits in these patients (Takemoto et al, JACC 2005).

Relation between LV dysfunction and ventricular arrhythmias after MI (Bigger et al, Am J Cardiol 1986)



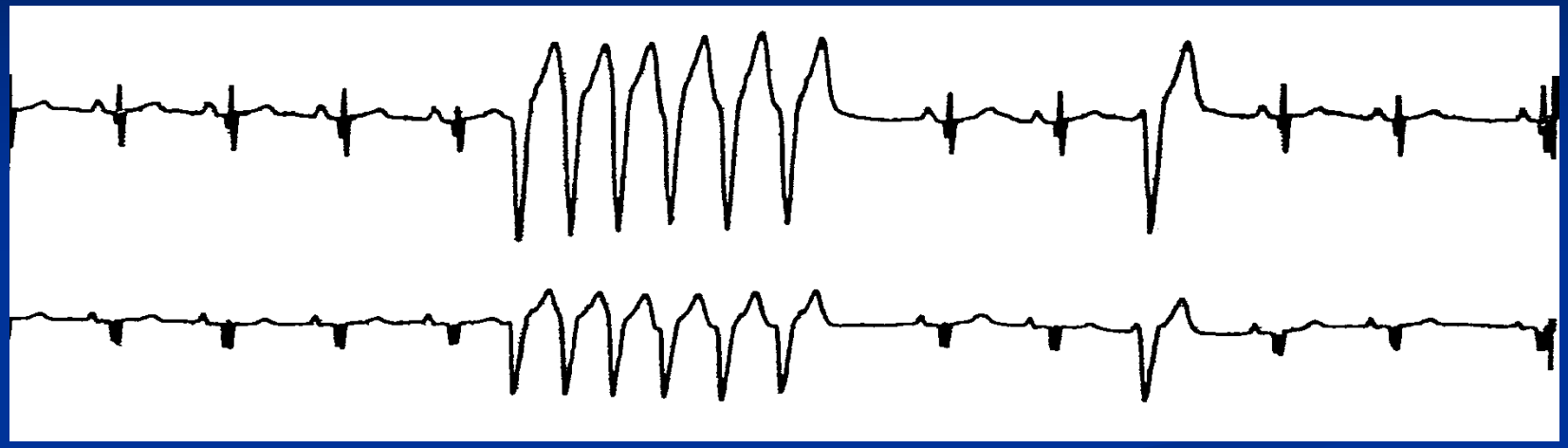
Treating patients with PVC

- PVCs are frequently seen in daily clinical practice and are usually benign.
- Presence of heart disease should be sought and, if absent, indicates good prognosis.
- There is no clear evidence that caffeine restriction is effective in reducing PVC frequency, but patients with excessive caffeine intake should be appropriately advised.
- Unifocal PVCs arising from RVOT are common and may increase with exercise and cause nonsustained or sustained VT. Catheter ablation is effective and safe treatment for these patients.
- B-blockers may be used for symptom control. It should also be considered in patients with impaired ventricular systolic function and/or heart failure.
- Risk of sudden cardiac death from malignant ventricular arrhythmia should be considered in patients with heart disease who have frequent PVCs. ICD may be indicated.

Treating patients with PVC (Ng GA, Heart 2006)

Structural heart disease	Frequent PVCs or VT	Frequent symptoms	Treatment
-	- (↓ on exercise)	-	Reassure
-	-	+	B-blocker
-	+ (monomorphic)	±	Catheter ablation
+	-	±	Assess SCD risk B-blocker
+	+	±	B-blocker ICD if high SCD risk

Nonsustained VT (NSVT)

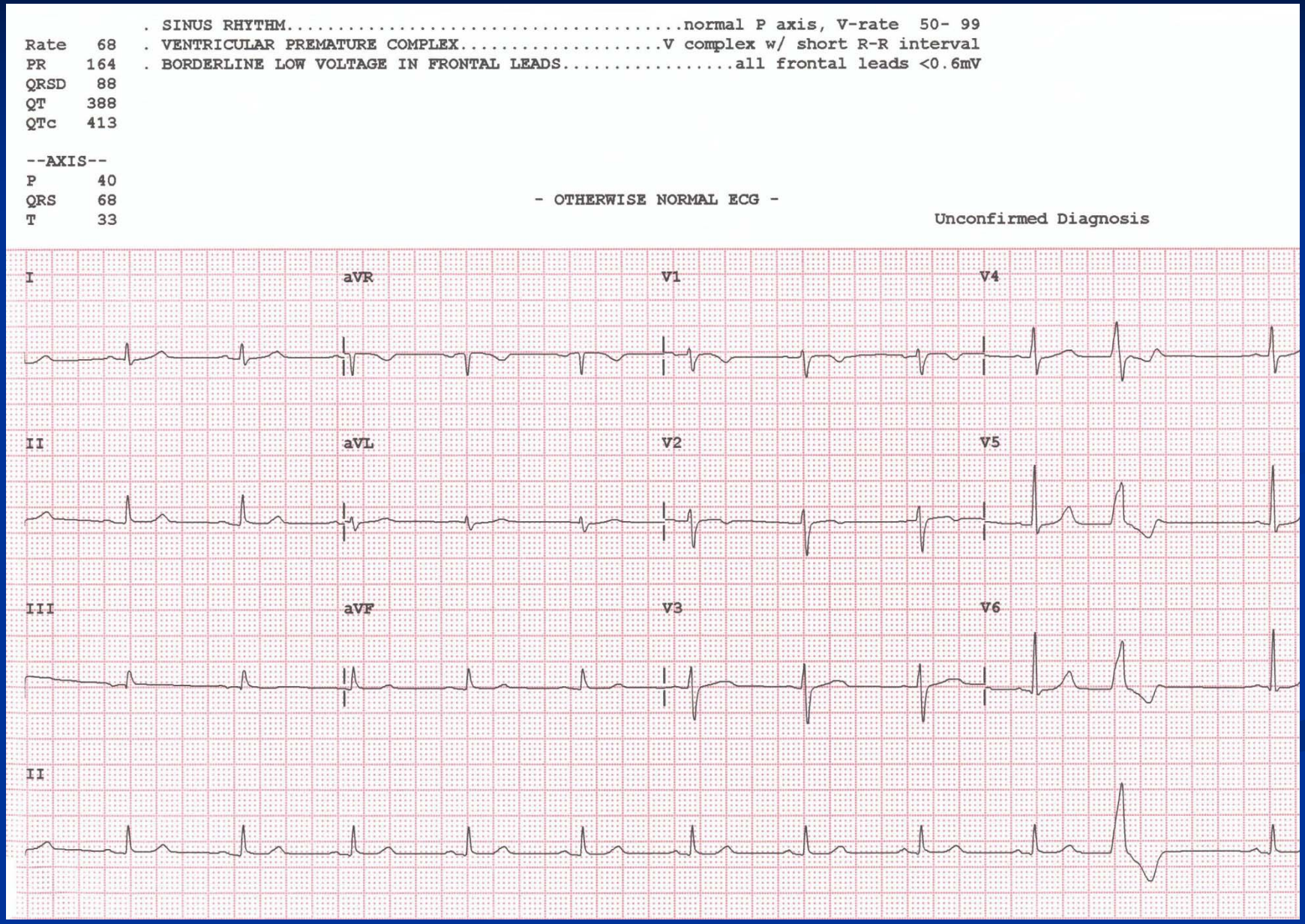


- Usually defined as ≥ 3 consecutive ventricular beats at rates >100/min
- Spontaneously terminating within 30 seconds, typically 7-10 beats
- Usually asymptomatic, causing no hemodynamic compromise
- Discovered incidentally during ECG monitoring

