

# Evidence based treatment for VT - does everyone need an ICD?

**Heart Rhythm Congress**

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# Conflicts of Interest

- I believe the ICD companies have stifled alternative research into VT
- I think too often we opt for ICD without thought of consequences for patient in terms of shocks / morbidity
- I like catheter ablation for VT
- Sponsored by Tennents



# Evidence Base for ICDs in VT

- Many of us have only practiced in the era of ICDs
- NICE guidelines in place since 2001

1.1.1 'Secondary prevention', that is, for patients who present, in the absence of a treatable cause, with one of the following:

- **having survived a cardiac arrest due to either ventricular tachycardia (VT) or ventricular fibrillation (VF)**
- **spontaneous sustained VT causing syncope or significant haemodynamic compromise**
- **sustained VT without syncope or cardiac arrest, and who have an associated reduction in ejection fraction < 35%**

But what is the evidence base .....?

# Secondary Prevention ICD Trials

AVID – Antiarrhythmics V Implantable Defib

~~CIDS – Canadian Implantable Defib Study~~

~~CASH - Cardiac Arrest Study Hamburg~~

# AVID

1016 patients entered study

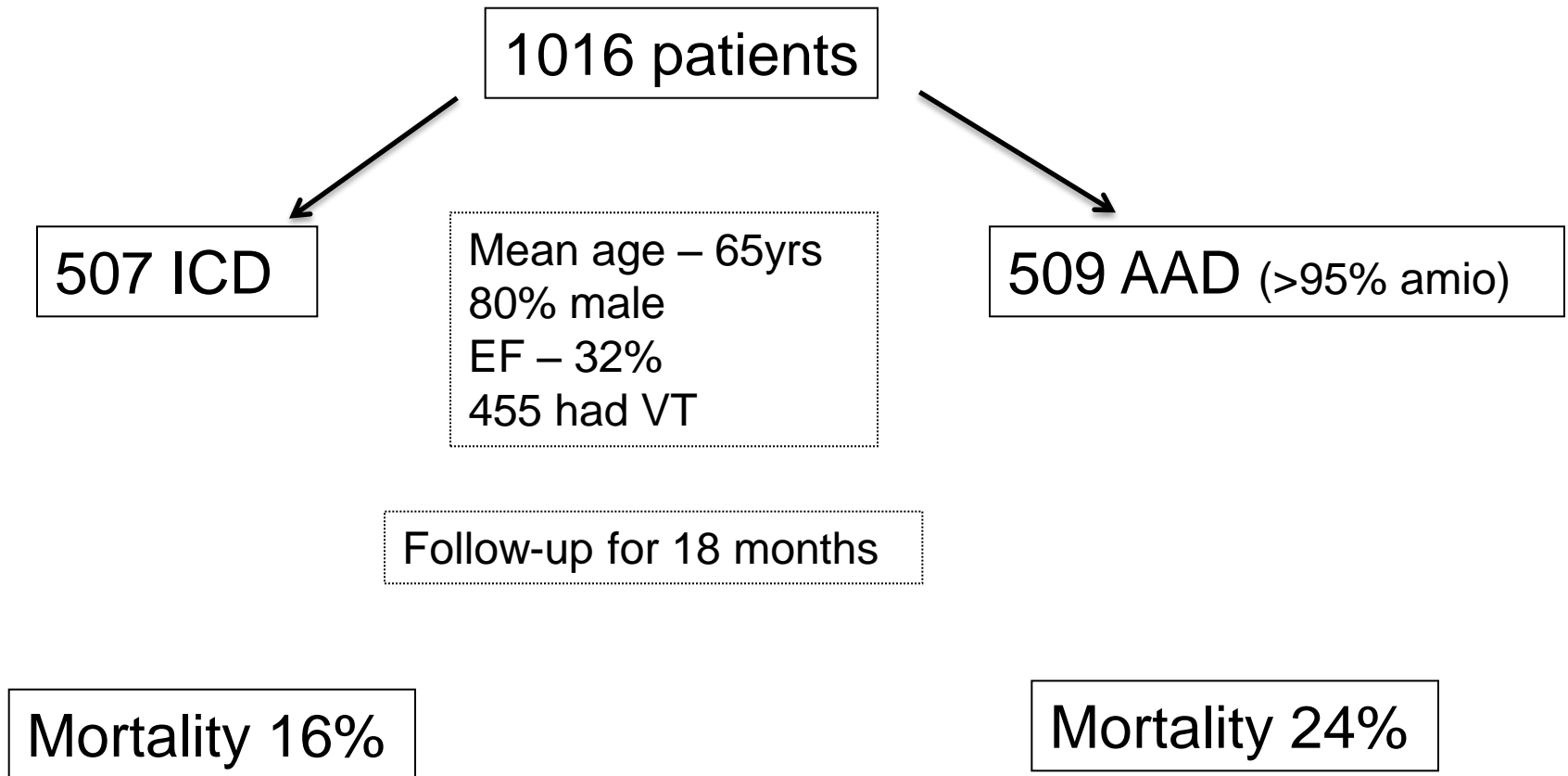
Inclusion Criteria:

- near-fatal ventricular fibrillation;
- sustained ventricular tachycardia with syncope;
- sustained ventricular tachycardia with an ejection fraction of 0.40 or less and symptoms suggesting severe hemodynamic compromise due to the arrhythmia (near-syncope, congestive heart failure, and angina).

