Hypertrophic
Cardio
Myopathy

1859 **H. LIOUVILLE**


Prospectus.

Gazette Médicale

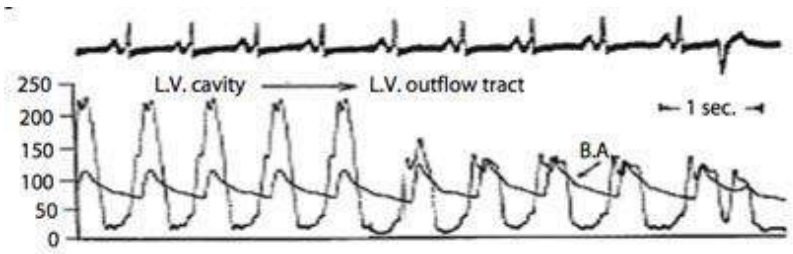
DE PARIS,

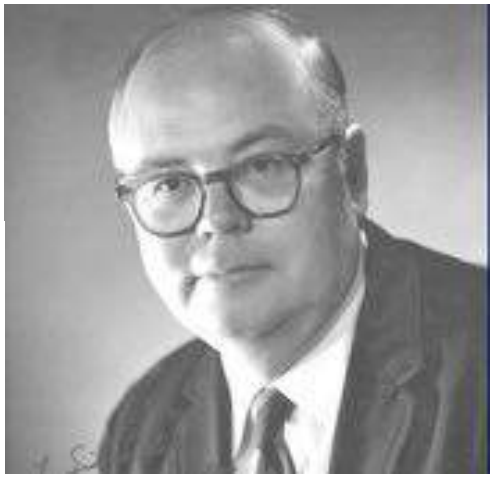
Journal de Médecine et des Sciences accessoires,

1959

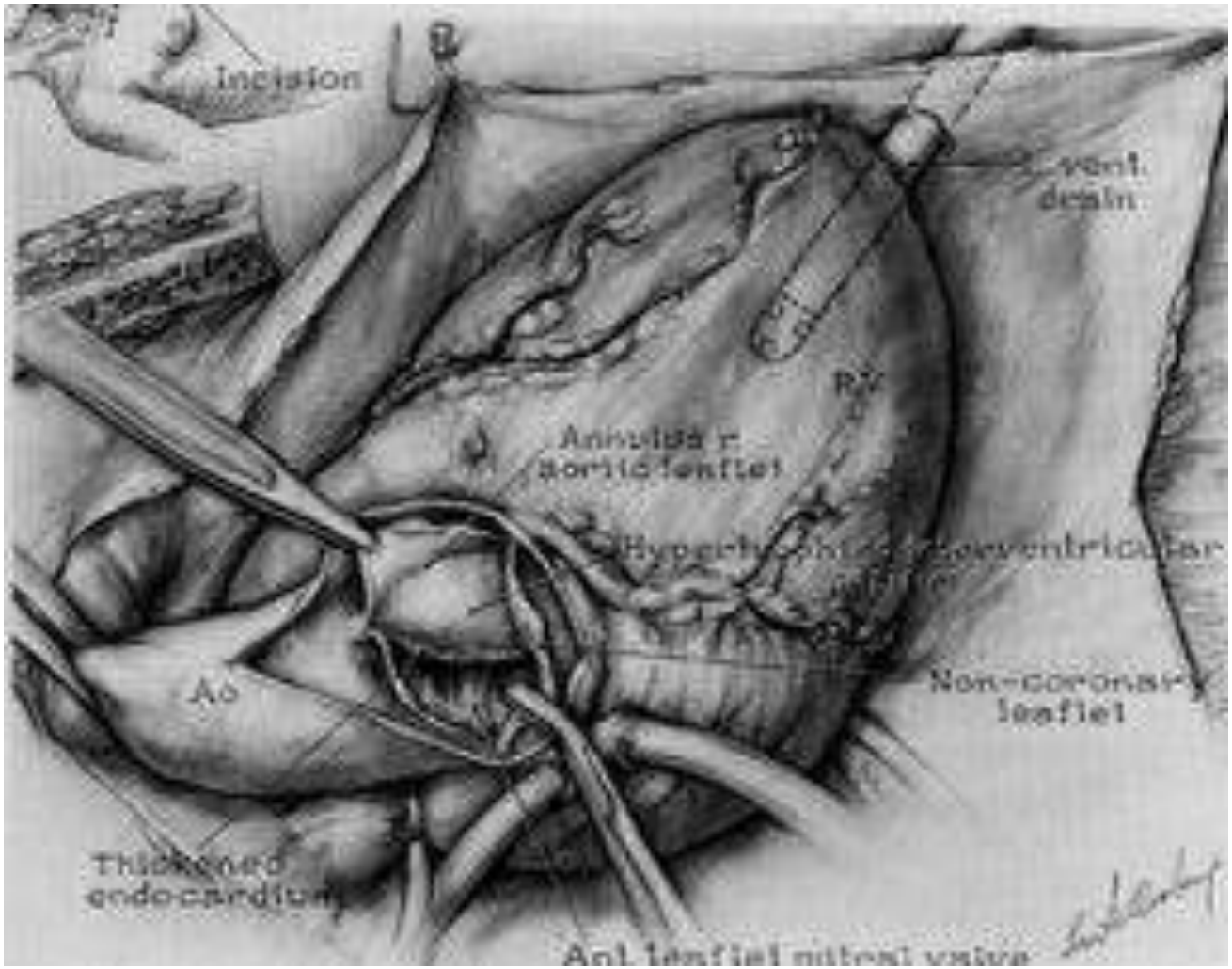
"And he said to me, you must have made a mistake. I left the operating room very humbled."