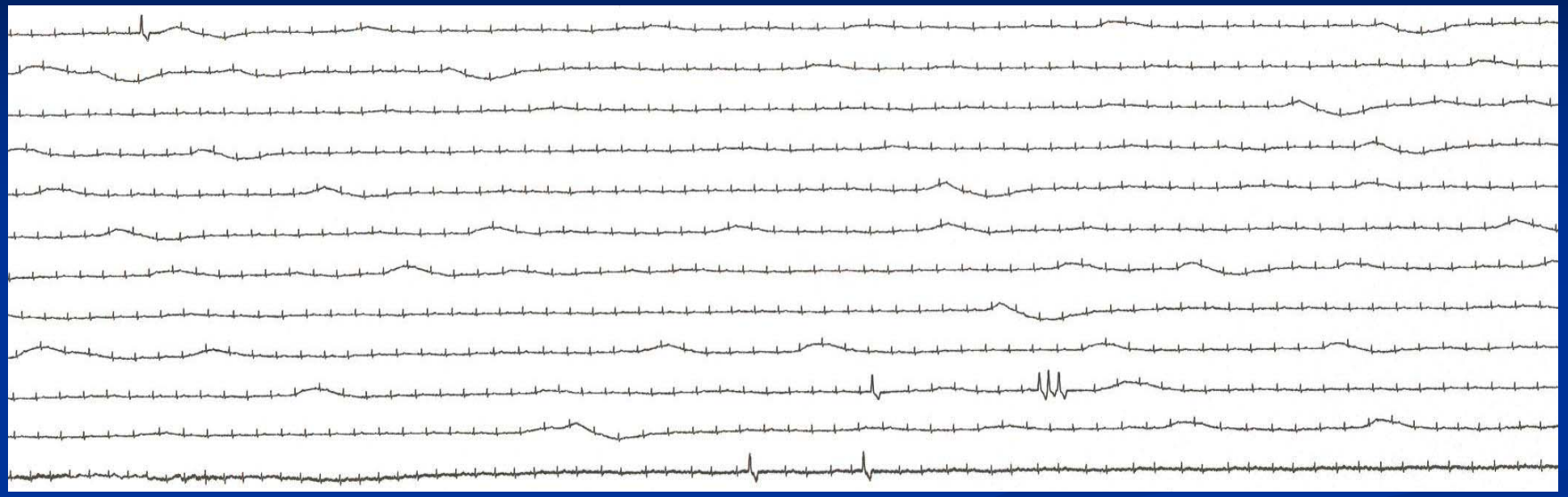
NSVT: Occurrence depends on underlying disease

CAD and prior MI	5 - 40%
First 48 hours after MI	45%
Dilated cardiomyopathy	40 - 60%
Hypertrophic cardiomyopathy	20 - 28%
Mitral valve prolapse (MVP)	0 - 5%
Other valvular diseases (AS)	10-20%
Long QT syndrome	20-30%
No apparent structural heart disease	0-3%

Chest discomfort in a young otherwise healthy lady



Chest discomfort in a young otherwise healthy lady



- Holter ECG: PVC 709/100,758 (0.7%, 30/hr), NSVT
- 2-D Echo: normal-sized chambers and normal wall motion
- Exercise-ECG: 12.8 METS, maximal HR = 170/min, No PVC during peak exercise
- SAECG: no late potential
- Reassurance

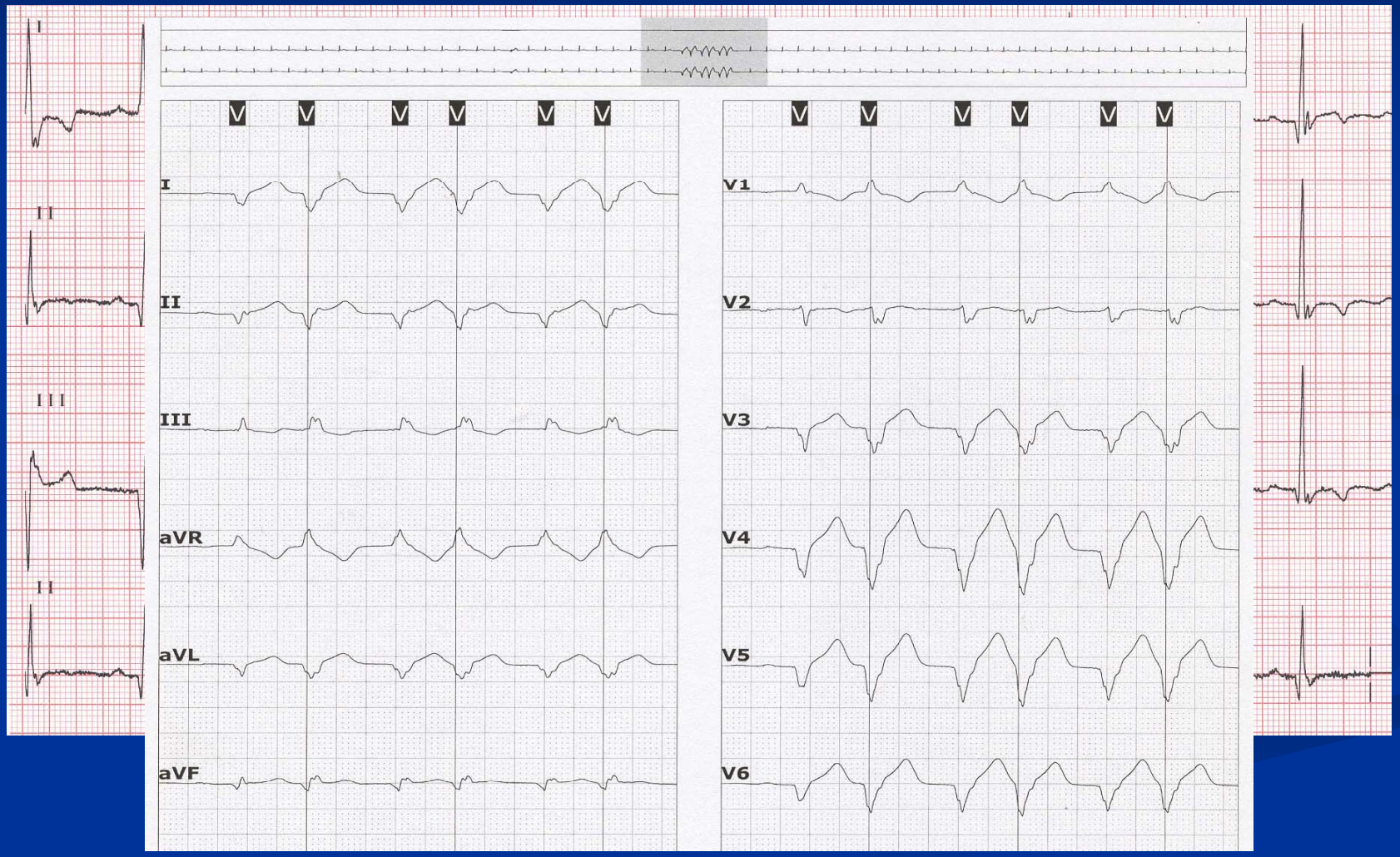
NSVT in subjects with structurally normal heart

- Very infrequent (<3%)
- Requires evaluation for LQTS, ARVC, HCM, Brugada syndrome
- No evidence for worse prognosis
- NSVT from RVOT
  - Beta-blocker, calcium channel blocker, catheter ablation

