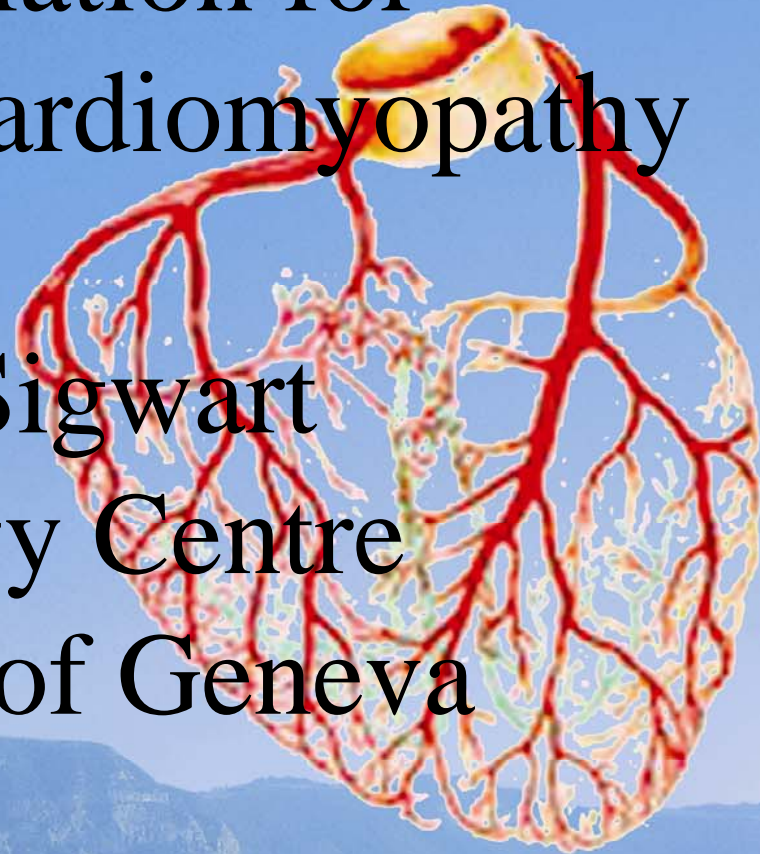
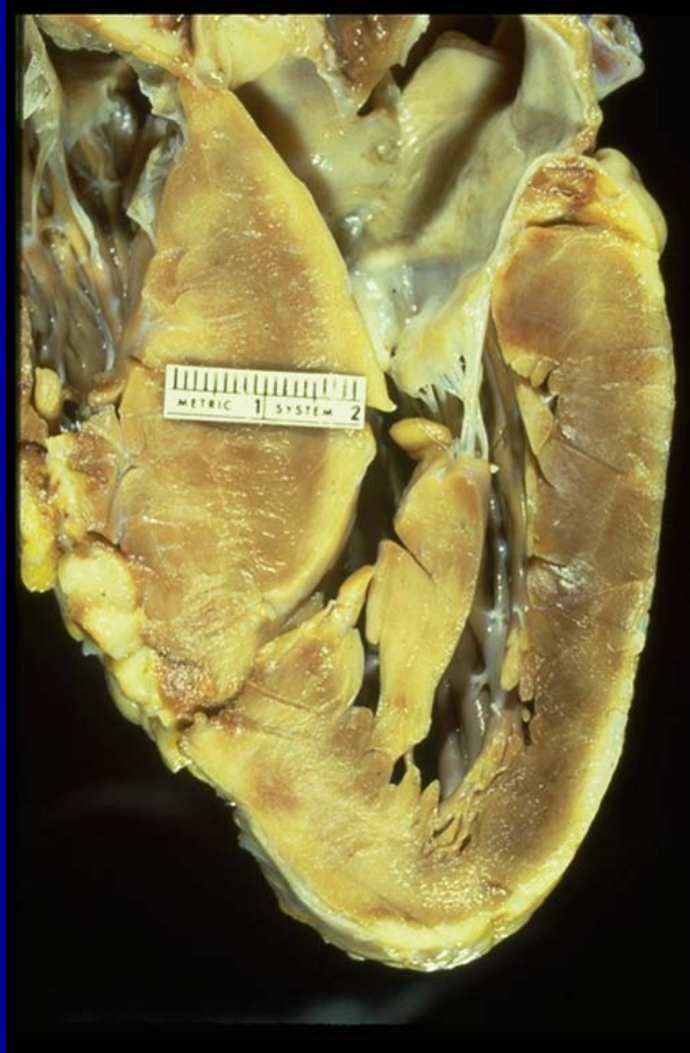


Septal Ablation for Hypertrophic Cardiomyopathy

Ulrich Sigwart
Cardiology Centre
University of Geneva



Hypertrophic Cardiomyopathy



Hypertrophic Cardiomyopathy

- **Hypertrophic Obstructive CM (HOCM):**
 - Incidence: 1 in 500
 - Autosomal dominant, male & female (equal)
 - Wide variety of geno- and phenotypes
 - Some mutations predictive of sudden death
 - Often unrecognised



Hypertrophic Cardiomyopathy

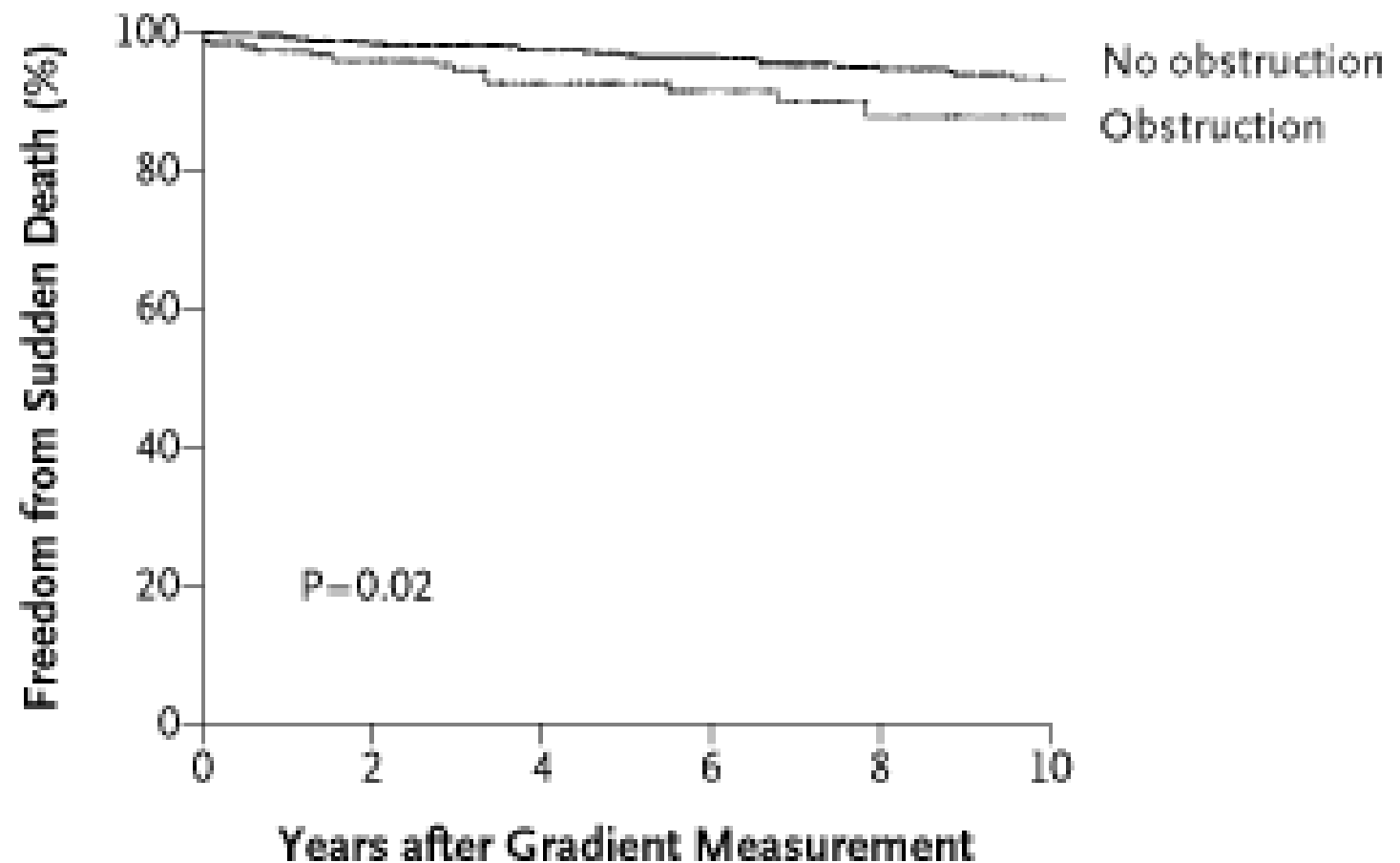
- Hypertrophic Obstructive CM (HOCM):
 - Pathophysiology:
 - Asymmetric septal hypertrophy
 - Myocardial disarray
 - *Dynamic* LV outflow tract gradient
 - SAM
 - LV Diastolic dysfunction