**Registry of non-randomised patients – 4450 patients**

N Engl J Med 1997;337:1576-83.

# AVID Results



# AVID Registry

1. Mortality during follow-up similar for patients presenting with 'stable' VT compared to 'unstable VT'<sup>1</sup>
2. Mortality for the 5% of patients thought to have a 'reversible' cause of VT / VF same as controls<sup>2</sup>
3. 150 patients in AVID had stable VT and an EF > 40%.  
There is no separate information on their outcomes.

1- *Circulation* 2001, 103:244-252: 2 - *J Am Coll Cardiol* 2001;38:1718 -24

# Current NICE Guideline

- 1.1.1 'Secondary prevention', that is, for patients who present, in the absence of a treatable cause, with one of the following:
- **having survived a cardiac arrest due to either ventricular tachycardia (VT) or ventricular fibrillation (VF)**
  - **spontaneous sustained VT causing syncope or significant haemodynamic compromise**
  - **sustained VT without syncope or cardiac arrest, and who have an associated reduction in ejection fraction < 35%**

# Arguments for an ICD in all

- Patients with an ICD implanted for 'stable' VT have been documented in about 20% to get therapy for fast VT
- It is safer

# Arguments against an ICD in all

- Not all ICD therapy is life-saving
- Improved quality of life

# Pre ICD Studies

1. Saxon et al<sup>1</sup> 4-year survival from sudden death and total mortality is better with tolerated VT than with cardiac arrest (87% versus 59% and 67% versus 45%)
2. Waller et al<sup>2</sup> 3 groups as judged by effect of drugs (non-ind, VT >100ms longer, no effect) – 2 yr total and SCD reduced in Gp 1 & 2 (12% + 4%) v Gp 3 (39% + 34%)
3. Sarter et al<sup>3</sup> In patients with VT sudden death mortality was 7% at 3 years (2.4% per year) – surgical risk

1- Saxon LA, Significance of clinical presentation in ventricular tachycardia/fibrillation. *Am Heart J.* 1989;118:695–701.

2 - Waller TJ. Reduction in sudden death and total mortality by antiarrhythmic therapy evaluated by electrophysiologic drug testing: criteria of efficacy in patients with sustained ventricular tachycardia. *J Am Coll Cardiol.* 1987;10:83– 89.

3. Sarter BH. What is the risk of sudden cardiac death in patients presenting with hemodynamically stable sustained ventricular tachycardia after myocardial infarction? *J Am Coll Cardiol.* 1996;28:122–129.

# VT – outside of ICD guidelines

2 groups:

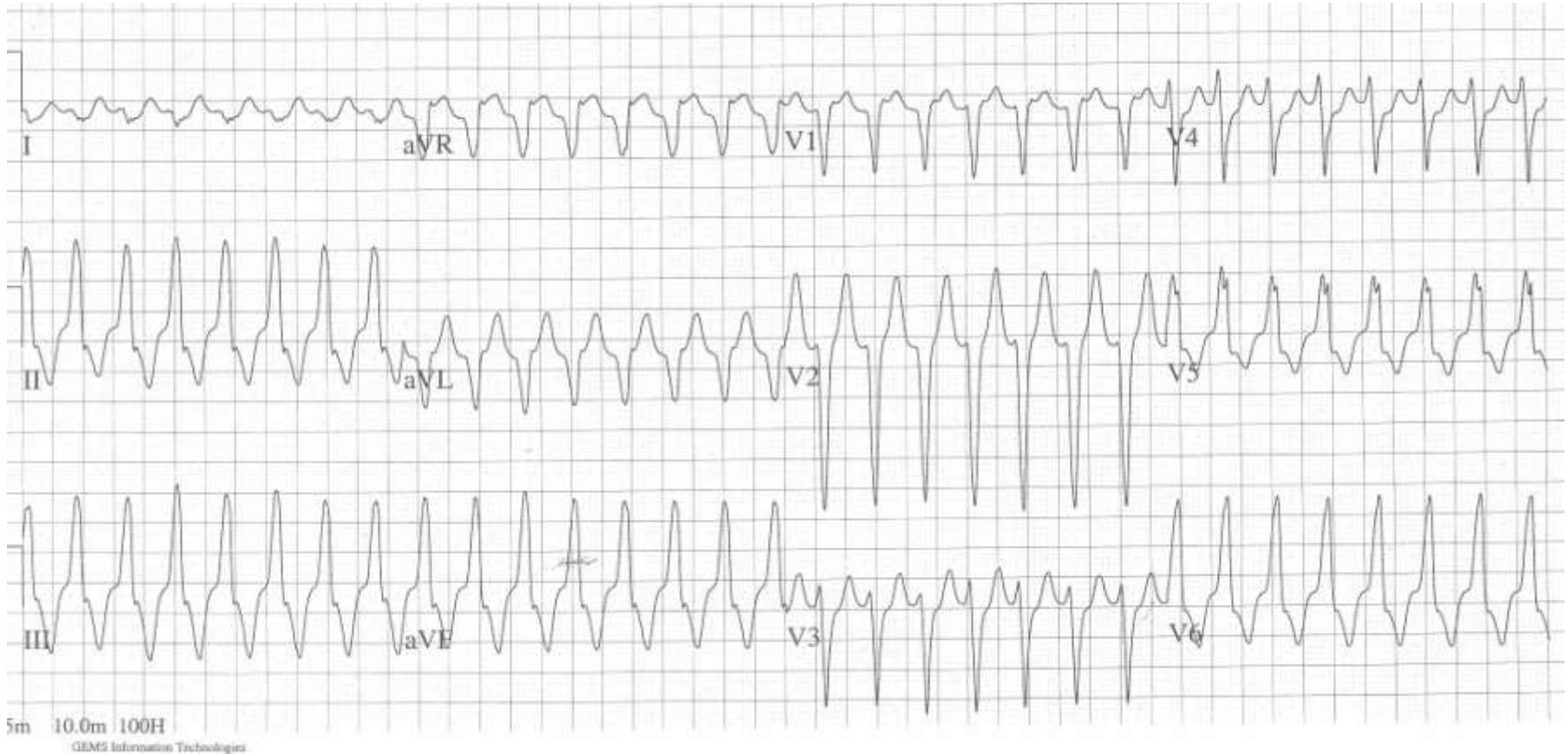
1. Structurally normal heart VT
2. VT – well tolerated with EF > 35-40%