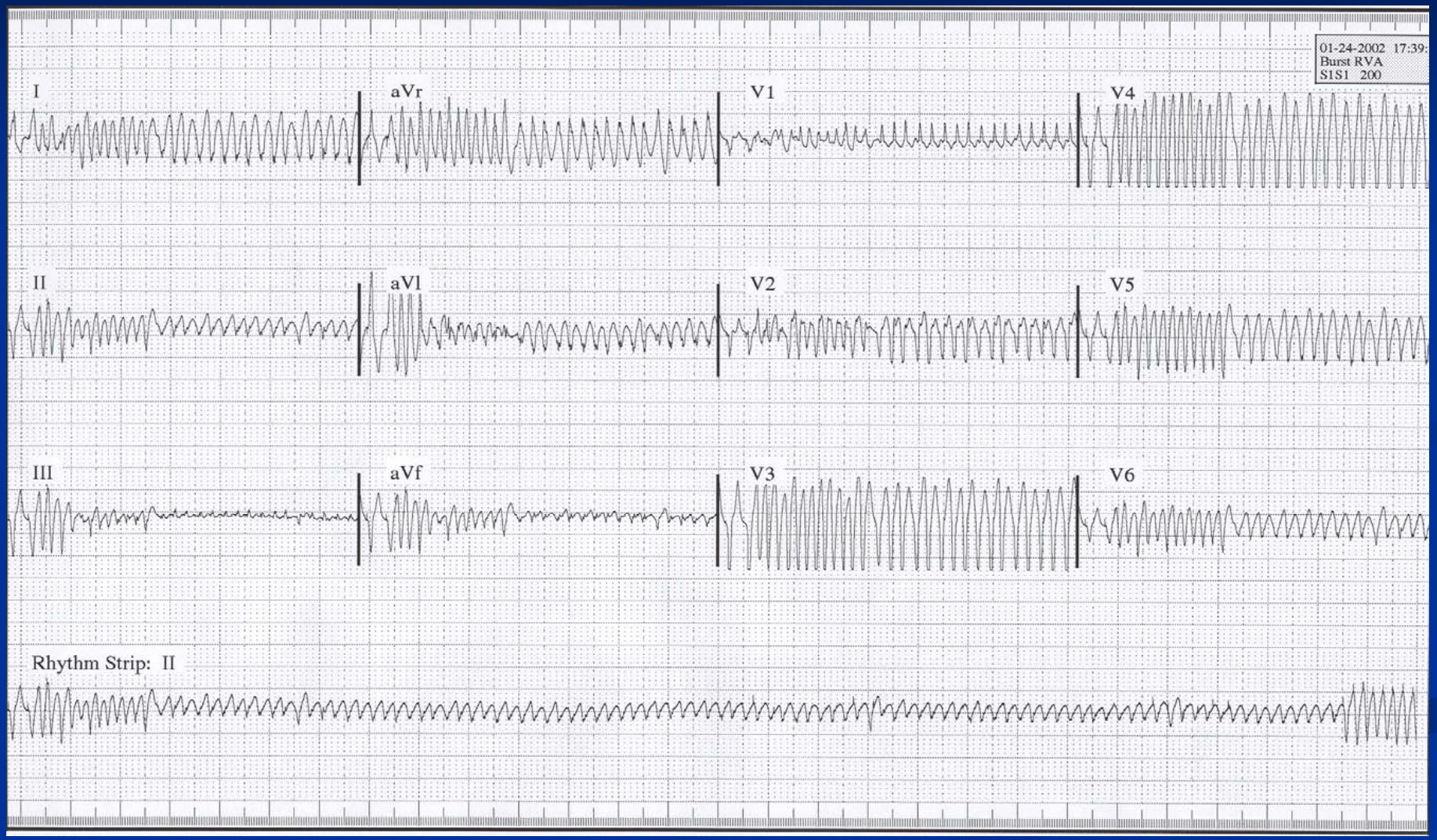
NSVT in mitral valve prolapse (MVP)

- Patients with MVP are at a slightly increased risk of SCD compared with general population. The presence of NSVT in patients with MVP has not been linked to the small increased risk of SCD.
- Hemodynamically significant MR, **not MVP itself**, may be the risk factor.
- EP studies among patients with NSVT and MVP have not proved to be helpful in defining risk for SCD.
- Some patients may have inducible ventricular arrhythmias with programmed stimulation, but there is no clear relationship of this finding to prognosis.
- The treatment approach to patients with MVP and NSVT depends on the presence of symptoms.

Presyncope in a patient with old MI



EP study


01-24-2002 17:39:
Burst RVA
S1S1 200
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aVr
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V2
V5
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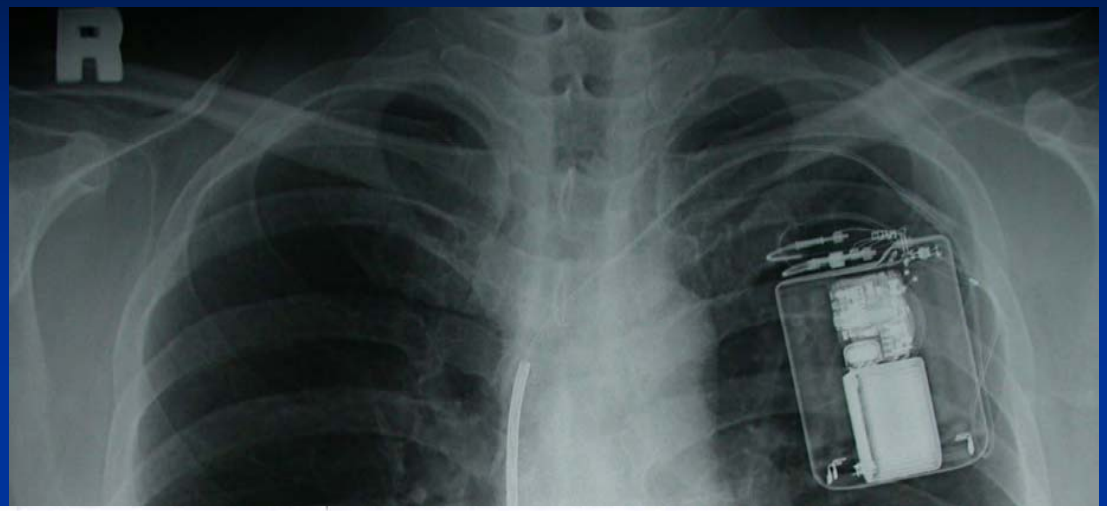
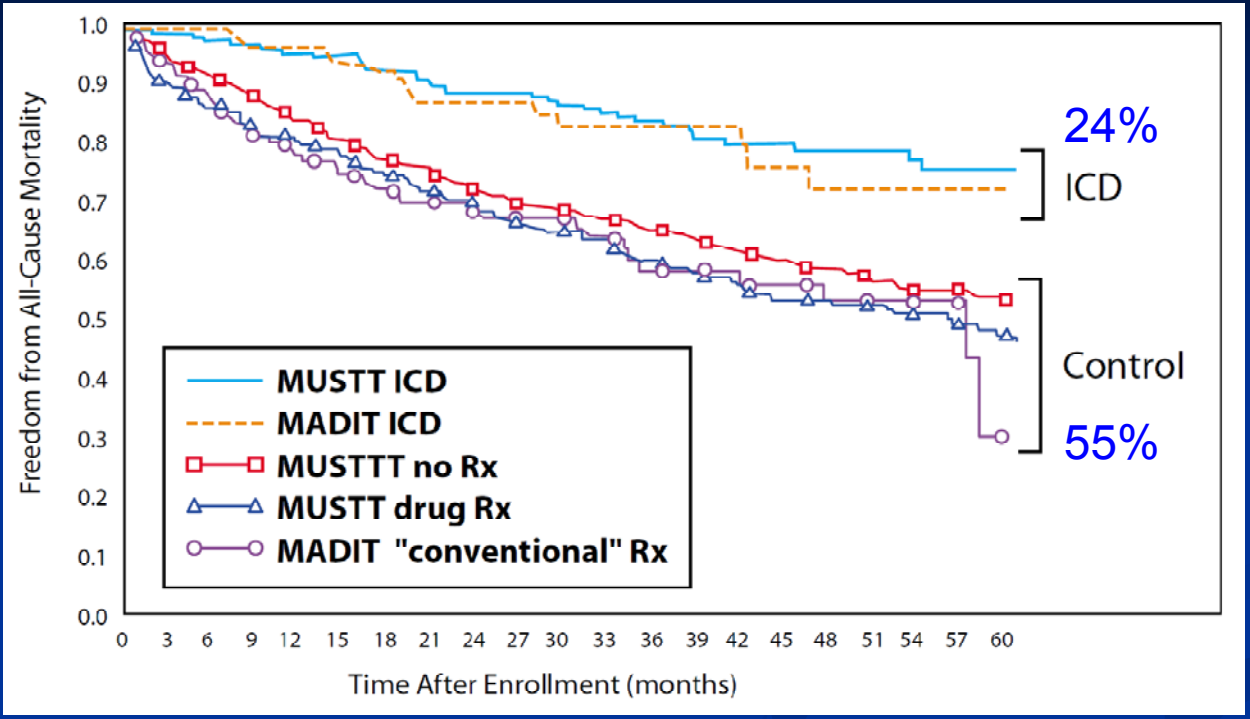
aVf
V3
V6
Rhythm Strip: II

