Identifying the right patients who benefit from ICD

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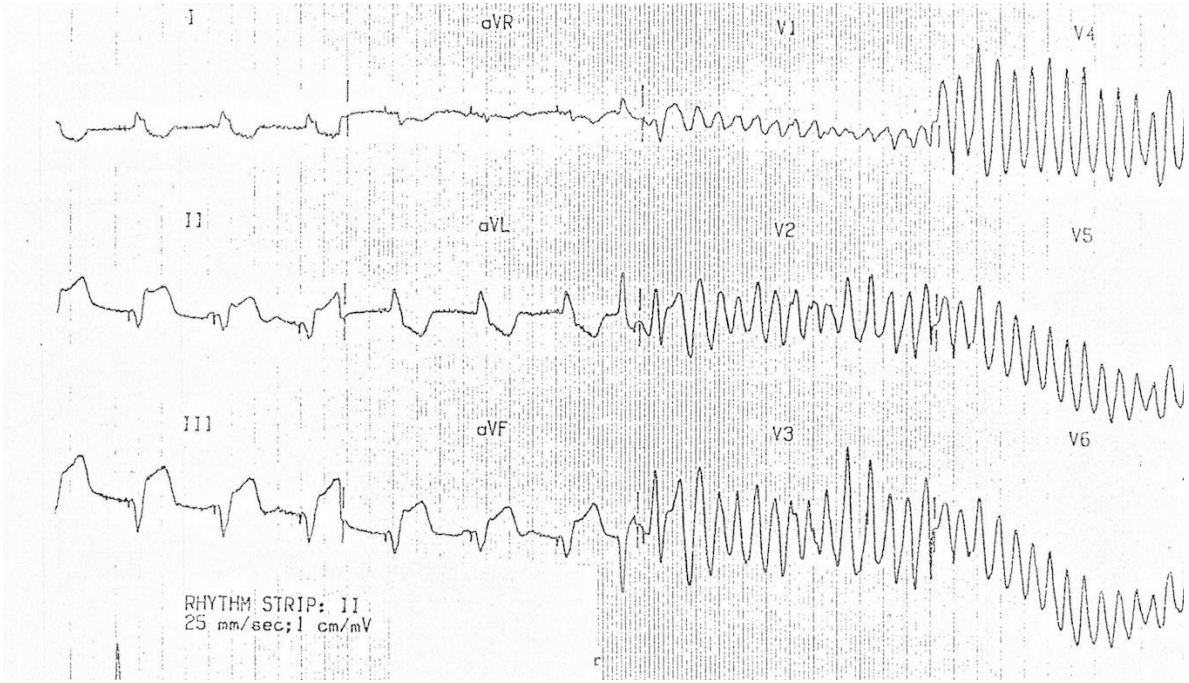
Outline

- **Introduction**
  - Sudden cardiac death
  - Risk stratification
- **When to implant ICD**
  - Secondary prevention
  - Primary prevention
- **When not to implant ICD**