# Treatment of Normal Heart VT

1. RVOT VT (LVOT)
  - Beta-blocker
  - Verapamil
  - Ablation
  
2. Fascicular VT
  - Verapamil
  - Ablation
  
3. Others e.g. mitral annular

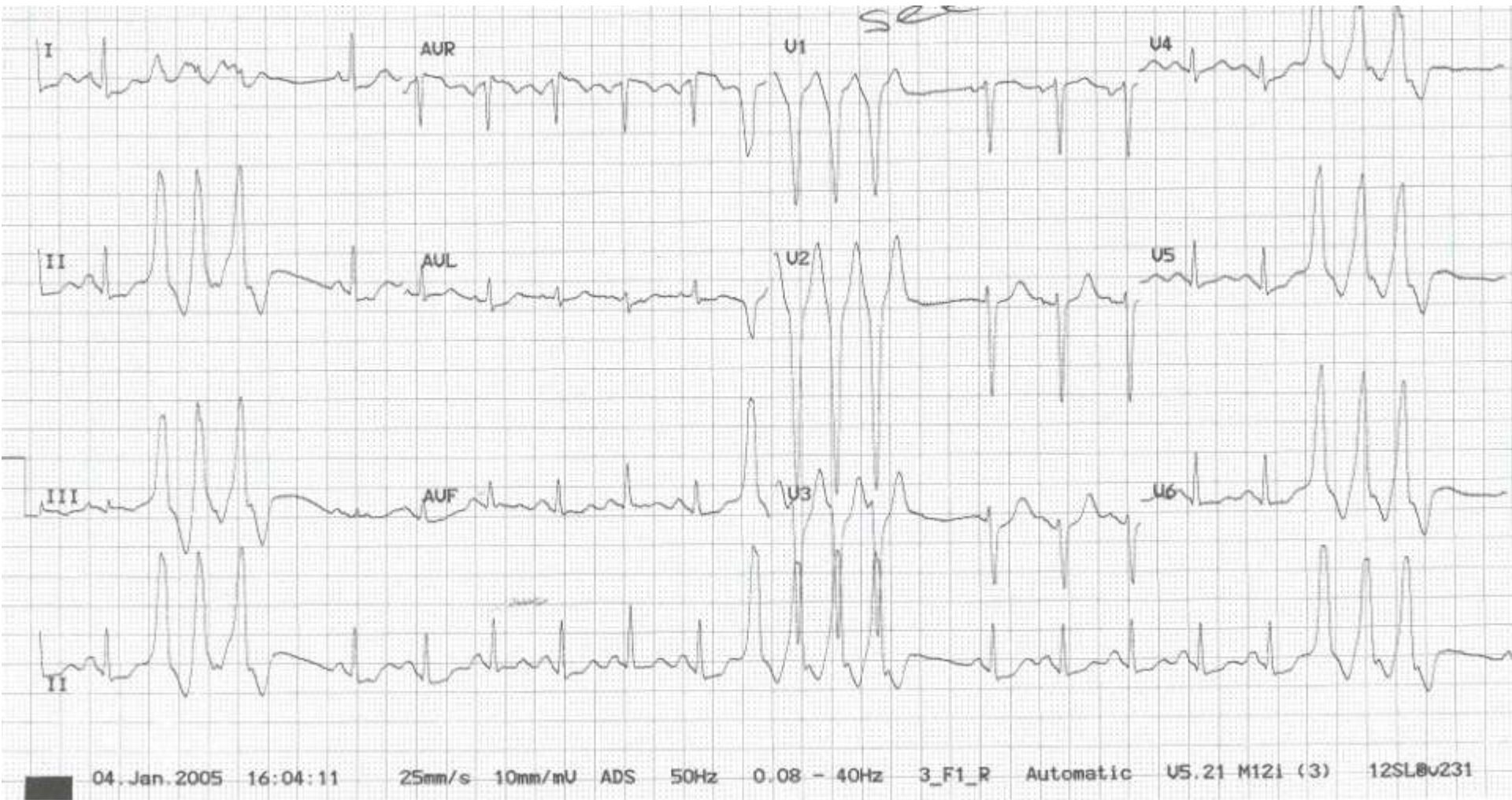
# Structurally Normal Heart VT

## RVOT VT

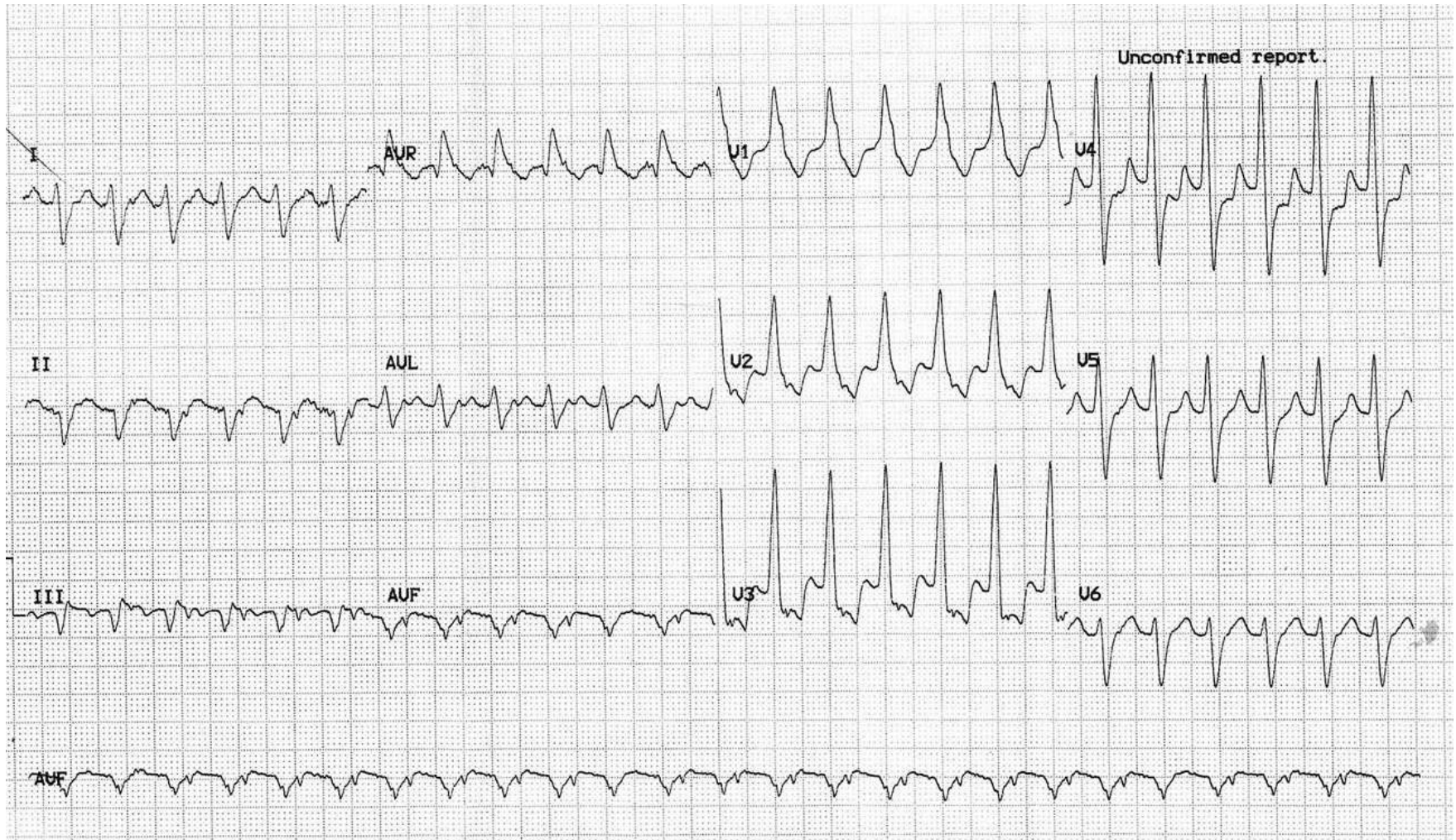