ICD

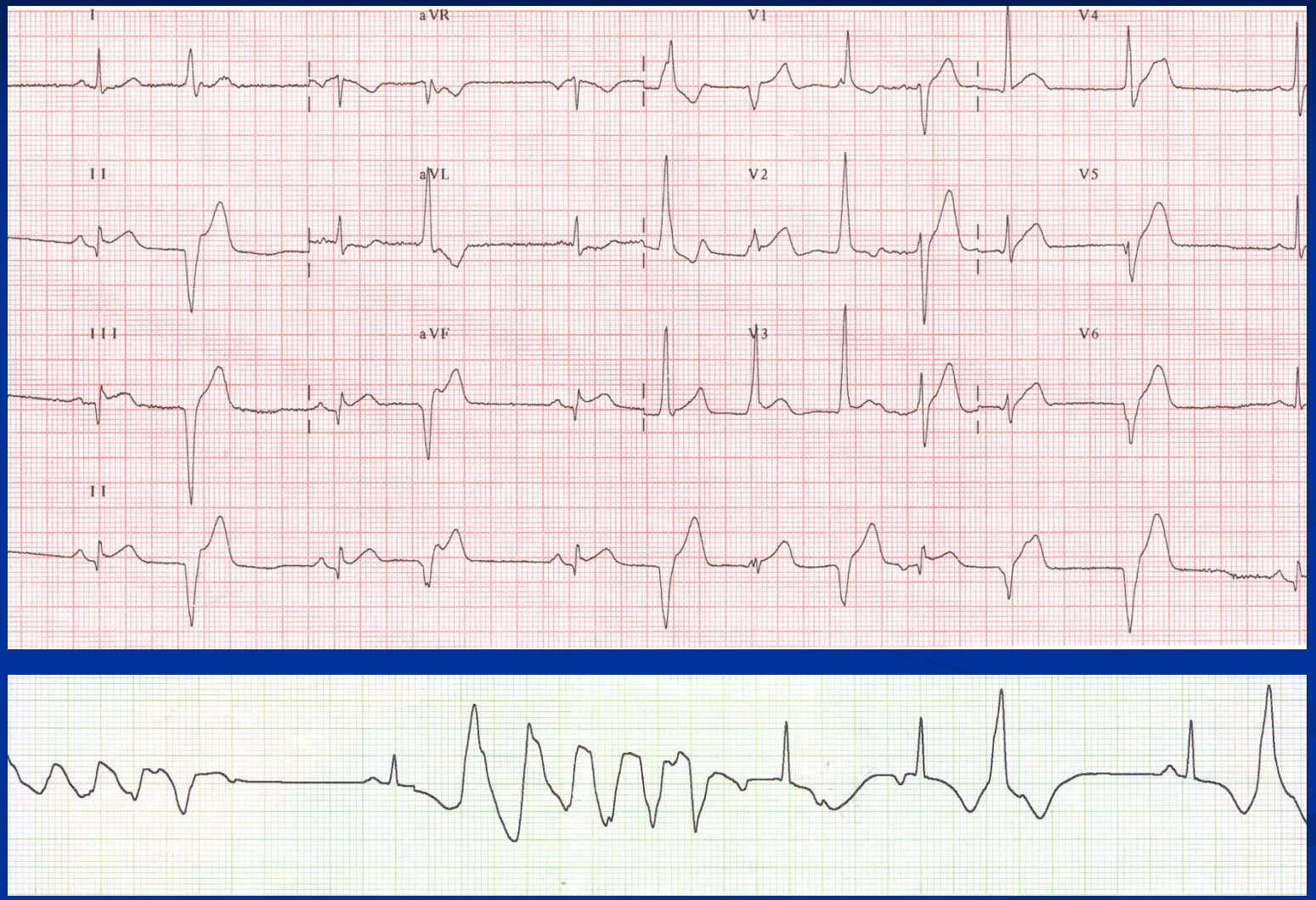


NSVT in CAD

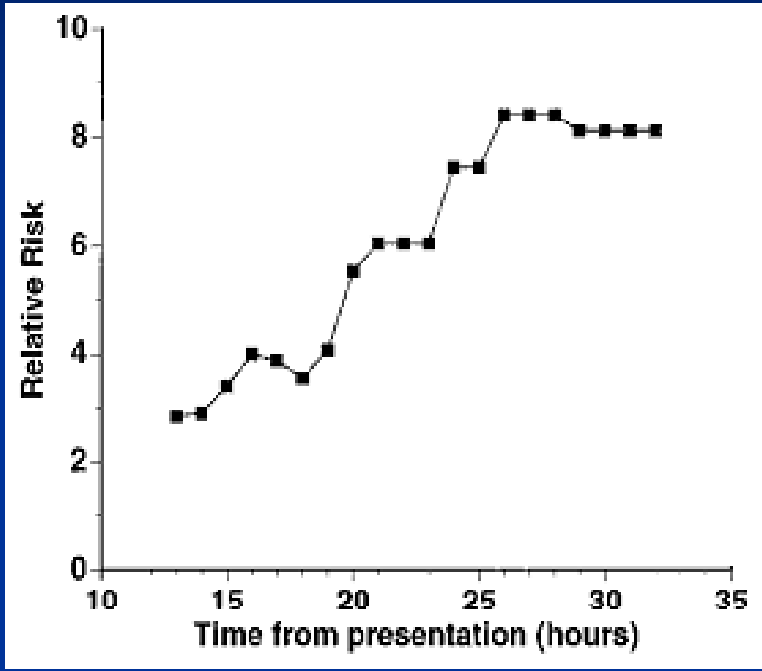


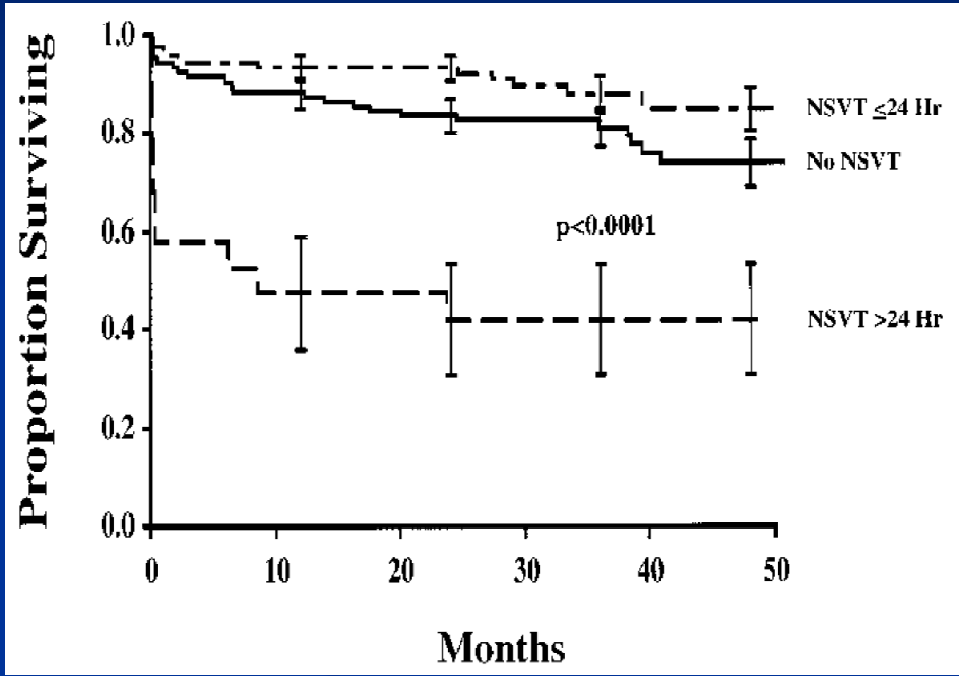
- Patients with NSVT who have CAD and depressed LVEF (>30%) should undergo EP testing, and if sustained VT is induced, ICD therapy should prescribed.
- Antiarrhythmic agents have been limited by imperfect efficacy and potential lethal side effects.
- ICD therapy consistently reduced the risk of SCD and total mortality in these patients.