HOCM

Maron et al NEJM 2003 348:295-303



No. at Risk

No obstruction	770	557	464	334	231	188
Obstruction	224	144	103	66	39	25

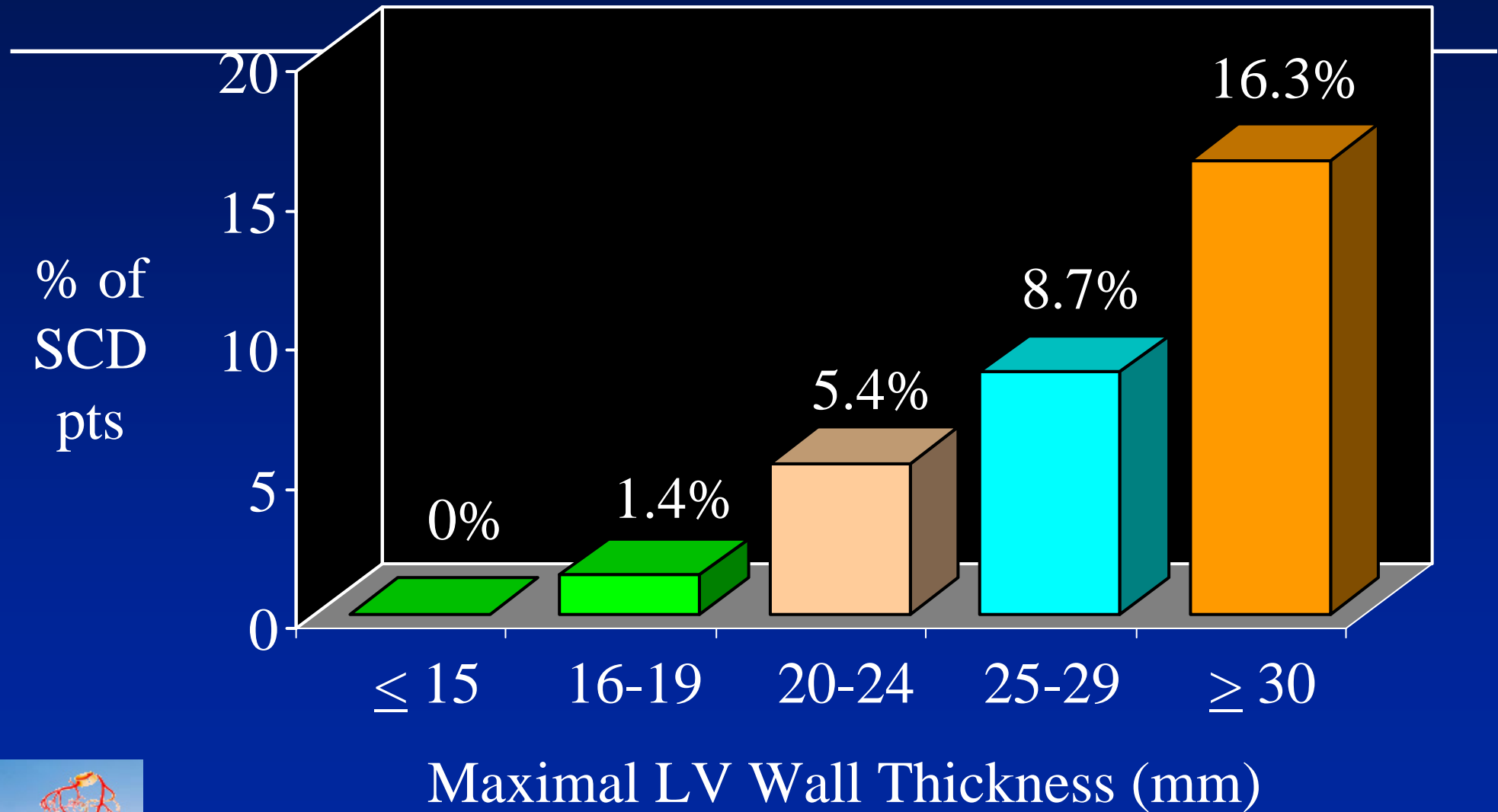


Hypertrophic Cardiomyopathy

- Hypertrophic Obstructive CM (HOCM):
 - Clinical manifestations:
 - Systolic murmur
 - SOB and/or angina pectoris
 - Dizzy spells or pre-syncope
 - Sudden death



Magnitude of LVH and SCD Risk



Spirito P et al. *NEJM* 2000;342:1778-85.

Hypertrophic Cardiomyopathy

- Hypertrophic Obstructive CM (HOCM):
 - Symptomatic therapy:
 - Negative inotropic drugs
 - DDD pacing
 - AICD



Hypertrophic Cardiomyopathy

- Hypertrophic Obstructive CM (HOCM):
 - Symptomatic therapy:
 - Negative inotropic drugs
 - DDD pacing and/or AICD
 - Surgical myotomy/ myectomy (MVR?)
 - Transplantation
 - Catheter treatment

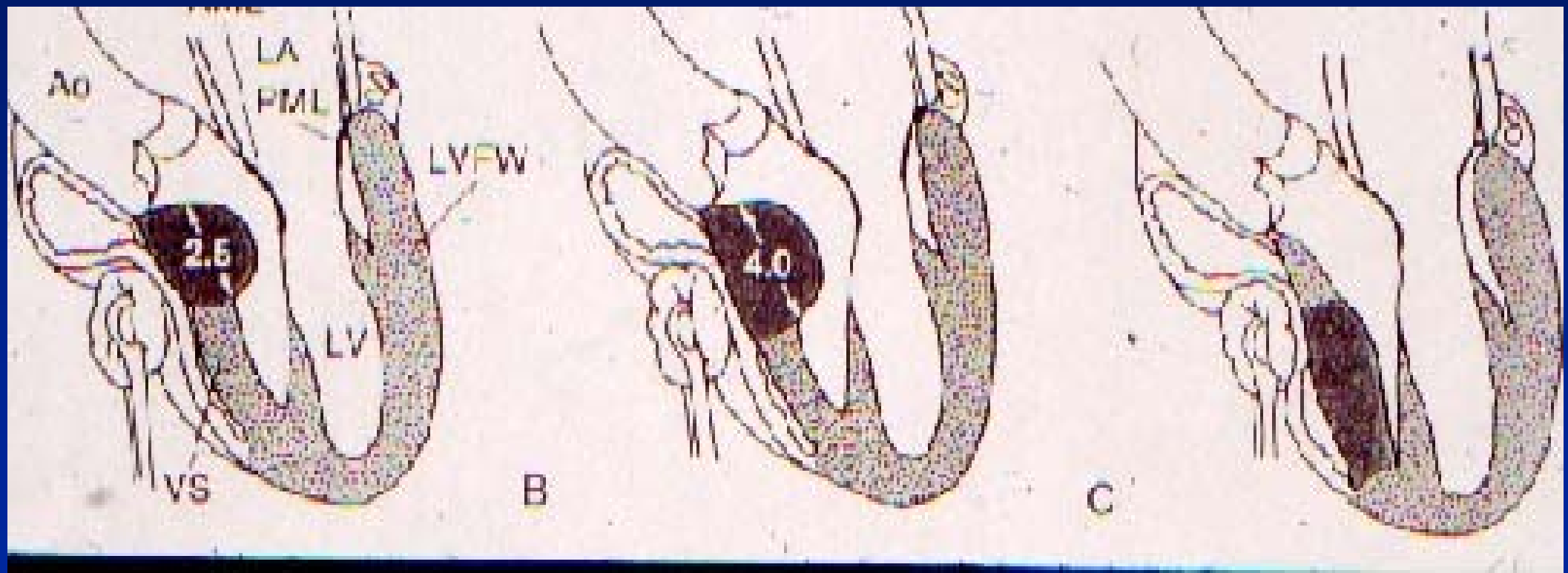


History of Myectomy

- Brock 1957
- Cleland 1958

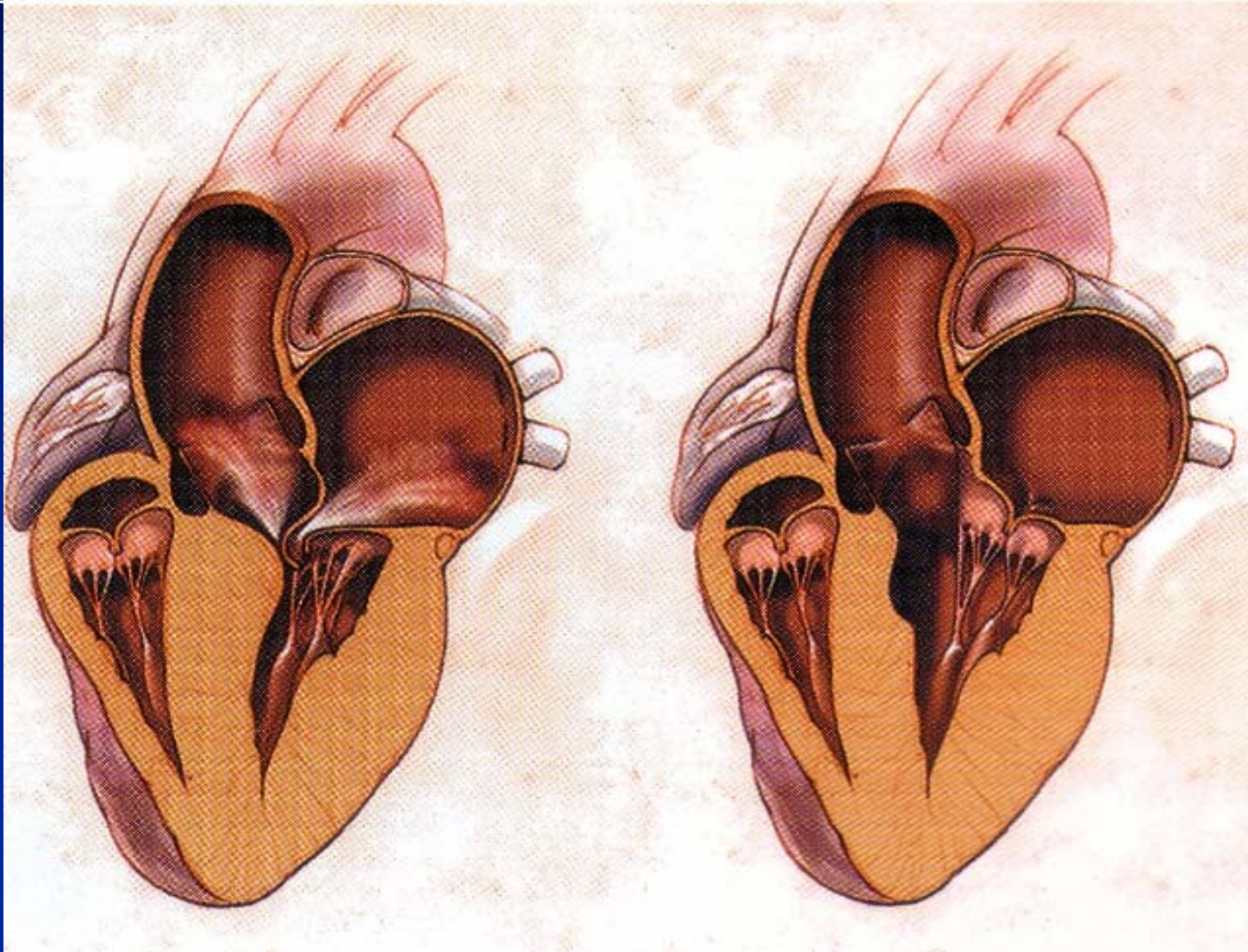


Myectomy



From: Braunwald

Non-Surgical Myocardial Reduction



Non-Surgical Myocardial Reduction

- Catheter Treatment of HOCM (NSMR):
 - Background:
 - Spontaneous septal infarction: improvement of symptoms