Sudden death

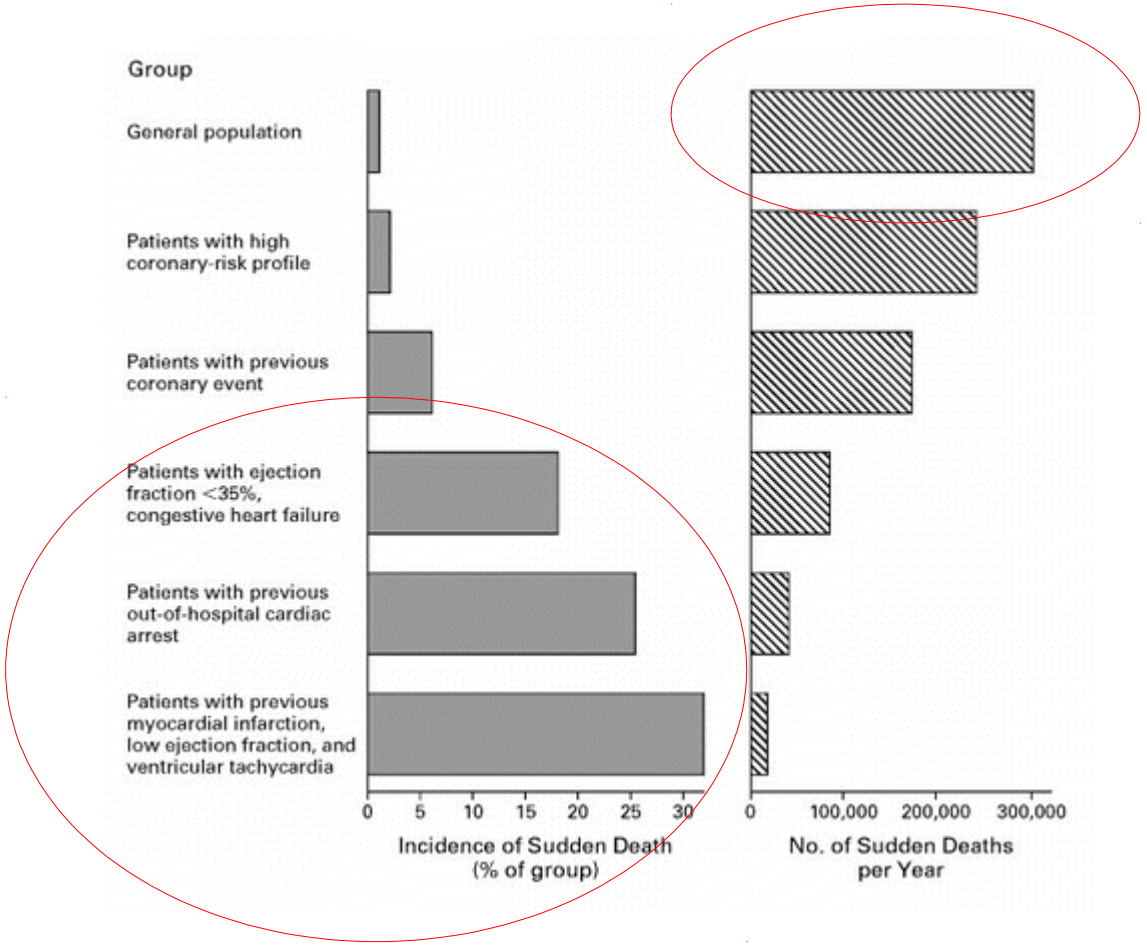
- **Sudden death – 10% of all deaths (1)**
- **Mostly cardiac, due to VF**



1) Rao B.H. et al. Contribution of sudden cardiac death to total mortality in India - a population based study. Int J Cardiol. 2012;154:163–167

Preventing sudden deaths

Do I need



Why not just say yes?

- **Invasive procedure**
  - Risks during implant and follow up
- **Costly**
  - Initial cost, replacements
  - 2.5 to 8 lakhs for a device
- **High NNT**

How to choose patients?

- **High risk subsets**
- **Risk stratification**
  - LVEF
  - Others

When to implant – Secondary prevention

- **Highest risk for recurrent events**
- **Evidence**
  - AVID (1) / CIDS / CASH
- **ICD better than drugs**

1) The Antiarrhythmics versus Implantable Defibrillators (AVID) Investigators. A Comparison of Antiarrhythmic-Drug Therapy with Implantable Defibrillators in Patients Resuscitated from Near-Fatal Ventricular Arrhythmias. N Engl J Med 1997; 337:1576-1584

Not all secondary prevention are the same

- **Resuscitated cardiac arrest with documented VF / VT (class IA)**
- **Hemodynamically unstable sustained VT (IB)**
- **Stable sustained VT with structural heart disease (IB)**
- **Sustained VT with near normal LV function (IIa C)**

1) ACC/AHA/HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities. Circulation. 2008 May 27;117(21):e350-408

When to implant – Primary prevention

- **Many sudden deaths are the first event**
- **High risk groups targeted**
  - Post MI
  - Non ischemic cardiomyopathy
  - Hypertrophic cardiomyopathy
  - ARVC / LQTS

Primary prevention – Post MI

- **Reduced LV ejection fraction (LVEF < = 30%) more than 6 week after MI (1)**
- **Reduced LV ejection fraction (<35%)with heart failure (2)**
- **Frequent PVCs / NSVT (3)**

1) Arthur J. Moss et al. Prophylactic Implantation of a Defibrillator in Patients with Myocardial Infarction and Reduced Ejection Fraction. N Engl J Med 2002; 346:877-883.
2) Gust H et al. Amiodarone or an Implantable Cardioverter–Defibrillator for Congestive Heart Failure. N Engl J Med 2005; 352:225-237
3) Arthur Moss et al. Improved Survival with an Implanted Defibrillator in Patients with Coronary Disease at High Risk for Ventricular Arrhythmia. N Engl J Med 1996; 335:1933-1940