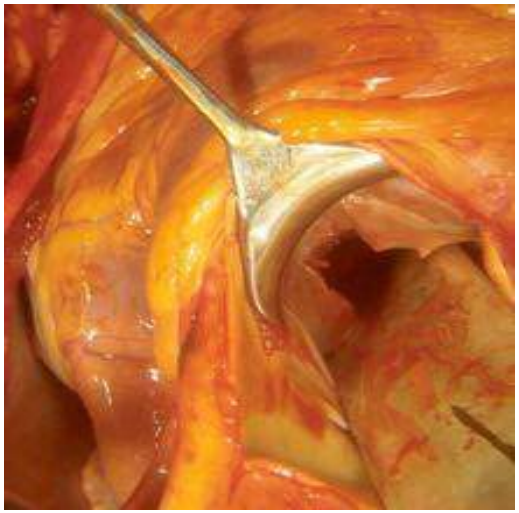

Eugene Braunwald




Andrew G. Morrow

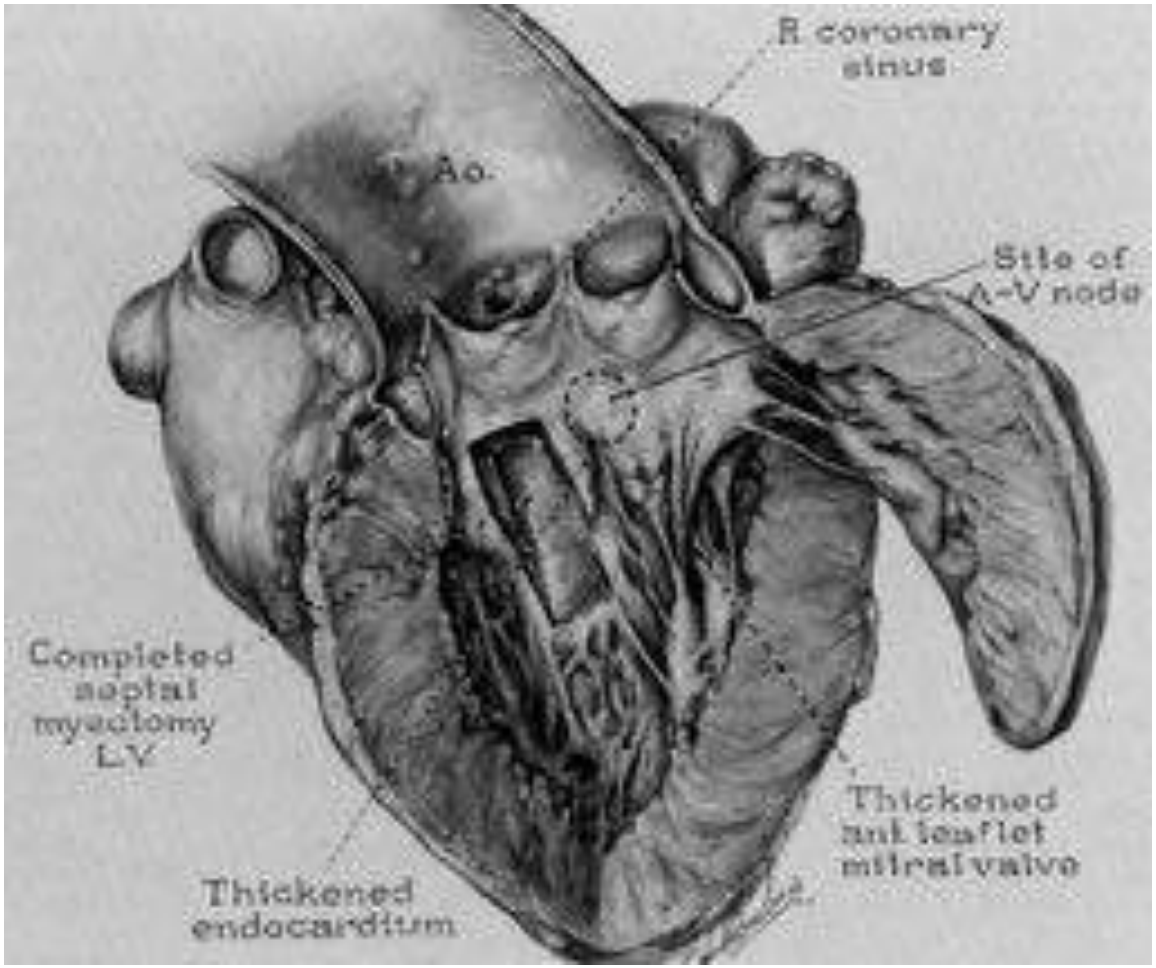
Morrow Procedure (Sixties)