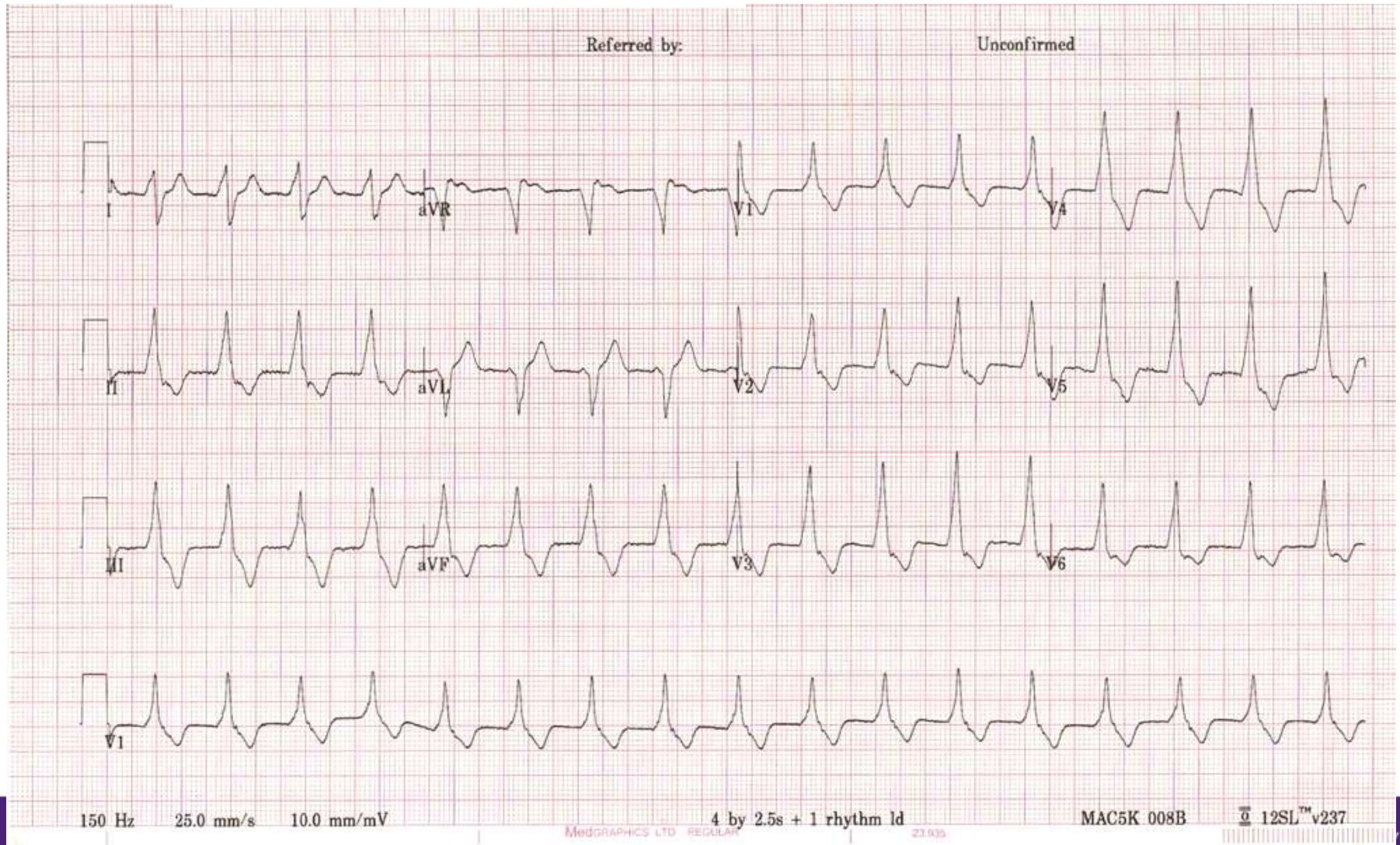
# RVOT – typical bursting



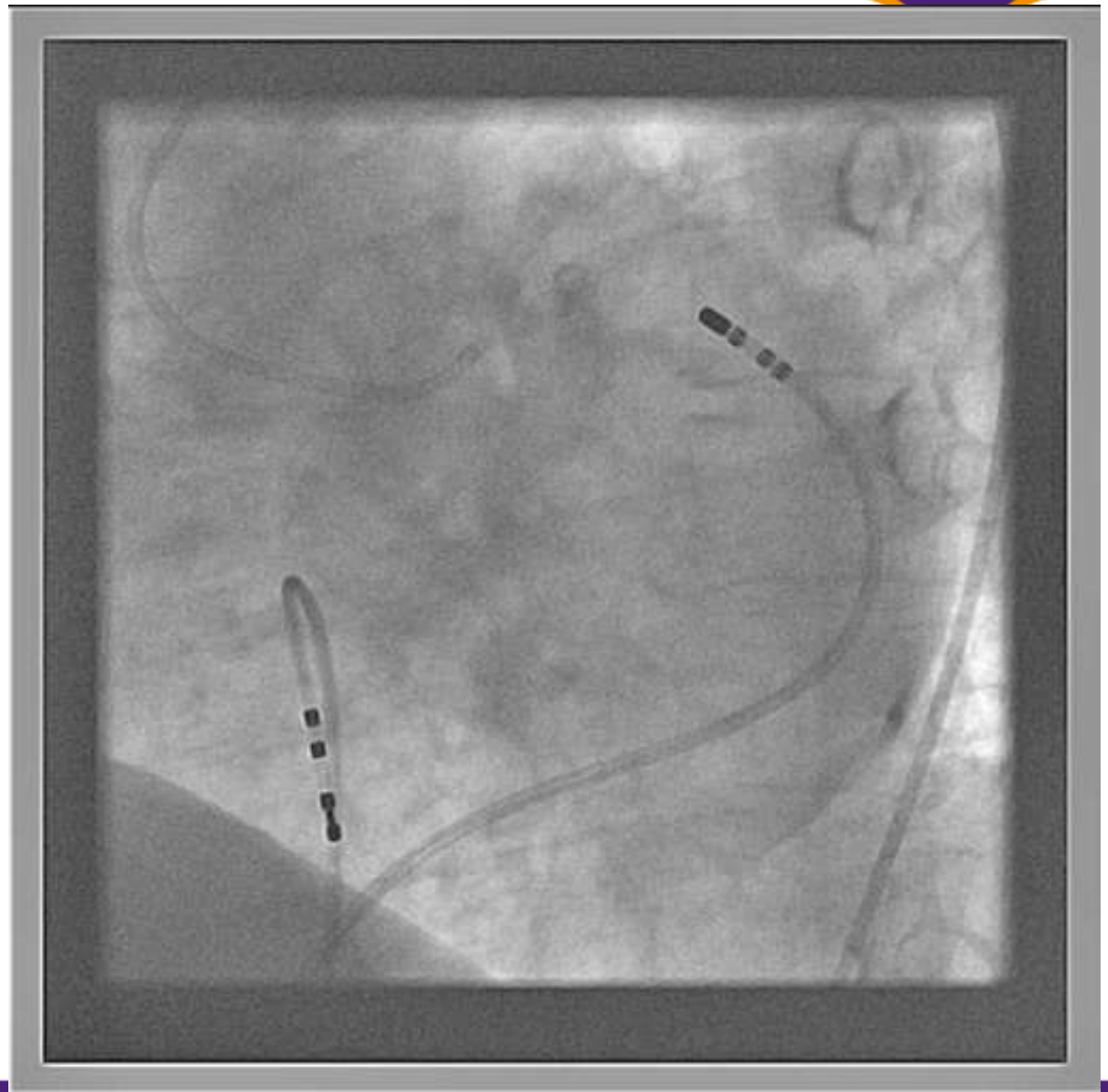
# Fascicular VT



# Mitral Valve Annular VT



Catheter Ablation  
Position Mitral  
Valve Annular VT



# VT with LVEF > 40%

2 groups

1. Cardiomyopathy (ARVC) - ICD indicated (LBBB VT)
2. IHD – ICD optional – how to guide treatment?

# Treating VT without an ICD

Key elements in assessment:

1. Haemodynamically stable VT
  - rate (? <180bpm)
2. No significant other coronary disease
3. Treated by ablation – full VT stimulation assessment