Non-Surgical Myocardial Reduction

- Catheter Treatment of HOCM (NSMR):
 - Background:
 - Spontaneous septal infarction: improvement of symptoms
 - Temporary occlusion of S1 results in LVOT gradient reduction (Sigwart 1983)



Non-Surgical Myocardial Reduction

- **Alcohol Ablation of HOCM (NSMR):**
 - 1st Clinical Experience (Sigwart 1994):
 - 3 patients with highly symptomatic HOCM resistant to drugs and DDD pacing
 - Catheter induced septal infarction (OH)
 - No complications
 - Dramatic symptomatic improvement (Lancet 1995)





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END DIASTOLE

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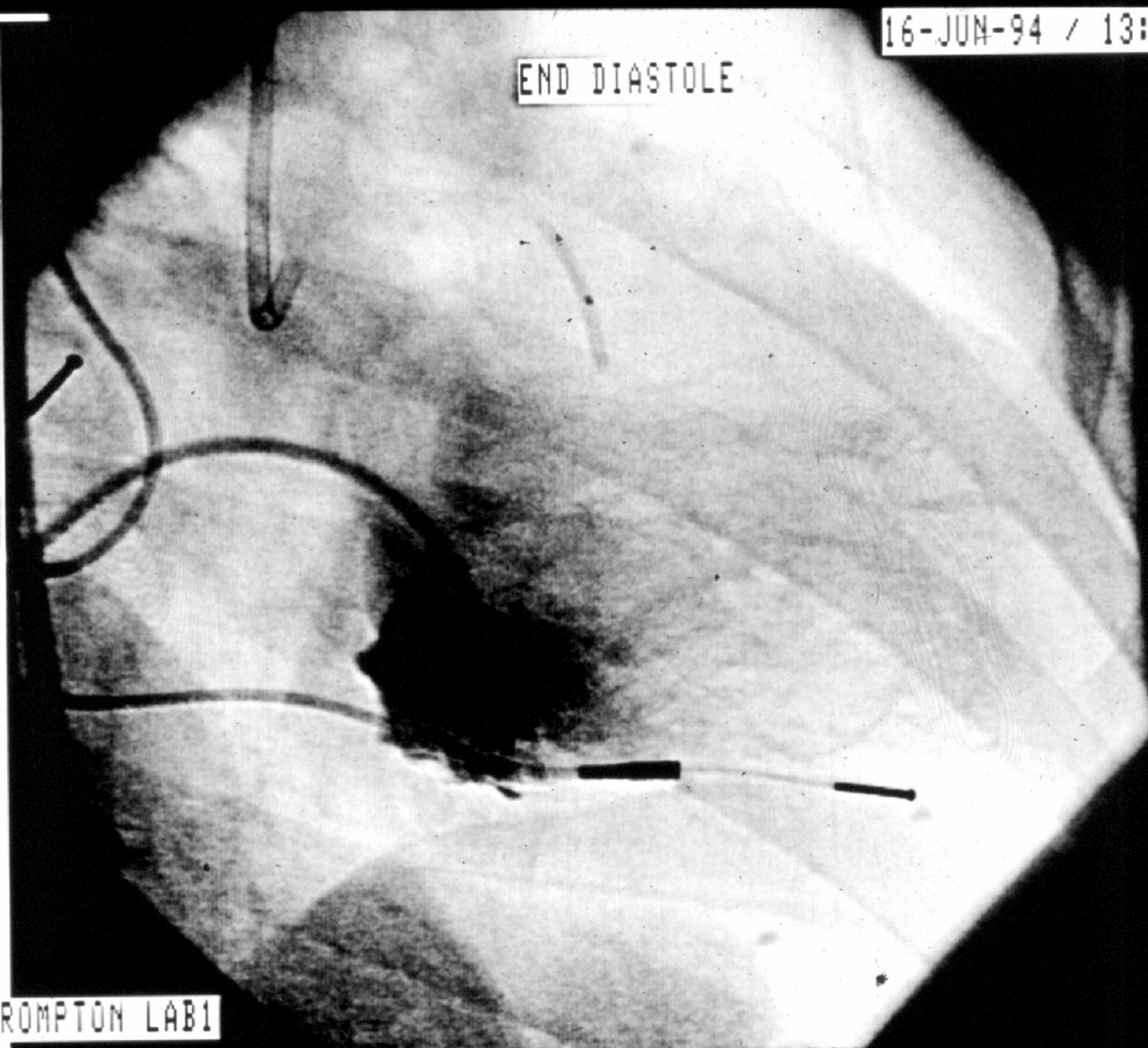
NS: 2A

IMAGE
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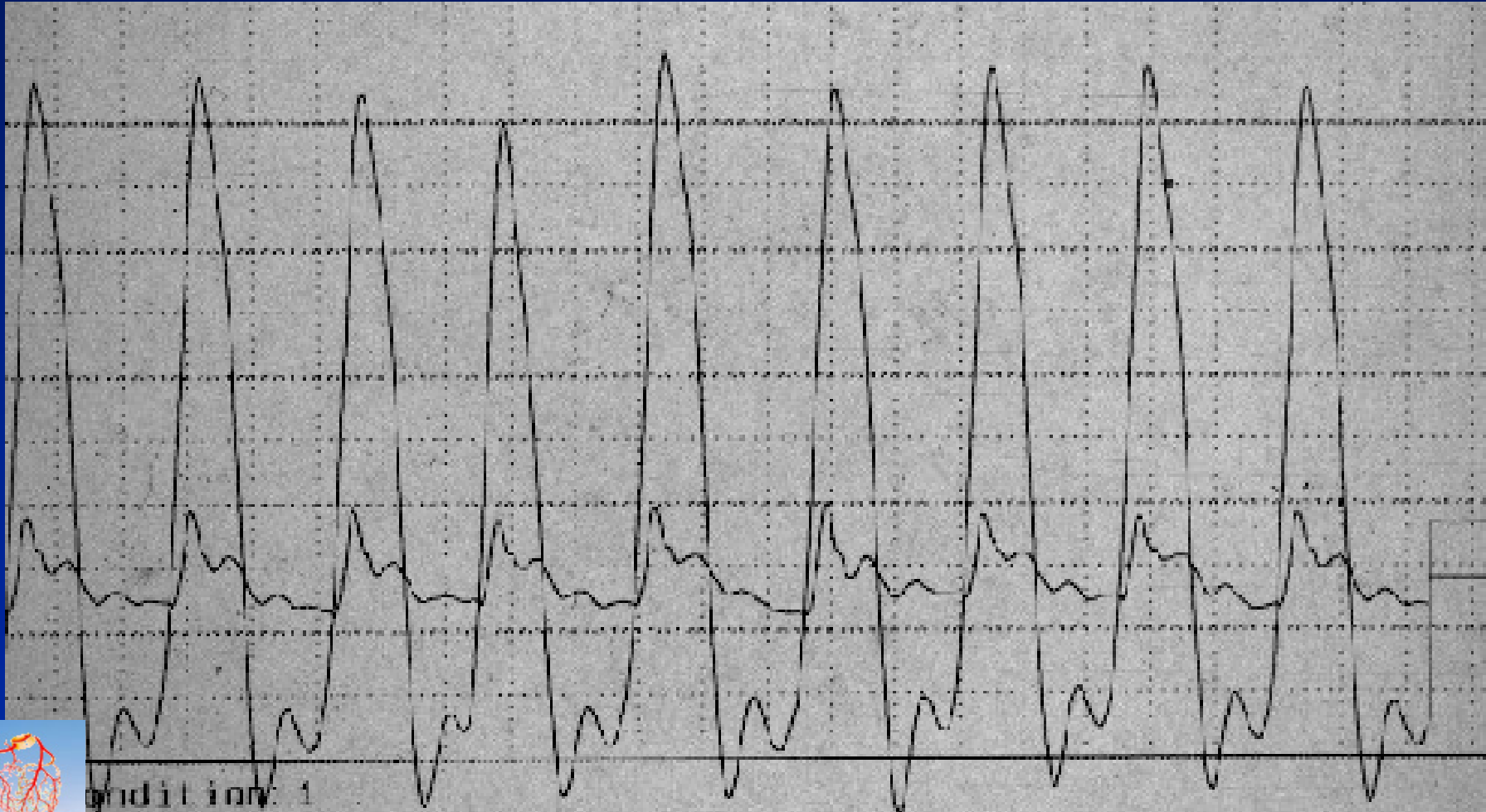
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US
ROYAL BROMPTON LAB1