Chest pain in a middle-aged male



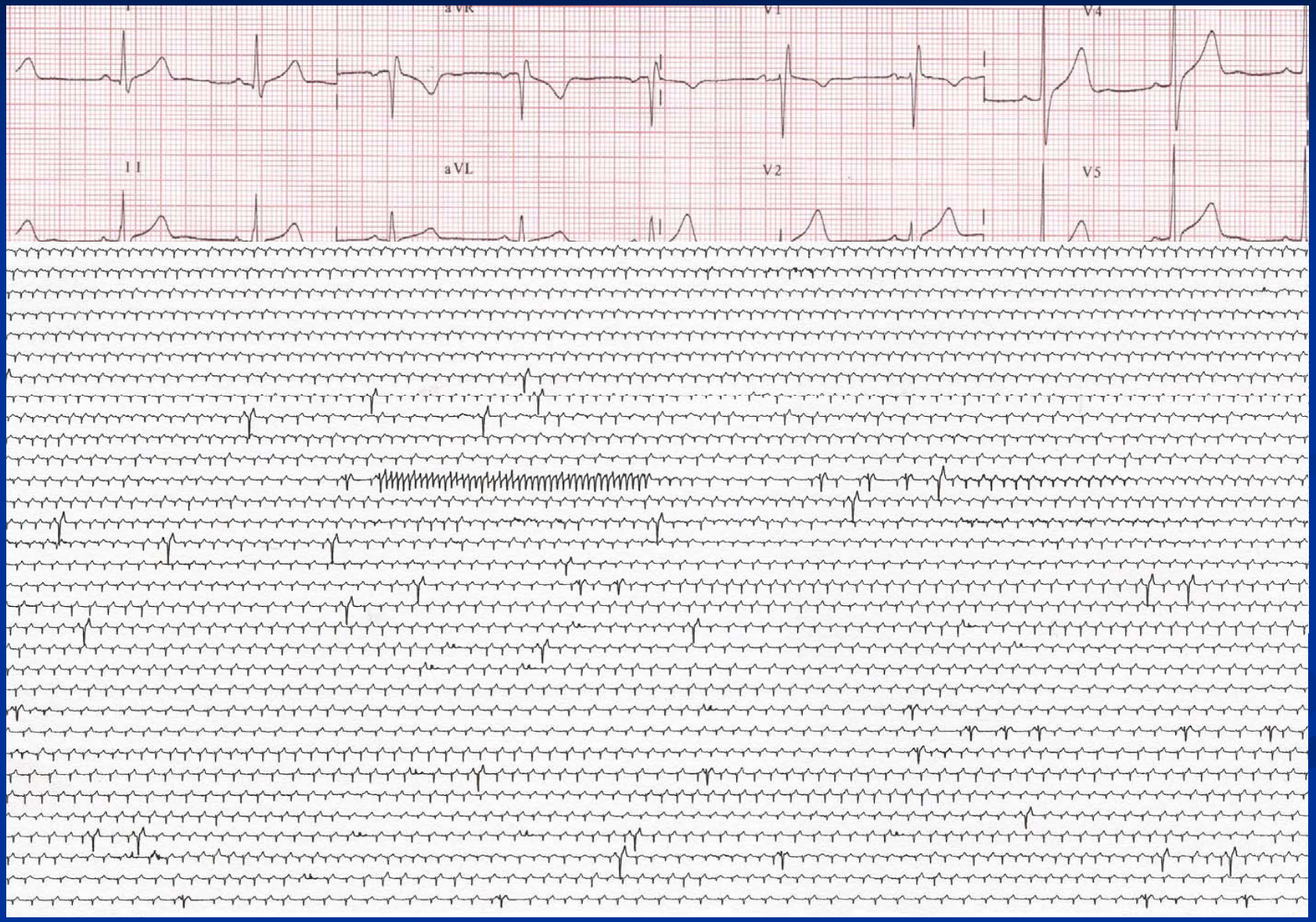
NSVT in the setting of acute MI



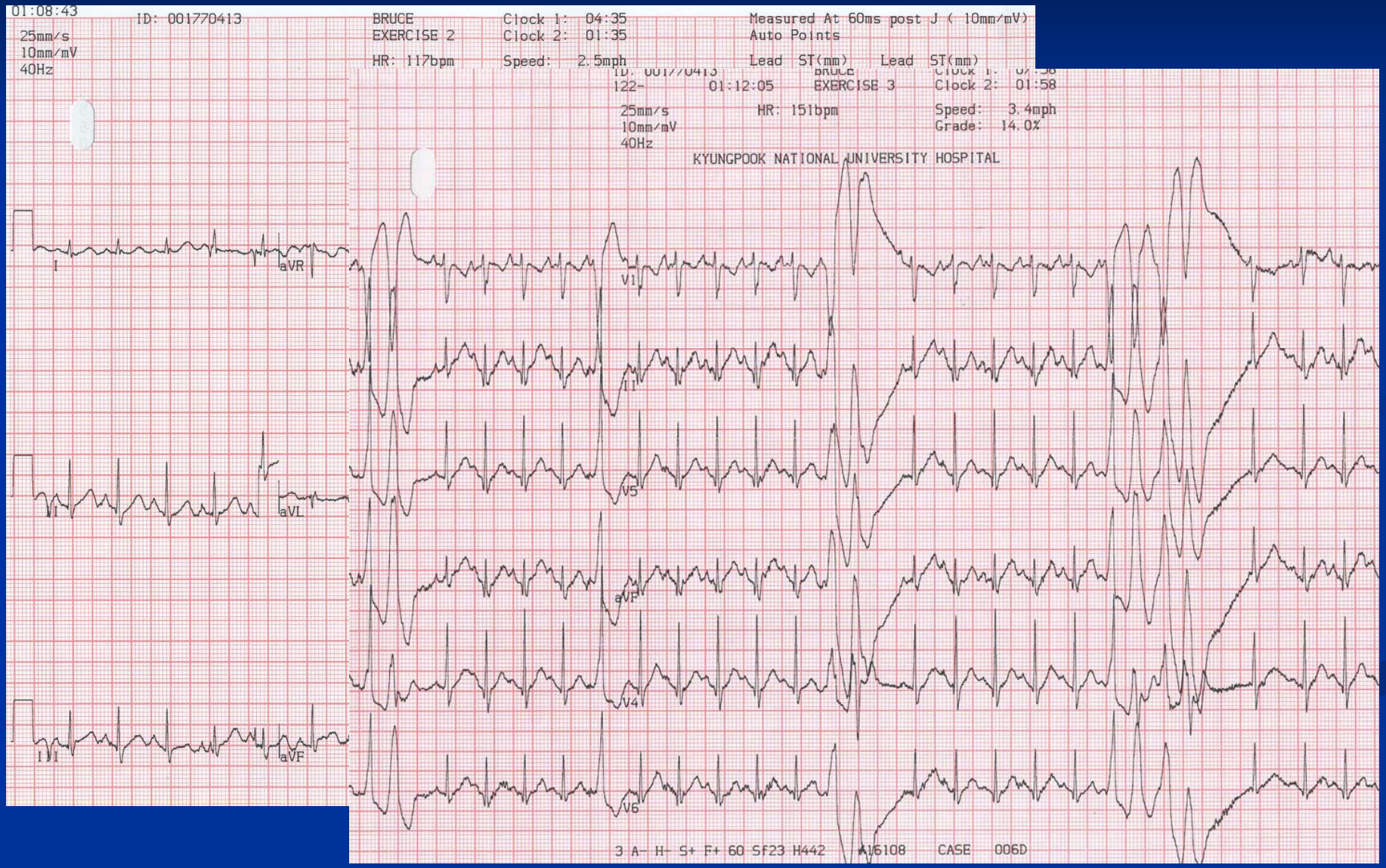


- NSVT that occurs in the setting of acute MI does have important prognostic significance. NSVT that occurs beyond the first several hours after presentation is associated with significant increases in relative risk (Cheema et al, Circulation 1998).