Primary prevention – NICM

- **Reduced LV ejection fraction (LVEF < = 35%) with heart failure (1, 2)**
- **Benefit less than in ischemic heart disease**
- **No benefit? (3)**

1) Gust H et al. Amiodarone or an Implantable Cardioverter–Defibrillator for Congestive Heart Failure. N Engl J Med 2005; 352:225-237
2) Alan Kadish et al. Prophylactic Defibrillator Implantation in Patients with Nonischemic Dilated Cardiomyopathy. N Engl J Med 2004;350:2151-8
3) Lars Køber et al. Defibrillator Implantation in Patients with Nonischemic Systolic Heart Failure. N Engl J Med 2016; 375:1221-1230

Primary prevention – HCM

- **Common – 1 / 500**
- **Relatively benign**
- **Risk markers**
  - Unexplained syncope
  - Sudden death in first degree relative
  - Septal thickness more than 30 mm
  - NSVT
  - Hypotensive response to exercise

When not to Implant

Early after MI

- **40 days (MADIT II)**
- **No benefit (1,2)**

- **Vest**
- **Secondary prevention**

1) IRIS investigators. Defibrillator Implantation Early after Myocardial Infarction. N Engl J Med 2009; 361:1427-1436
2) DINAMIT investigators. Prophylactic Use of an Implantable Cardioverter–Defibrillator after Acute Myocardial Infarction. N Engl J Med 2004; 351:2481-2488

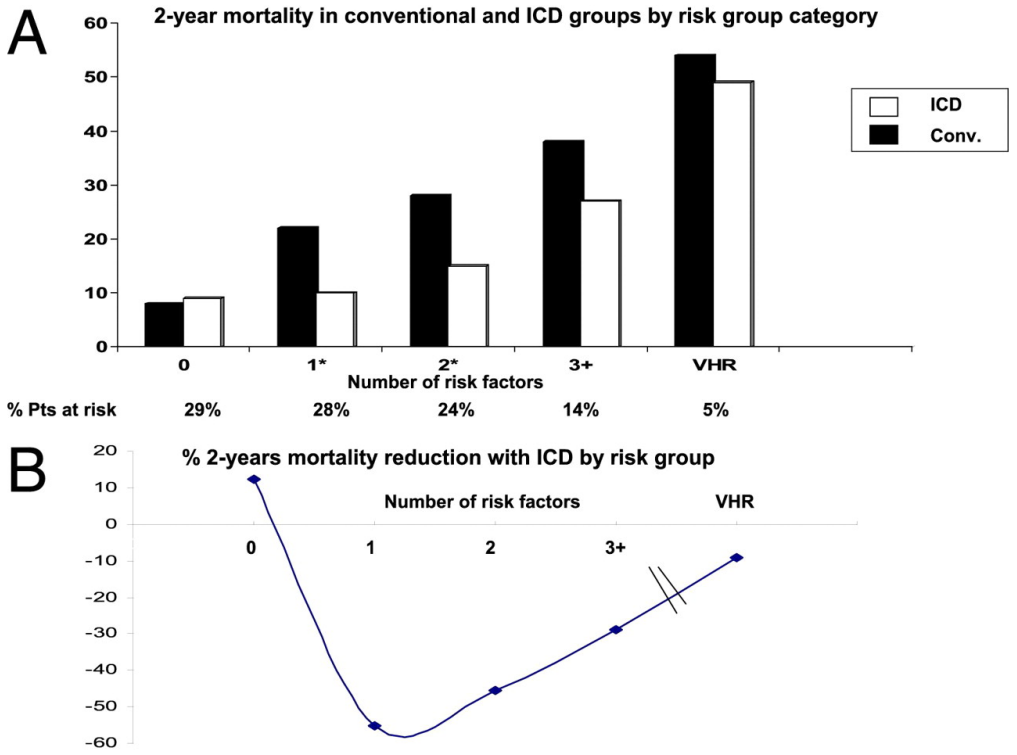
VT early after MI

- **AIVR – Benign / no treatment**
- **Primary VF – No ICD, but not benign!**
- **Primary VF – Consider ICD (1)**
  - Low EF / Recurrent VF
  - Persistent NSVT / Inducible VT
  - Revascularization not possible
- **VT after 48 hours – ICD (no waiting period)**