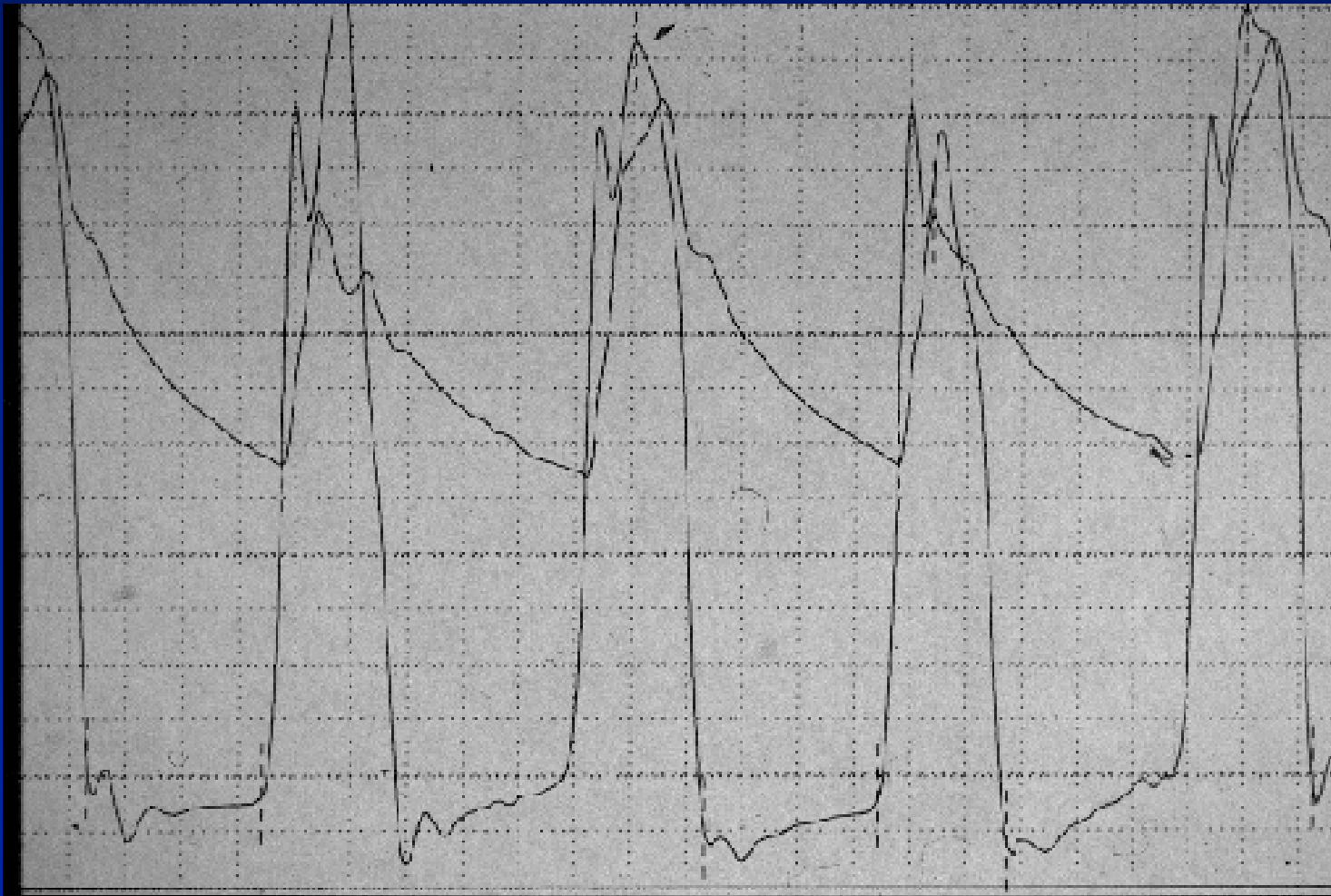
LV



Non-Surgical Myocardial Reduction



Non-Surgical Myocardial Reduction



Non-Surgical Myocardial Reduction

- **Inclusion Criteria:**

- Symptomatic HOCM with

- SAM
 - Septum thickness more than 18 mm
 - Resting gradient more than 30 mmHg
 - Provoked gradient more than 60 mmHg