Evaluation of a patient with cardiomegaly

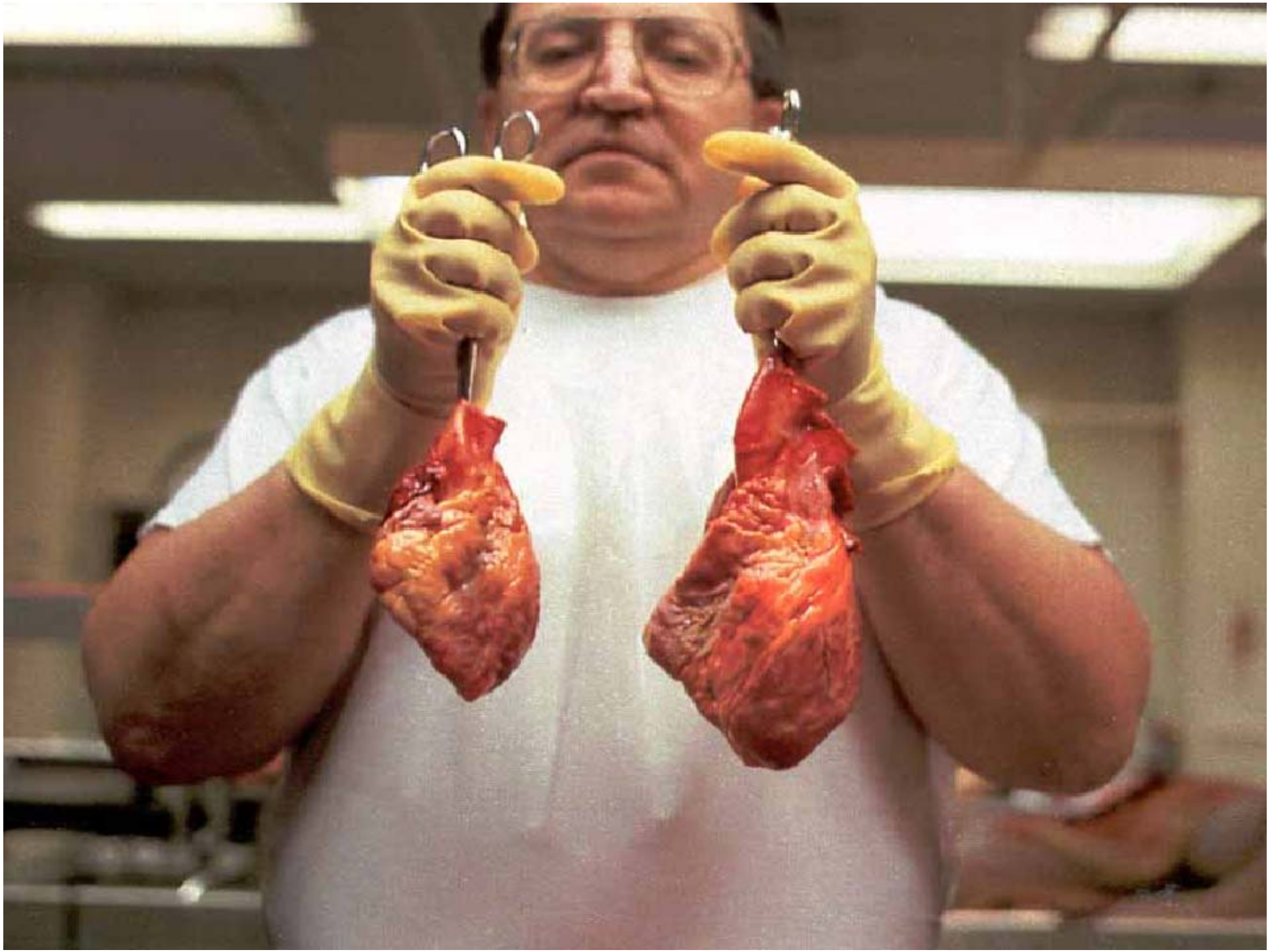


Exercise-ECG



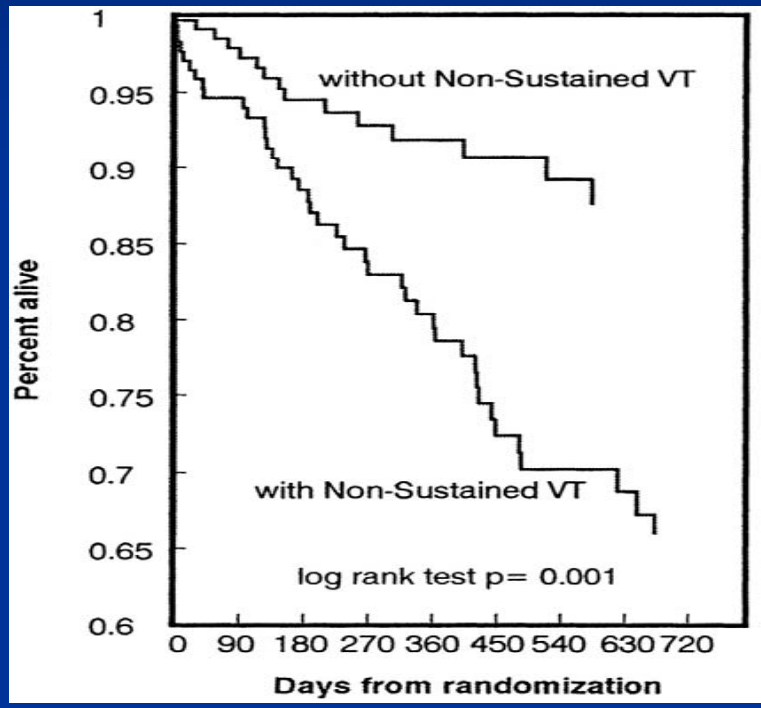
Treatment

- Routine medication
  - ACE-I / ARB
  - β-Blocker
  - Diuretics
- ICD?
- Amiodarone?