1) ACCF/HRS/AHA/ASE/HFSA/SCAI/SCCT/SCMR 2013 Appropriate Use Criteria for Implantable Cardioverter-Defibrillators and Cardiac Resynchronization Therapy. Journal of the American College of Cardiology Mar 2013, 61 (12) 1318-1368;

When not to implant

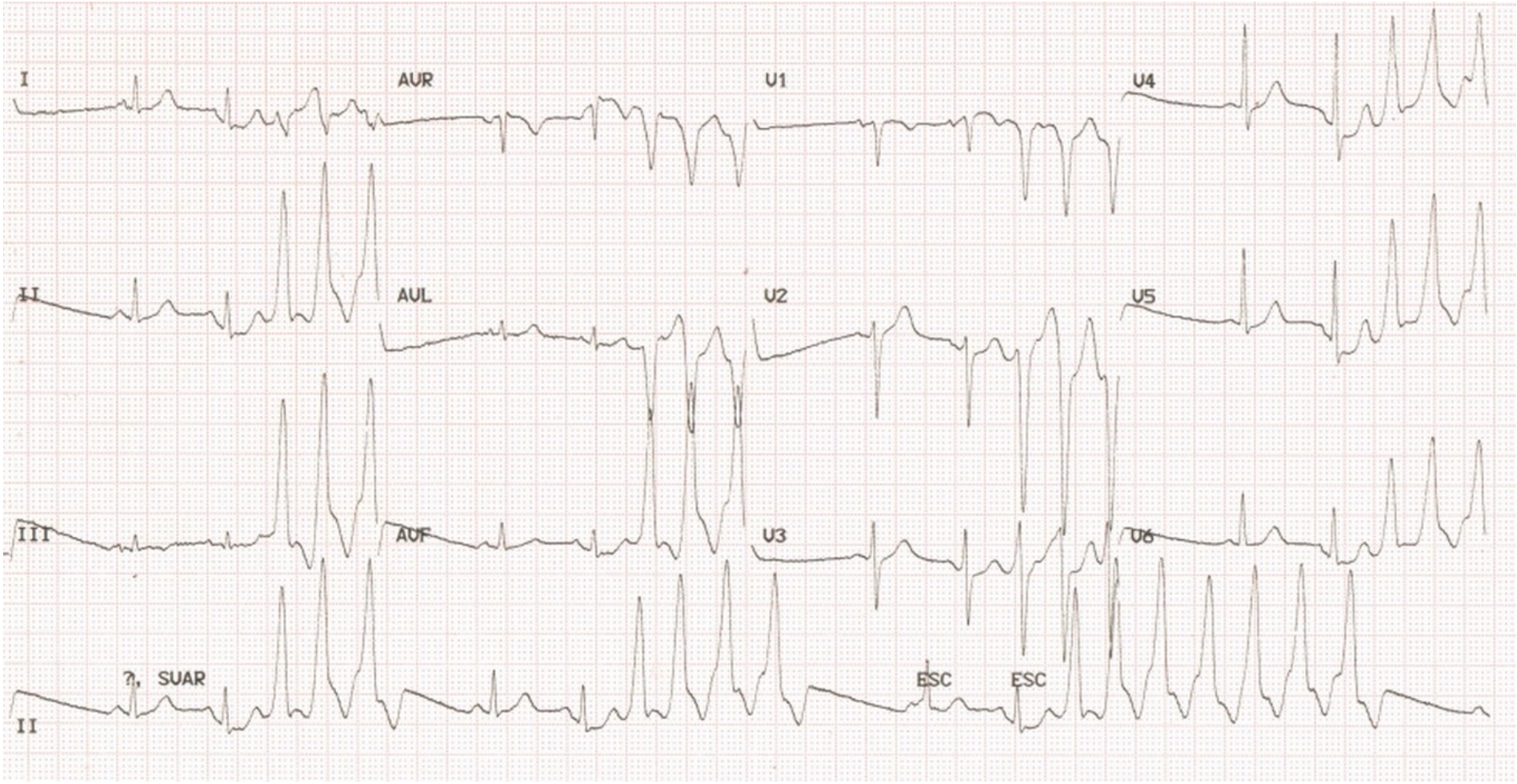
- **Expected longevity**
- **Comorbidities**