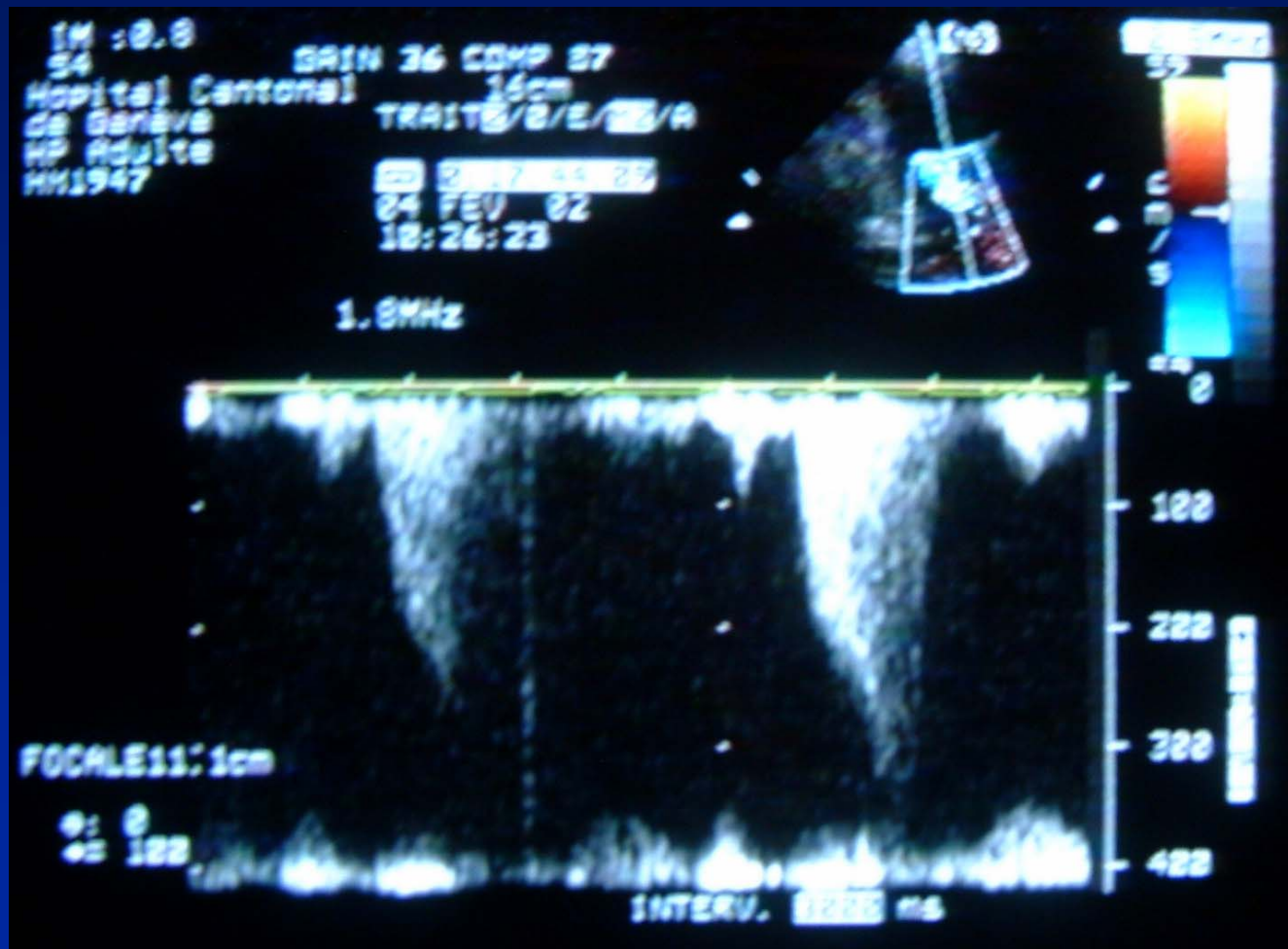


Non-Surgical Myocardial Reduction

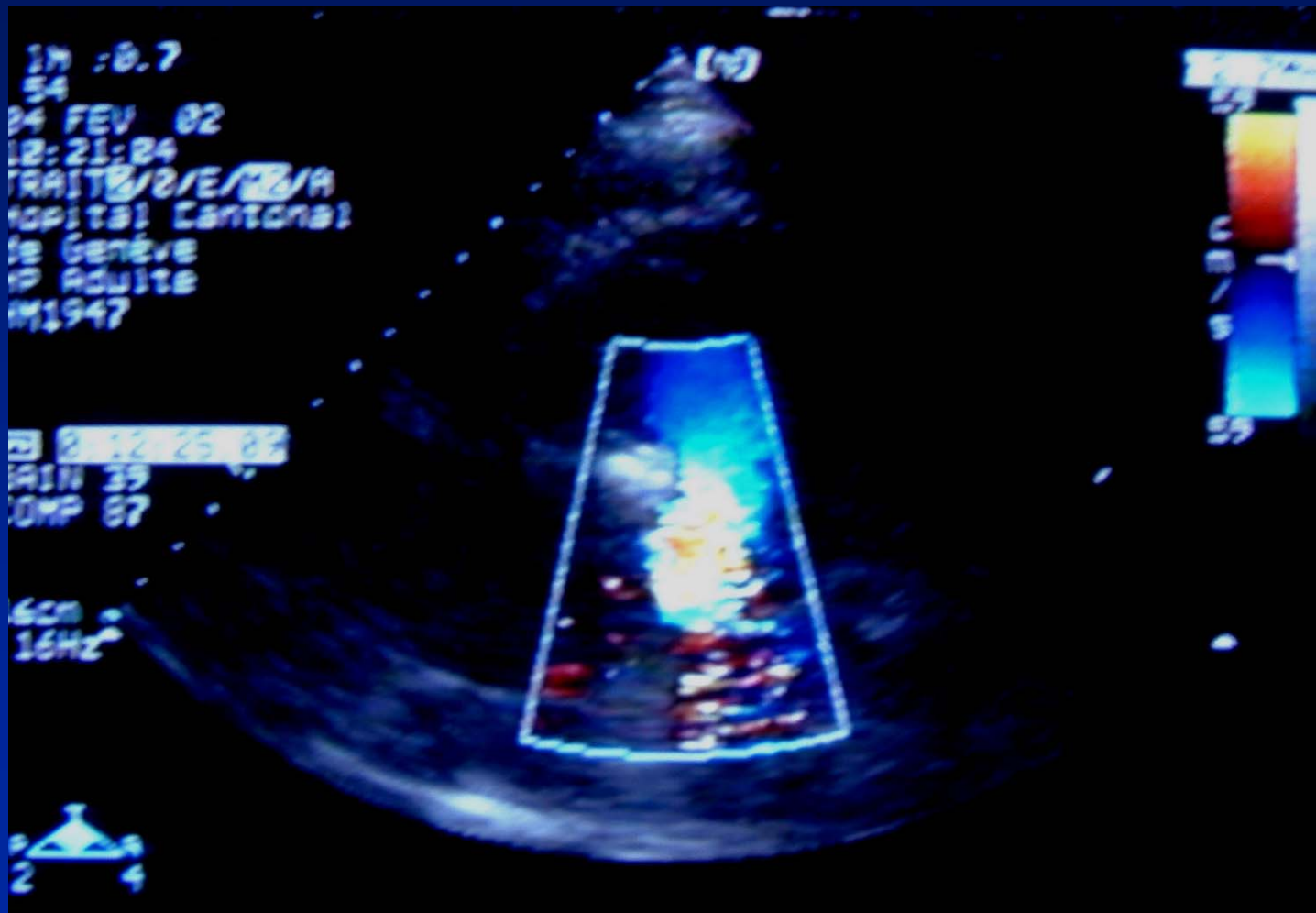
- **Procedural Details:**
 - Simultaneous pressures LV and Ao
 - PTCA guide F7 in LCA, PM in RV
 - Coaxial OTW balloon stable in S1 (evtl. S2,3)
 - ECHO: 1 to 2 ml contrast through balloon
 - Mild sedation and/or analgesia
 - 1 to 3 ml of absolute alcohol through balloon



NSMR in HOCM



NSMR in HOCM



Non-Surgical Myocardial Reduction

- Alternative ways under investigation:
 - Coil occlusion
 - Particle embolization



Non-Surgical Myocardial Reduction

- Results:

- Immediate gradient reduction
- Immediate symptom reduction
- Further gradient reduction over 1st three months
- Improvement of exercise capacity
- Reduction of SAM, MR, PAP & LVEDP



Non-Surgical Myocardial Reduction

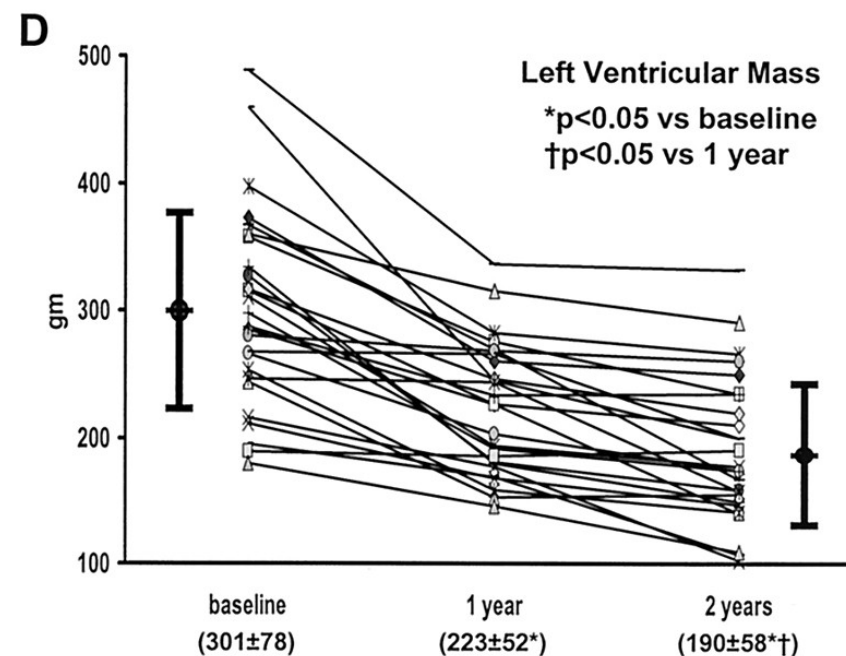
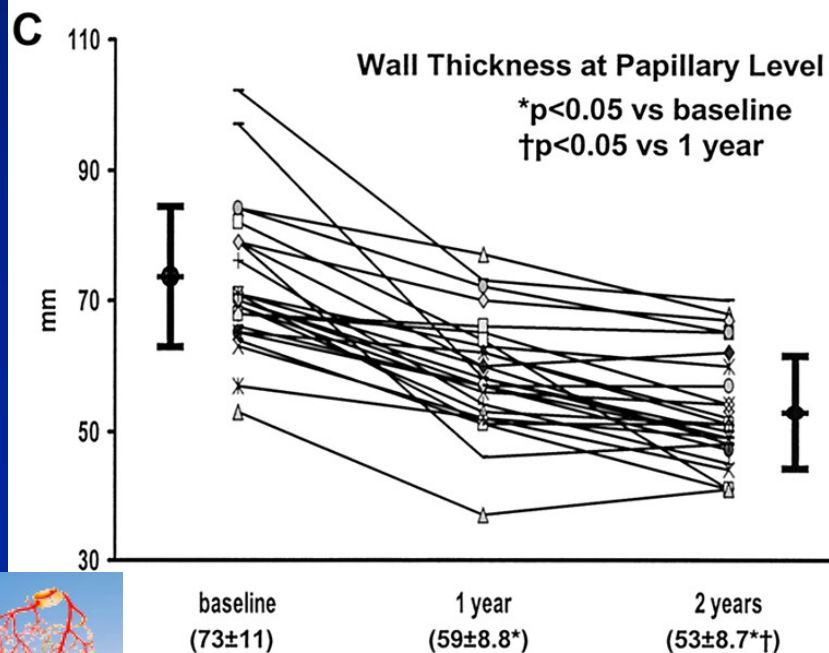
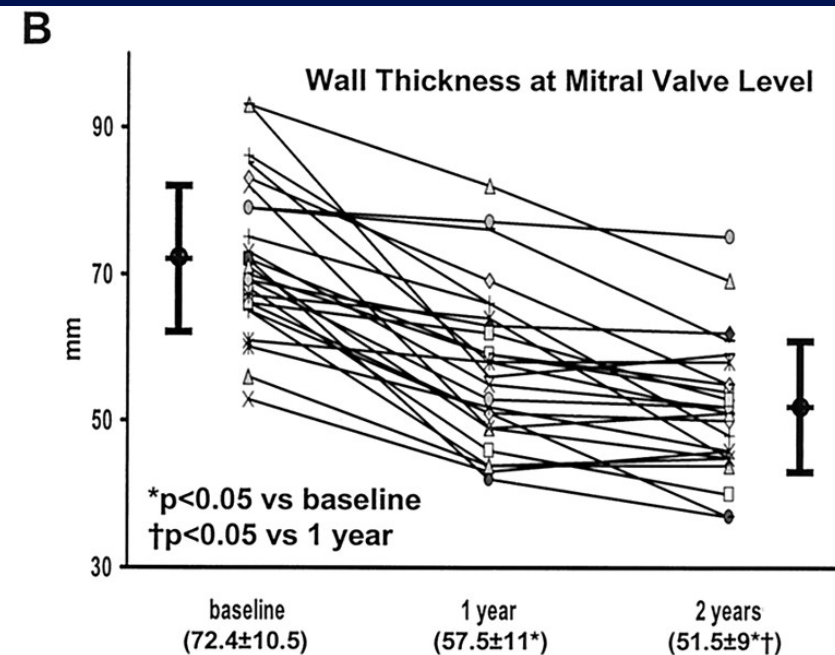
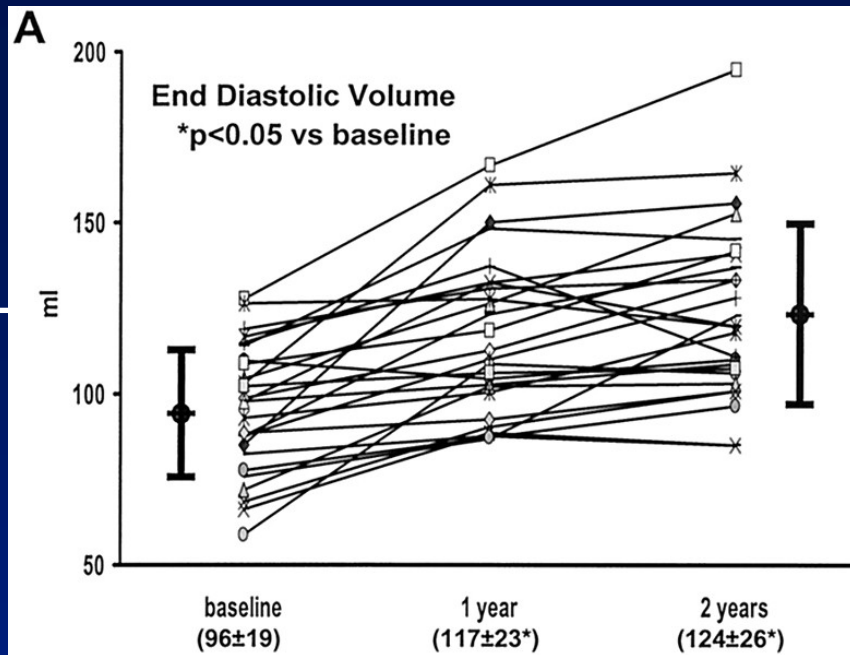
- **Baylor results (N= 213) up to 4 years FU:**
 - Number of septals 1.4+/-0.56
 - Peak CK elevation 1463+/-884
 - Permanent PM (total) 15%
 - Permanent PM (late series) 10%
 - Reduction of LVEF from 75 to 63 % over time