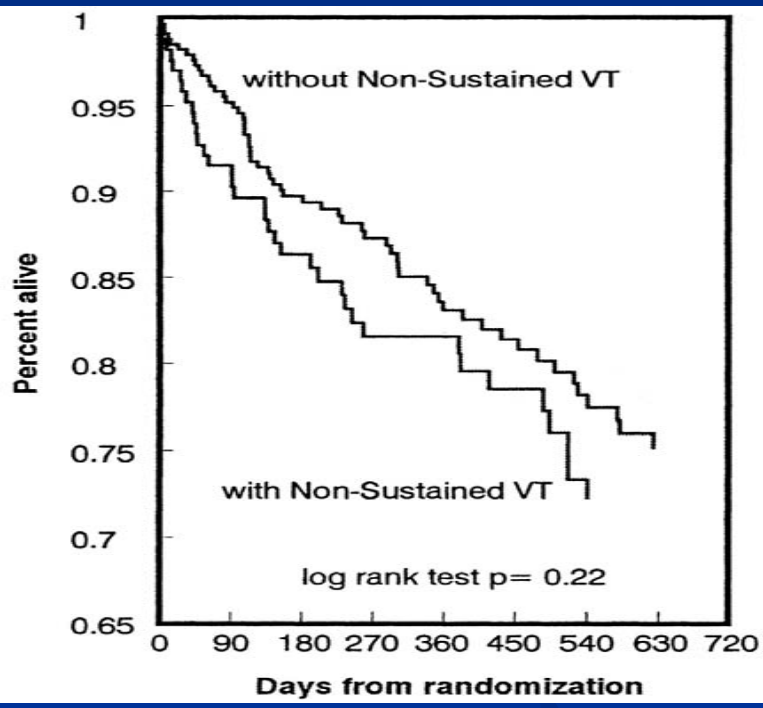


NSVT in severe heart failure
Independent marker of increased mortality due to SD

Sudden death



Death due to CHF

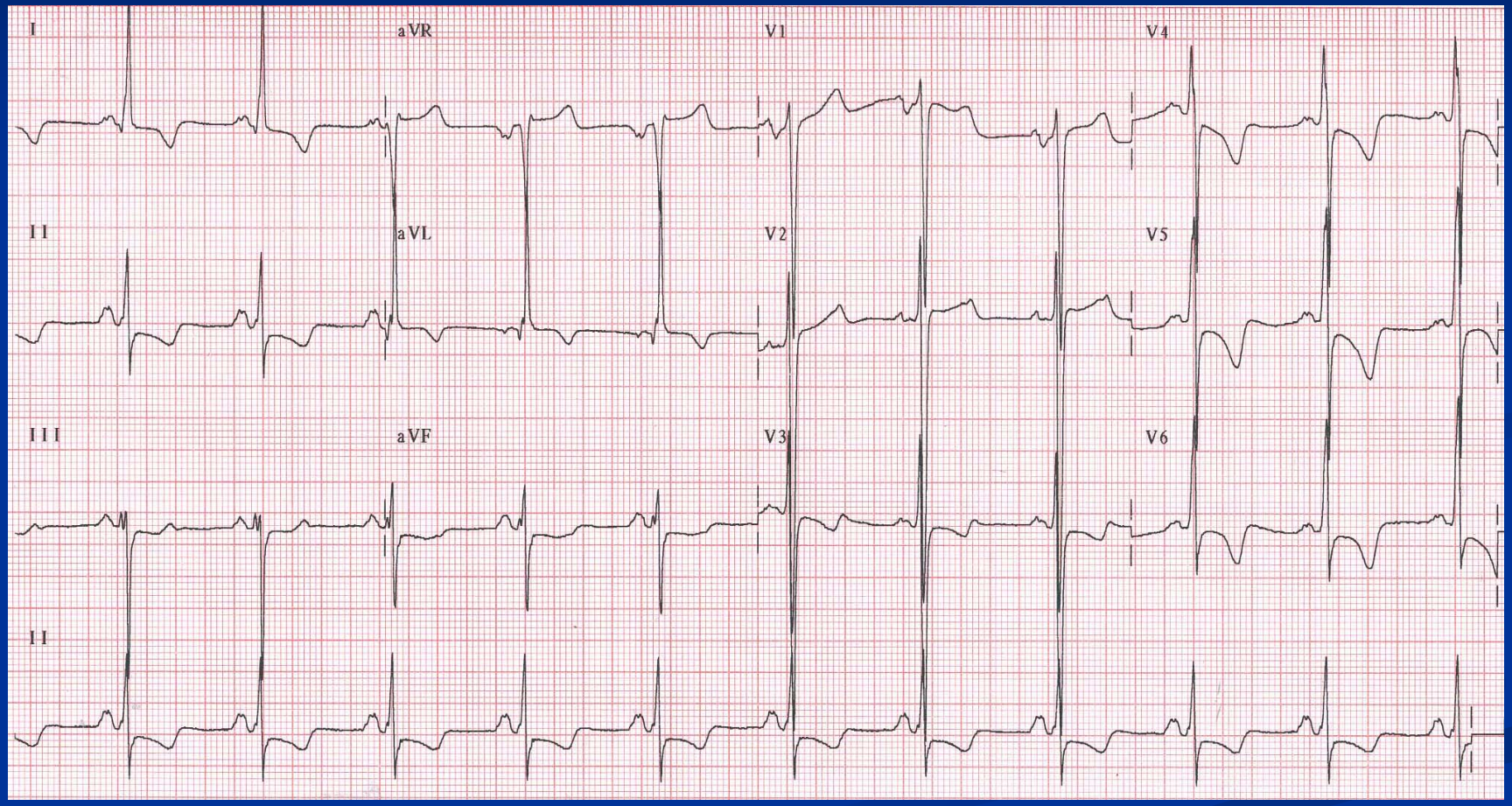


(Doval et al, Circulation 1996)

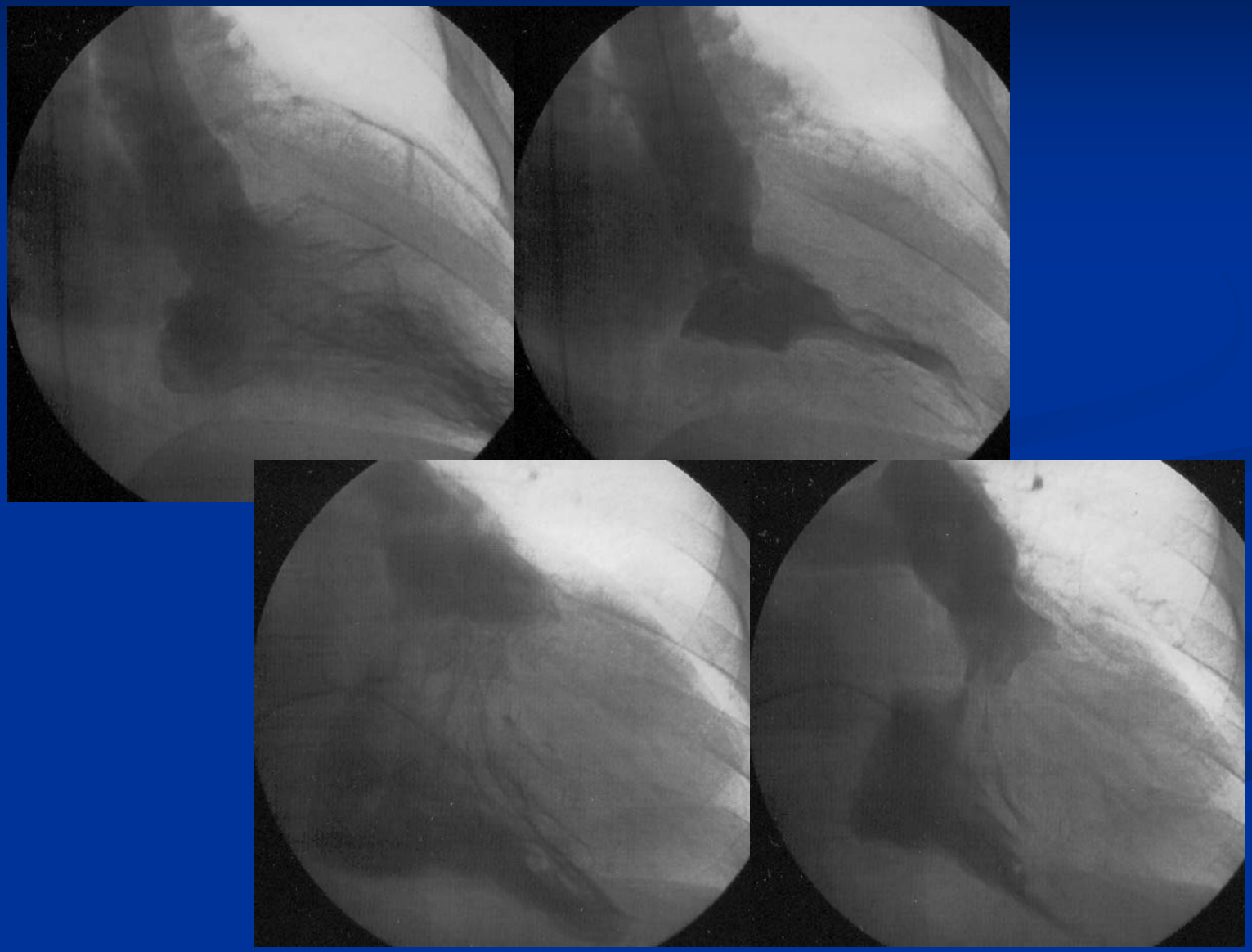
NSVT in DCM

- Treatment of patients should be directed primarily at CHF with therapies proven to modify overall mortality, such as ACE inhibitors and β-blockers, in addition to treatment that improves symptoms.
- NSVT in these patients may be just expression of severe cardiac dysfunction, so suppression of NSVT may not improve survival of patients with DCM.
- The results of programmed stimulation as a prognostic tool have been discouraging.
- The effect of ICD in preventing SD seems promising especially in patients with severe LV dysfunction.

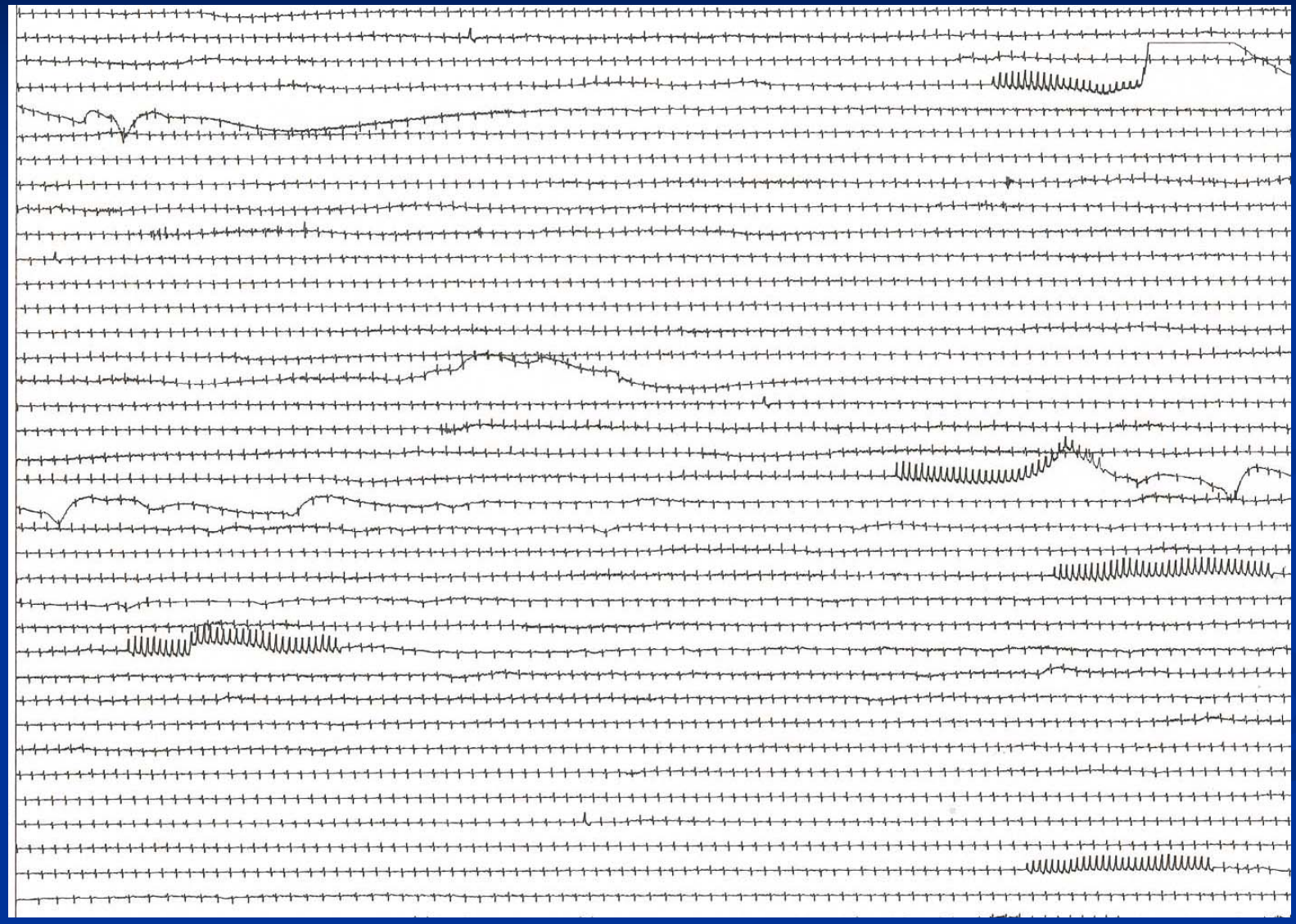
Dyspnea and dizziness in a patient with HCM