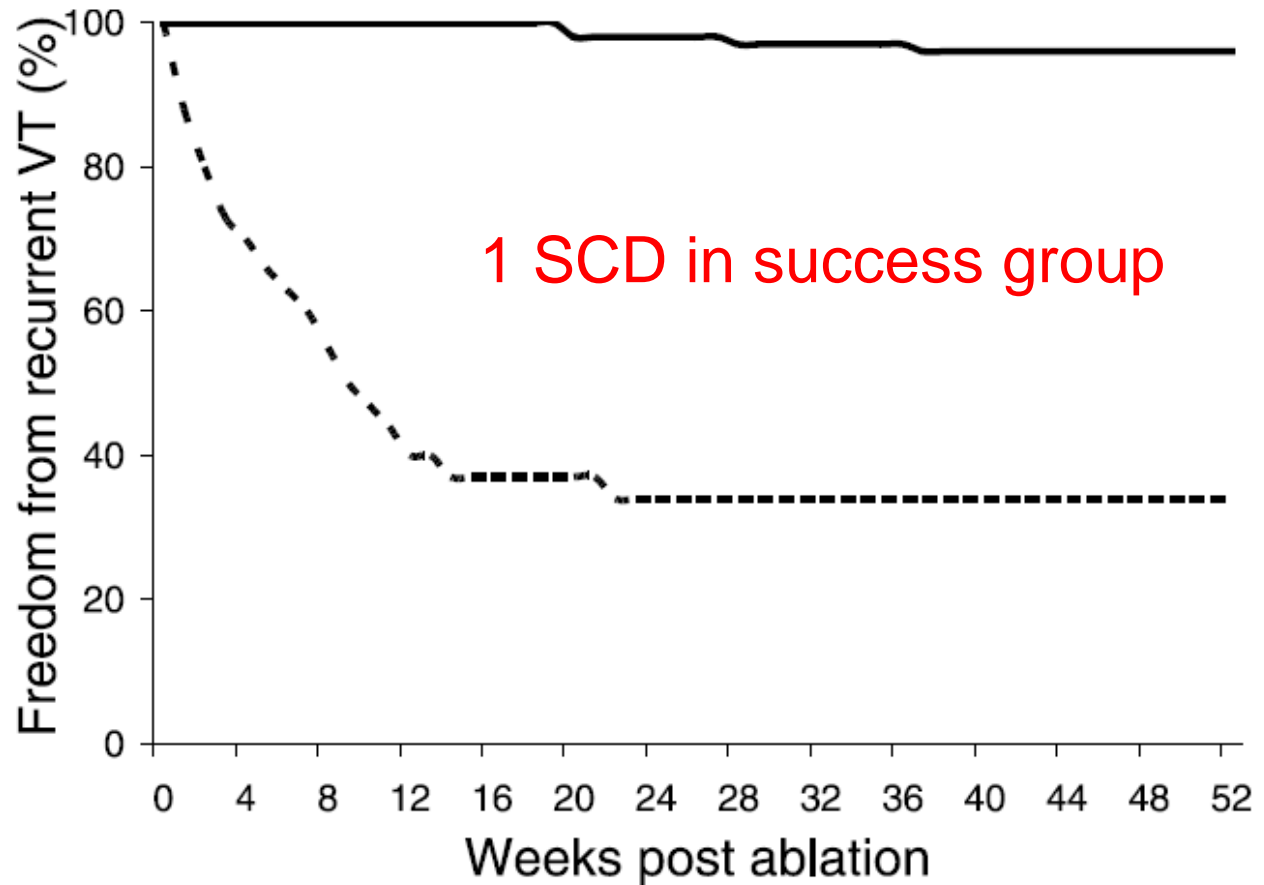
# Evidence for VT Ablation

- Single centre experience of 112 patients – Newcastle
- Westmead (Aus) VT induction protocol
  - uses up to 5 extras to induce VT
- All patients inducible with up to 3 extras at start
- Success – no VT 5 extras or 2 more than at baseline needed to induce
- Success in 72% / Failed 28%
- Predictors of success - <3 VT morphologies / haem stability