Non-Surgical Myocardial Reduction

- German regist.(N= 264) up to 6 years FU:
 - Number of septals 1.1+/-0.3
 - Peak CK elevation 482+/-264
 - Mortality 1.2%
 - Permanent PM 9.6%
 - Inst. resting gradient reduction 75%



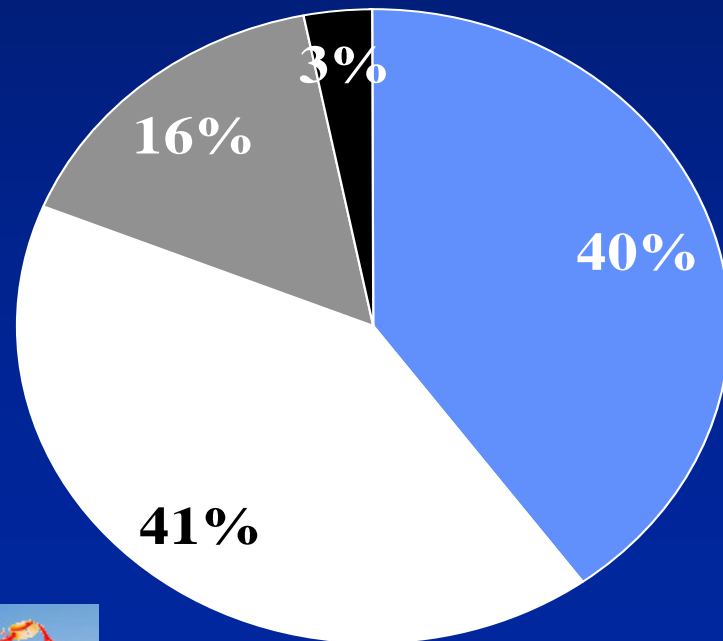


Septal Ablation in HOCM

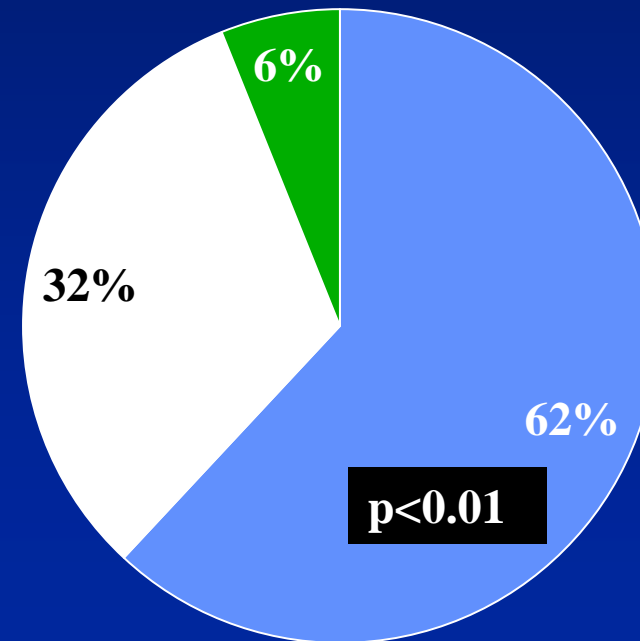
LVOT Gradient: Follow-Up vs. Baseline

■ Complete ■ >50% ■ 20 - 49% ■ No Change

3 Months vs. Acute Result

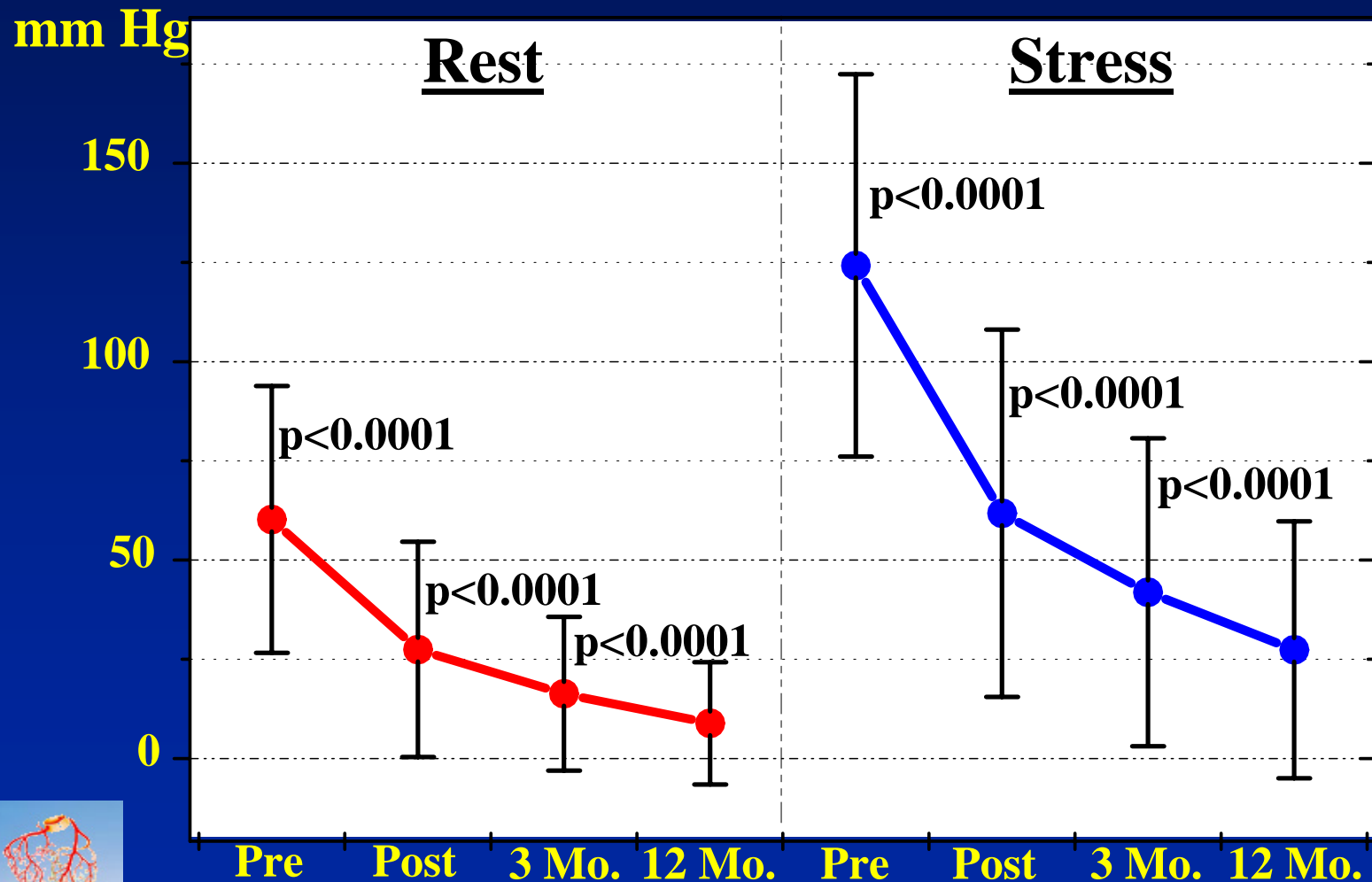


1 Year vs. 3 Months



H. Seggewiss et al, 49th Scientific Sessions ACC, 2000

Non-Surgical Myocardial Reduction



LVOTG



Catheter vs Surgery

- **No systematic, randomised comparison!**
 - Number of myectomies < 3000
 - Collected over 40 years and falling
 - Number of ablations < 3000
 - Collected over 9 years and rising