Left and right ventriculogram



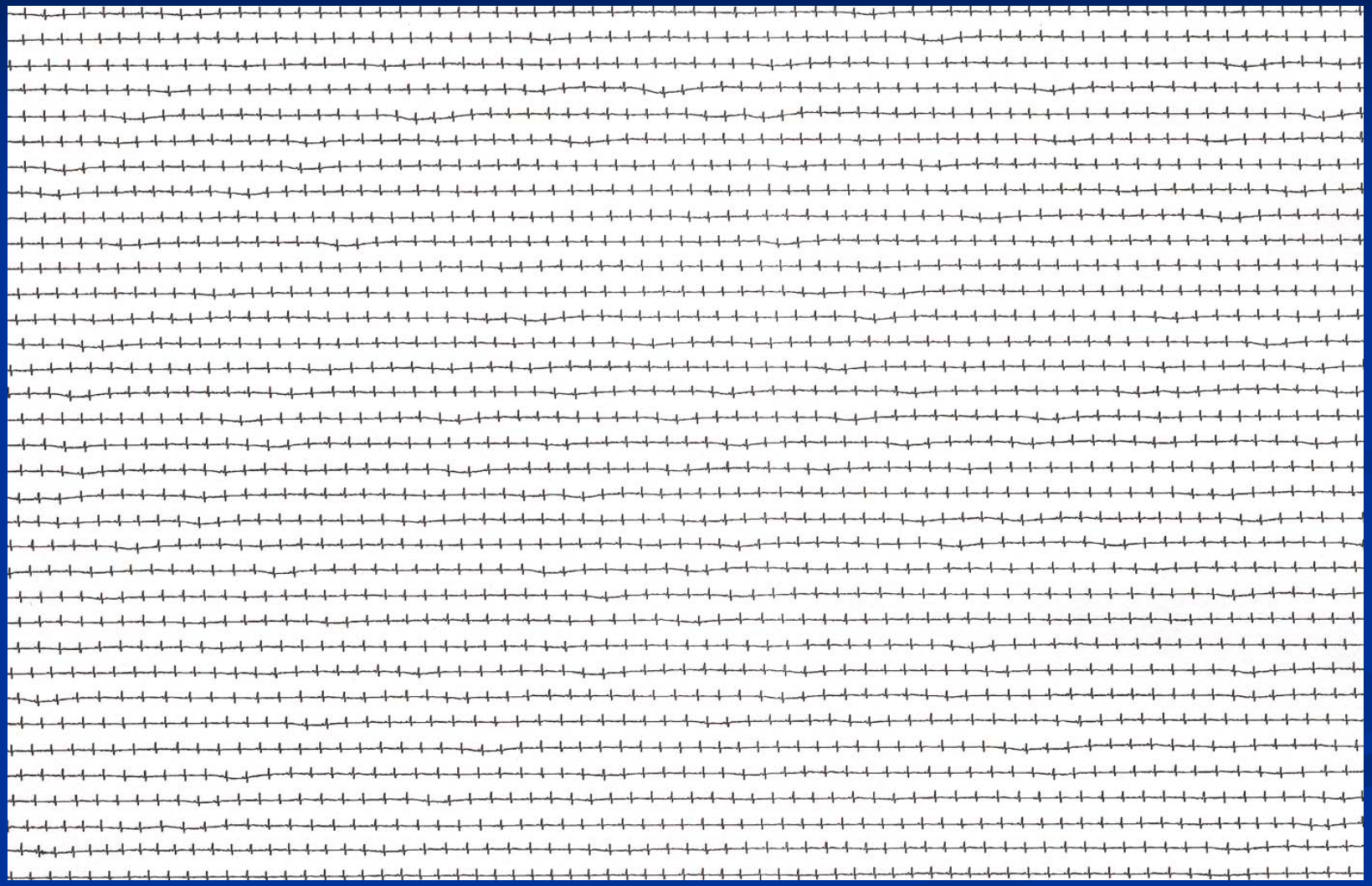
Initial Holter-ECG



Treatment

- Surgery
  - Myomectomy
  - MVR
- Antiarrhythmic drug ?
- Ablation ?
- ICD ?

Holter-ECG after surgery



NSVT in HCM

- NSVT in HCM is frequent.
- NSVT may be a marker of increased risk for SCD (1.4%/year versus 0.6%/year), but the magnitude of the risk assigned to this finding probably also depends on the presence of other important clinical risk factors, such as symptoms and a family history of SCD.
- The utility of programmed stimulation among asymptomatic patients without clinical risk factors is not clear.
- The benefit of antiarrhythmic agents is unclear and/or disappointing.
- ICD therapy is reported to highly effective in the primary and secondary prevention of SCD.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Management and evidence-based therapy in patients with NSVT (1) (Saksena and Camm 2004)

NSVT setting	Management	Evidence-based Rx
Asymptomatic, no overt heart disease	Evaluate for ischemic heart disease and other organic disorders, ECG, exercise test, 2 D-echo; and other test, if needed	No treatment necessary
Symptomatic with RVOT morphology of NSVT	EP testing Differentiate with ARVC	B-blockers, verapamil, adenosine RF ablation, if needed
Hypertrophic cardiomyopathy	Evaluate other risk factors; syncope, family history	B-blockers, amiodarone, ICD if other risk factors present
Nonischemic DCM with EF <35%	No EP testing needed	ICD
Nonischemic DCM with EF ≥35% and syncope with documented VT/VF or cardiac arrest	No EP testing needed	ICD
LQTS with recurrent syncope or cardiac arrest	No testing needed	B-blockers, ICD
Brugada syndrome with syncope or cardiac arrest	No testing needed	ICD
ARVC with syncope or cardiac arrest	No testing needed	ICD

Management and evidence-based therapy in patients with NSVT (2) (Saksena and Camm 2004)

NSVT setting	Management	Evidence-based Rx
Acute MI, NSVT <24 hr NSVT >24 hr until predischarge	Routine for acute MI Routine for acute MI EP testing if EF <40%	Primary angioplasty, thrombolysis Optimal CAD therapy* Revascularization
Asymptomatic CAD without MI or MI with EF >40%	No need for specific management	Optimal CAD therapy*
Syncope in CAD without MI or MI with EF >40%	EP testing	Optimal CAD therapy* If EP-inducible: ICD
MI with EF = 31-40%	EP testing	Optimal CAD therapy* If EP-inducible: ICD
MI with EF ≤30%	No further testing needed	Optimal CAD therapy* ICD therapy
Optimal CAD therapy: administration of β-blockers, statins, ACE-inhibitors (when needed), and revascularization therapy		

Summary

- The prognostic significance of PVC & NSVT is heavily influenced by the type and severity of underlying heart disease.
- Both PVC & NSVT are usually asymptomatic, however, the clinician must determine its clinical significance, diagnostic and therapeutic plan to these asymptomatic patients.
- Most results of antiarrhythmic medication in patients with structural heart disease were not effective and often harmful. However, implantation of ICD was consistently effective in reducing total and sudden death.

감사합니다


CAUTION
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SHARP EDGES
DO NOT TOUCH THE EDGES OF THIS SIGN
ALSO, THE BRIDGE IS OUT AHEAD