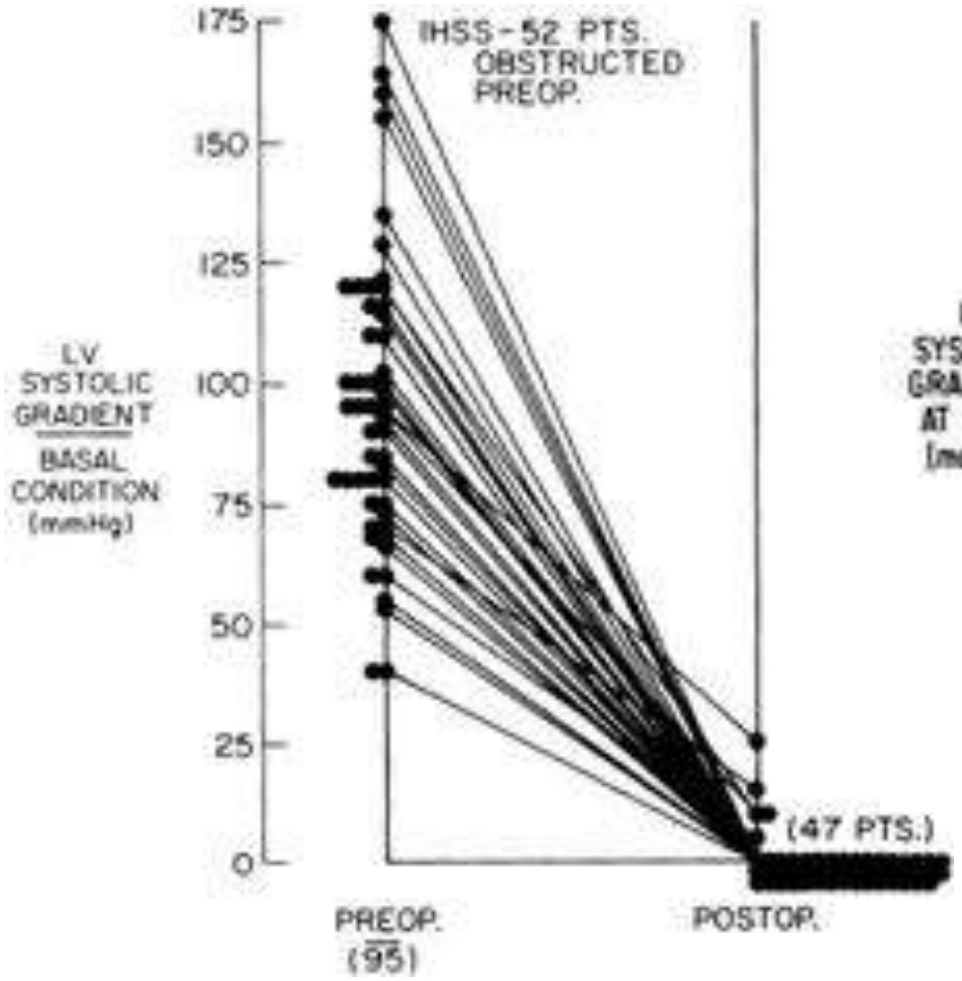


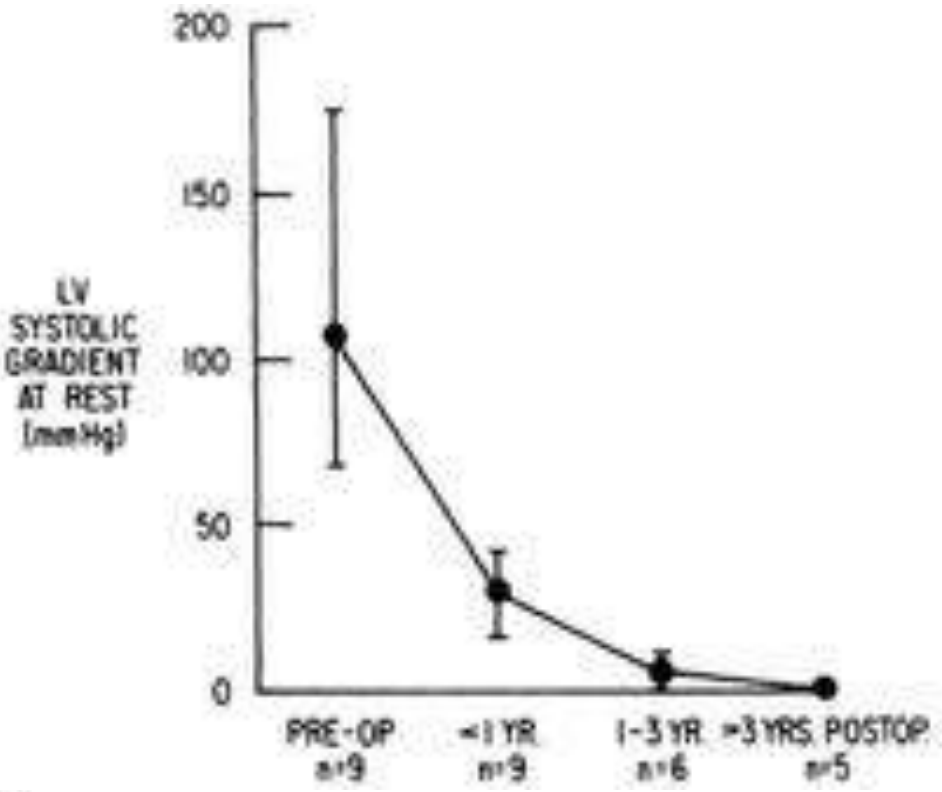
Morrow Procedure (Sixties)

« the incisions are made quite close to the seat of the soul »