# Results

**Success** ———  
(no VT or 2 extras  
more to induce)

**Failed** - - - - -  
(VT still inducible  
at <2 extras more)



# Pre-ICD VT ablation

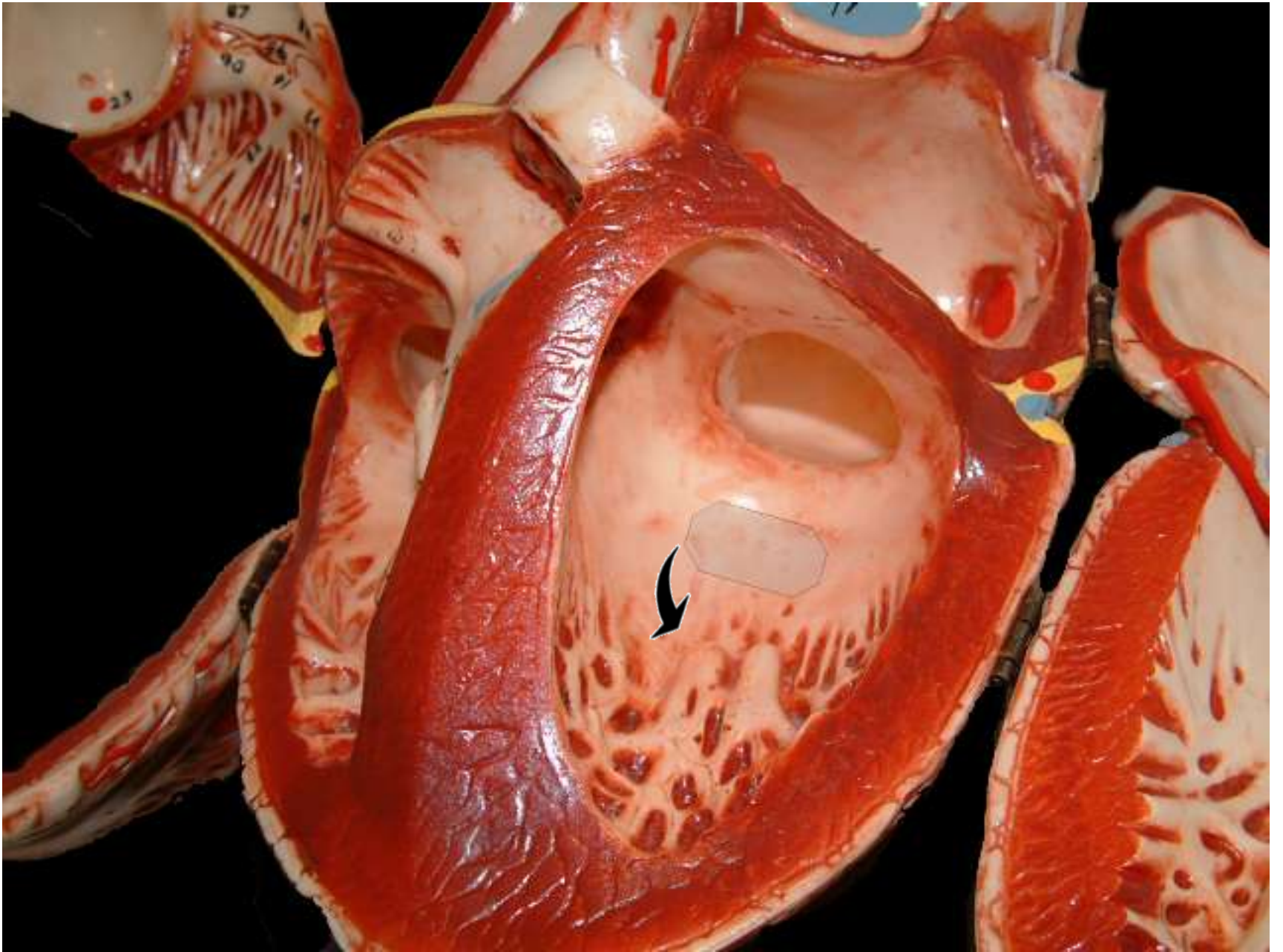
2 major studies

SMASH VT (NEJM 2007) and VTACH (Lancet 2010)

Similar sized studies (about 120 patients)

Half randomised to catheter ablation pre-ICD

Ablation technique – substrate based using CARTO or NavX



# Results

- Both studies similar follow-up – 22 months
- Reduced VT and ICD shocks
- SMASH-VT - ICD therapy 33% → 12% with ablation
- VTACH - ICD therapy 71% → 50% with ablation  
(benefit mainly in those with EF >30%)

**Summary of Published Results in Patients Undergoing Catheter Ablation of Post-MI VT**

Authors	Patients, n	Patients With Post-MI VT, n	Mean LVEF, %	Short-Term Success, %	Procedural Mortality, %	Major Morbidity, %	Patients With ICD, %	Mean Follow-Up, mo	VT Recurrences, %	In Patients With Short-Term Success and No ICD		Total Mortality During Follow-Up
										VT Recurrences	SCD	
Morady et al <sup>41</sup>	15	15	27	73	0	0	20	9	13	0/8	0/8	0
Kim et al <sup>42</sup>	21	21	32	81	5	0	43	13	45	2/12	0/12	0
Rothman et al <sup>43</sup>	35	35	24	86	0	11	51	14*	31	0/16	2/16	6/35
Stevenson et al <sup>44</sup>	52	52	33	71	2	6	44	18	31			
Ortiz et al <sup>45</sup>	34	34	31	62	0	3	44	26	38			
El-Shalakany et al <sup>46</sup>	15	15	26	93	0	NA	13	15	27			
Calkins et al <sup>31†</sup>	146	119	31	75	2.7	5	79	8	46	3/27	NA	22/142
O'Callaghan et al <sup>47</sup>	55	55	32	82	1.8	7	70	39	NA‡	NA‡	2/17§	20/54
Borger et al <sup>48  </sup>	151	89	29	79	2.2	8	55	34¶	23	5/38#	0/38**	12/87
Della Bella et al <sup>49</sup>	124	124	34	73	0.8	3	20	41	28	19/91	2/91	15/123
O'Donnell et al <sup>50</sup>	109	109	NA††	72	0	6	26	61	23	3/63	0/63	25/109
Segal et al <sup>32</sup>	40	40	36	82	2.5	15	65	36	57	NA	0/14	13/39
<b>Total</b>	<b>797</b>	<b>708</b>	<b>...</b>	<b>76</b>	<b>1.5</b>	<b>6</b>	<b>48</b>		<b>33</b>	<b>14%</b>	<b>2.5%</b>	<b>20%</b>

**SCD – 2.5%**



# Conclusions

- More evidence is needed in those with EF >35-40%
- In the meantime many will use ICD
- Ablation has a role – if VT ablated and non-inducible with 5 extras ? An ICD could be avoided