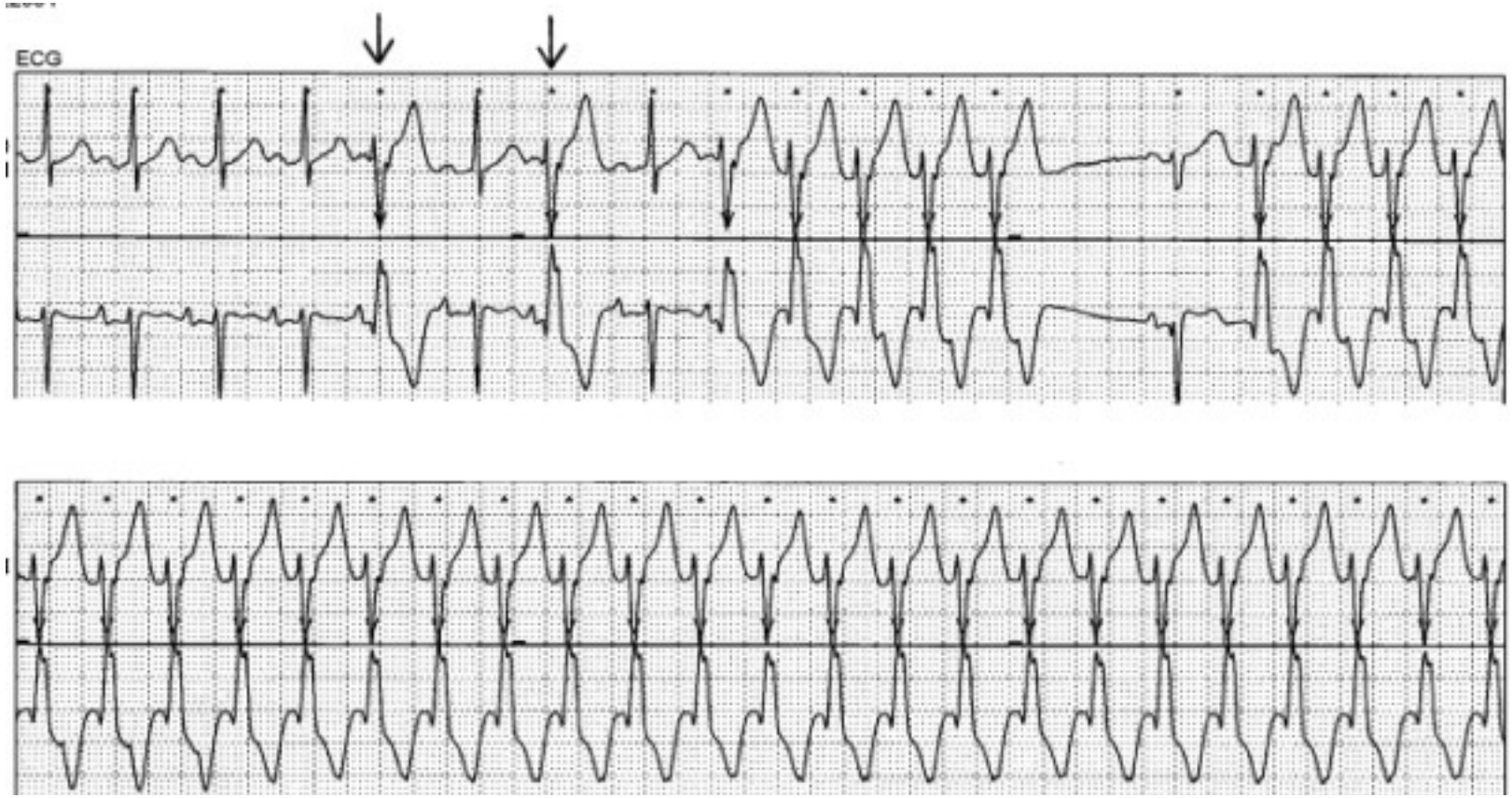
When not to implant

- **Reversible causes – TIC**
- **Incessant VT**
- **Wrong diagnosis**
  - Not all WQRST is VT
  - Not all VT is malignant

Referred for ICD – Patient 1



Referred for ICD – Patient 2



Summary

- **ICD powerful treatment to prevent sudden death in those at risk**
- **Selecting the right patients critical to use ICD optimally**
- **Knowing when not to implant is often as important as, or more important than knowing when to implant**