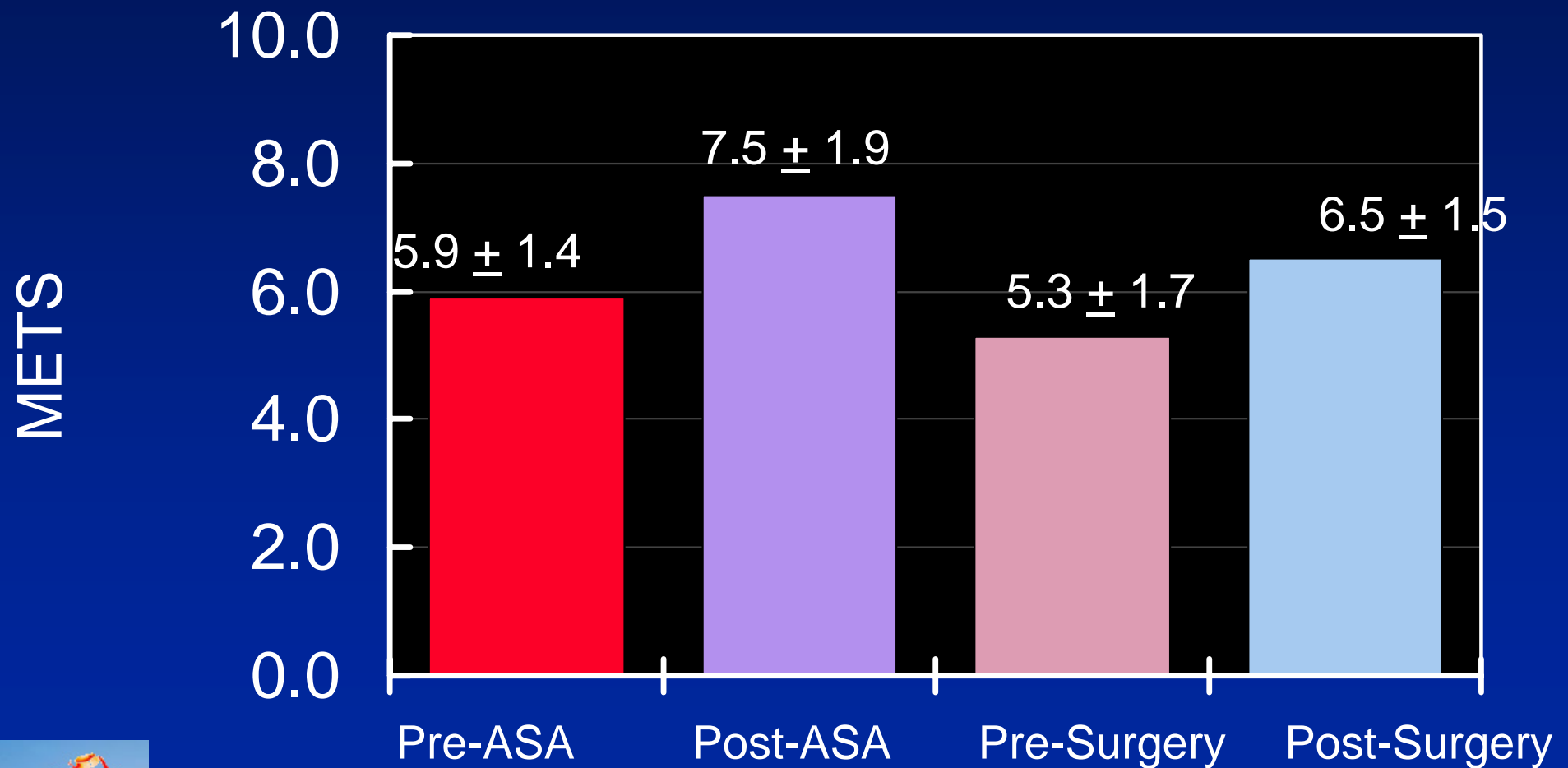


Catheter vs Surgery

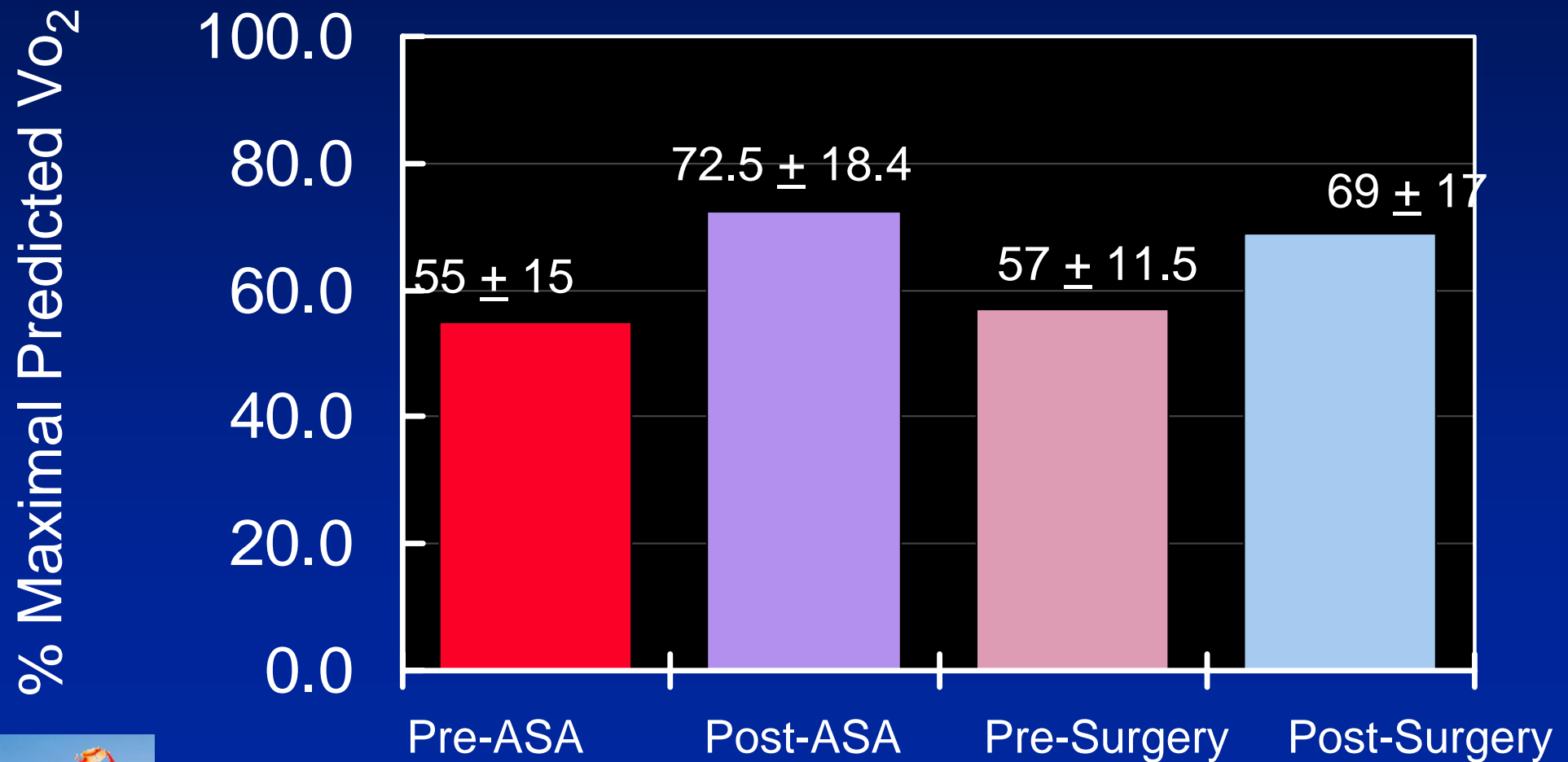
- Potential danger:
 - Surgical expertise may suffer from low volume
 - Catheter results may suffer from poor indication, dispersion and low volume per operator



CATHETER VERSUS SURGERY

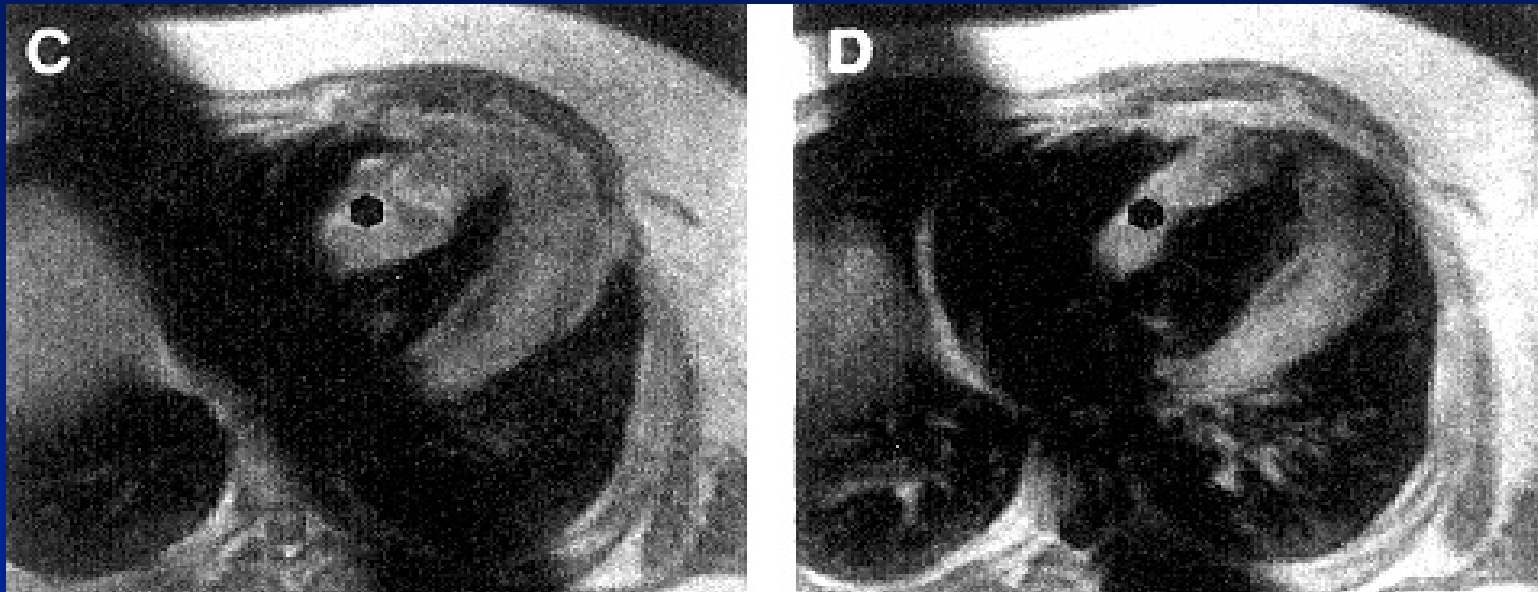


CATHETER VERSUS SURGERY



Septal Ablation in HOCM

Effect of Remodeling



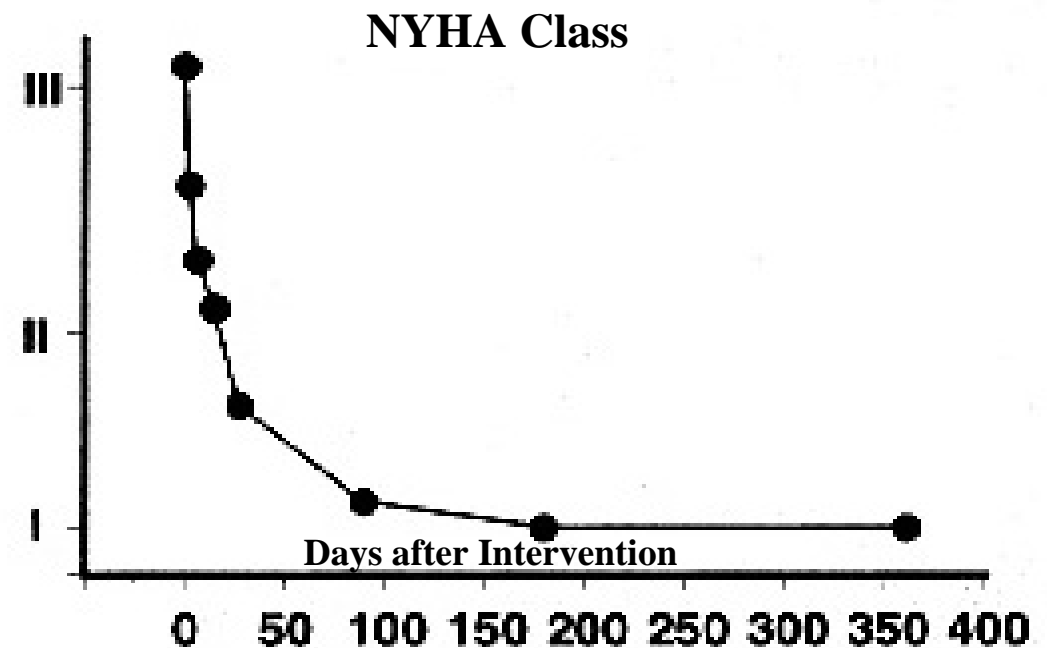
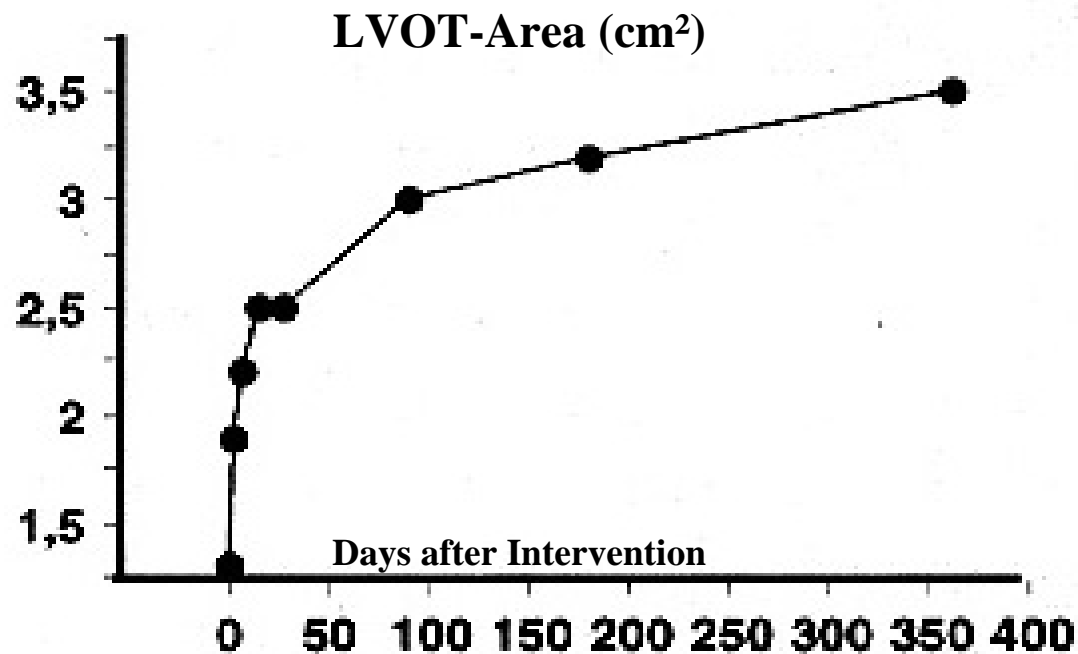
Baseline	N = 10	Follow-Up
24±2	IVS (mm)	19±1
15.1±2.1	LVPW (mm)	13.7±1.8

J. Schulz-Menger et al, Circulation 2000;101:1764-1766



Septal Ablation in HOCM

Effect of Remodeling



J. Schulz-Menger et al, Circulation 2000;101:1764-1766

Non-Surgical Myocardial Reduction

- **Complications:**

- Pain, mild to moderate, short duration
- Ventricular arrhythmia & ECG changes
- AV block, temporary or permanent
- OH spills, no re-flow, coronary dissection, pericardial tamponade, death

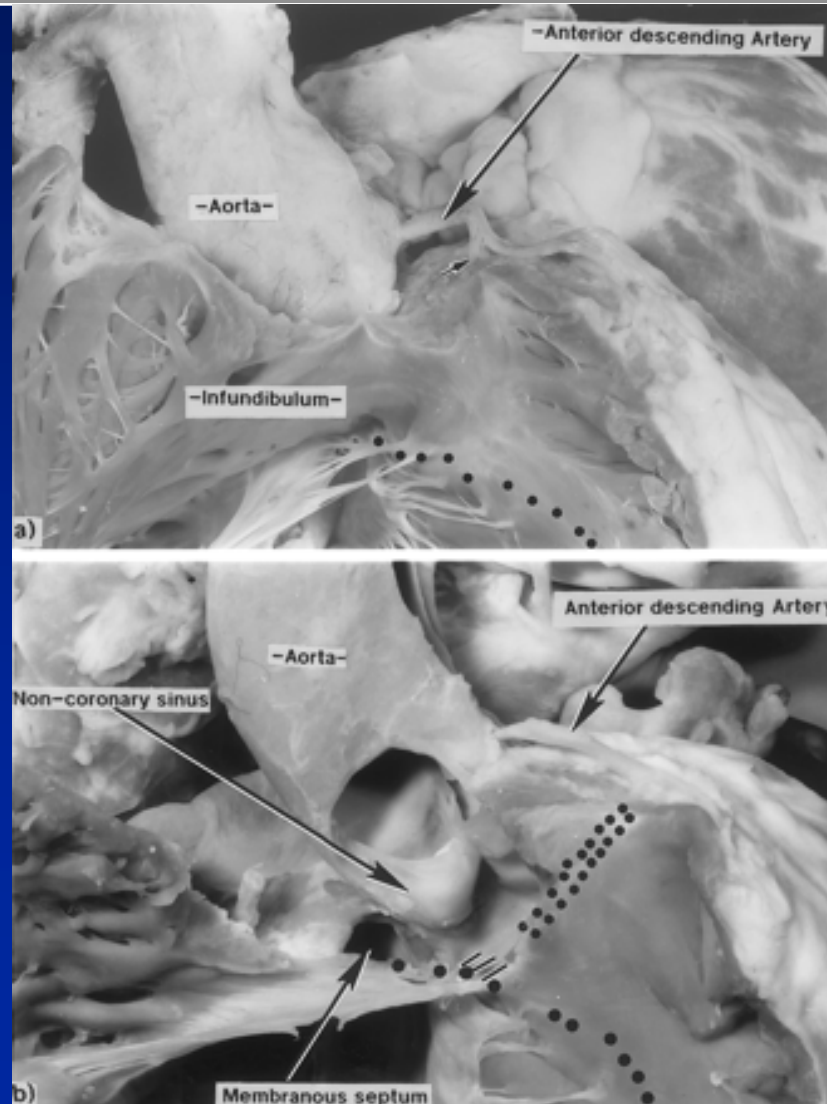


Non-Surgical Myocardial Reduction

- Complications:
 - AV block

Sigwart et al.

Circulation. 1998;98:377-378



Non-Surgical Myocardial Reduction

- Patient information:

- Alternative options: yes / no
- Procedural success: +/- 90%
- Mortality: +/- 1%
- Transient AV block: +/- 30%
- Permanent AV block: +/- 10%

- Limited *very long term* experience



Non-Surgical Myocardial Reduction

- Long Term (<9Y) Outcome:
 - Sustained clinical improvement



Non-Surgical Myocardial Reduction

- Long Term (<9Y) Outcome:
 - Sustained clinical improvement
 - Sustained gradient reduction



Non-Surgical Myocardial Reduction

- Long Term (<9Y) Outcome:
 - Sustained clinical improvement
 - Sustained gradient reduction
 - No apparent new arrhythmia



Non-Surgical Myocardial Reduction

- Long Term (<9Y) Outcome:
 - Sustained clinical improvement
 - Sustained gradient reduction
 - No apparent new arrhythmia
 - LV remodelling with minor augmentation of left ventricular cavity size



Non-Surgical Myocardial Reduction

- Conclusion:
 - NSMR is effective in short and long term



Non-Surgical Myocardial Reduction

- **Conclusion:**

- NSMR is effective in short and long term
- relieves symptoms and gradients in HOCM



Non-Surgical Myocardial Reduction

- **Conclusion:**

- NSMR is effective in short and long term
- relieves symptoms and gradients in HOCM
- does not produce unwanted LV dilatation



Non-Surgical Myocardial Reduction

- **Conclusion:**

- NSMR is effective in short and long term
- relieves symptoms and gradients in HOCM
- does not produce unwanted LV dilatation
- appears more effective than DDD pacing and maybe as effective as surgery in many patients