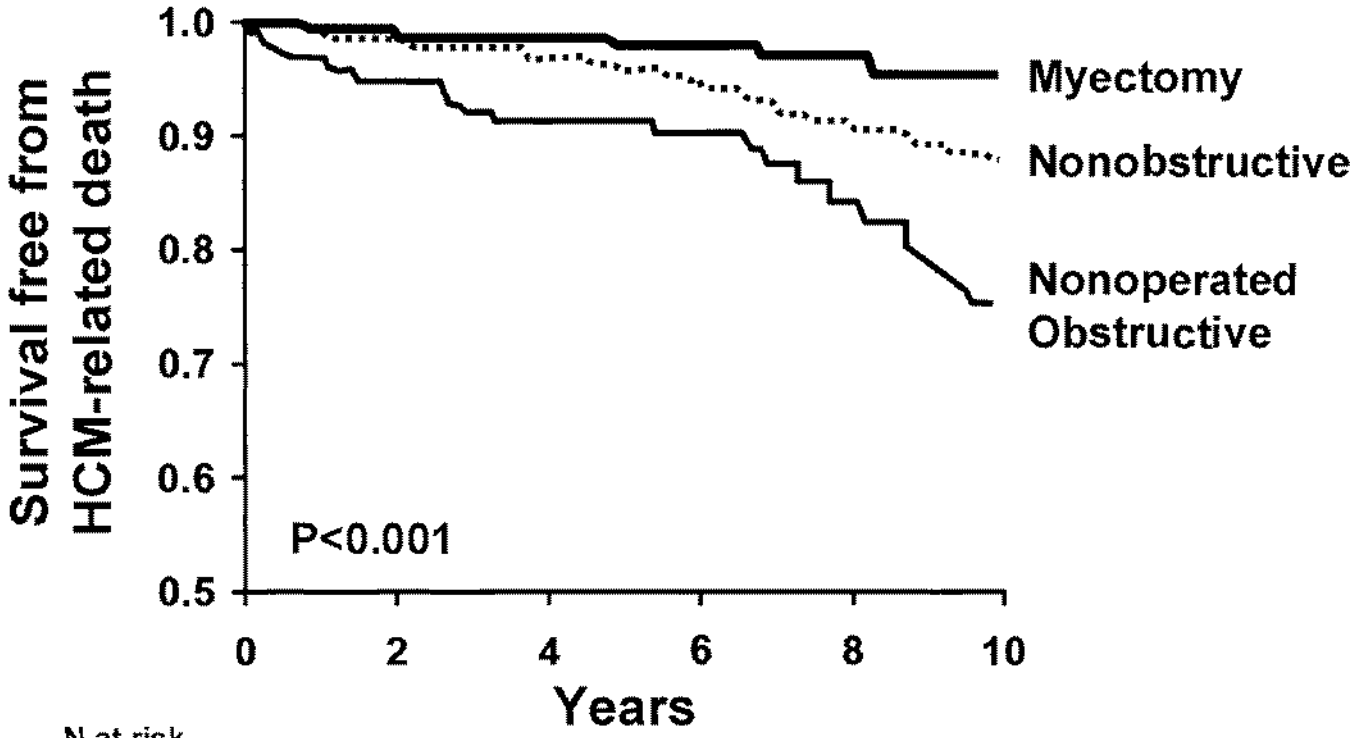


Morrow Procedure (Results)





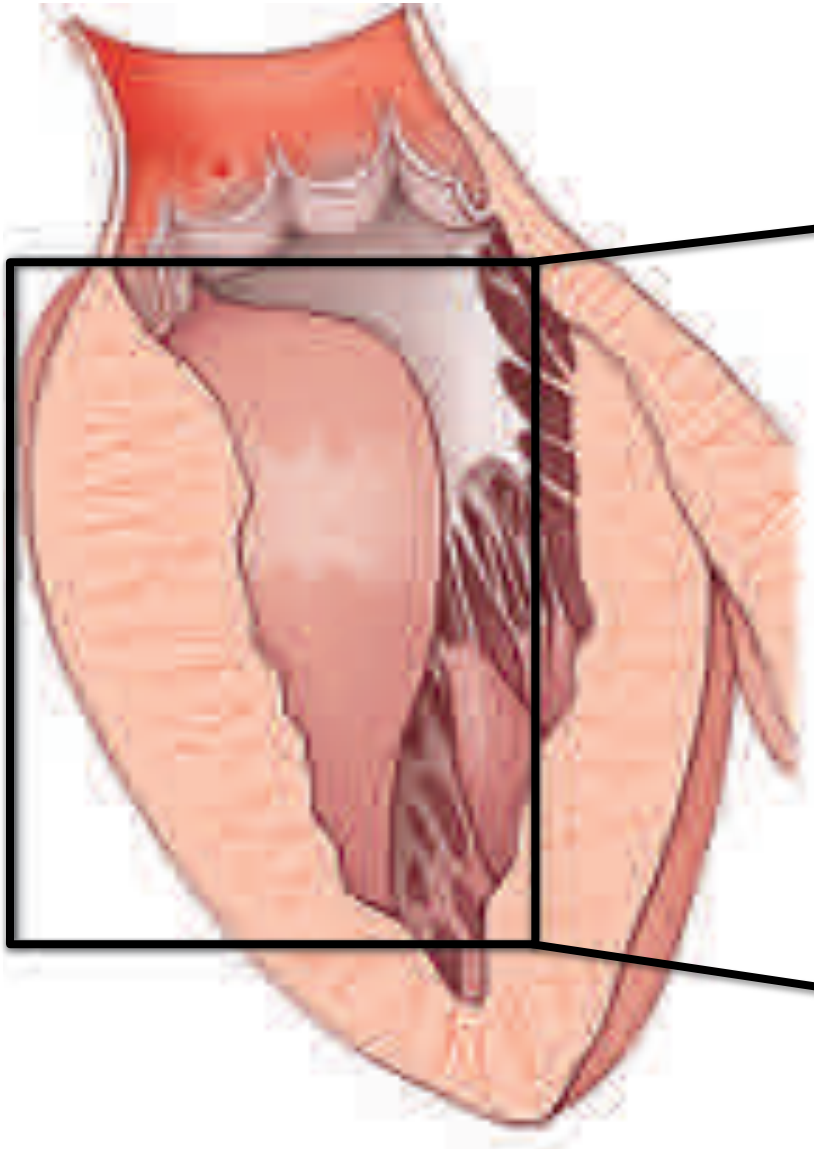
Mayo Clinic : Survival in three subgroups of patients with hypertrophic cardiomyopathy: obstructive with surgical myectomy (*n* = 289), obstructive without surgical myectomy (*n* = 228), and nonobstructive (*n* = 820)



N at risk						
Myectomy	289	249	179	108	66	39
Nonobstructive	820	587	490	355	244	201
Nonoperated obstructive	228	146	106	69	42	28

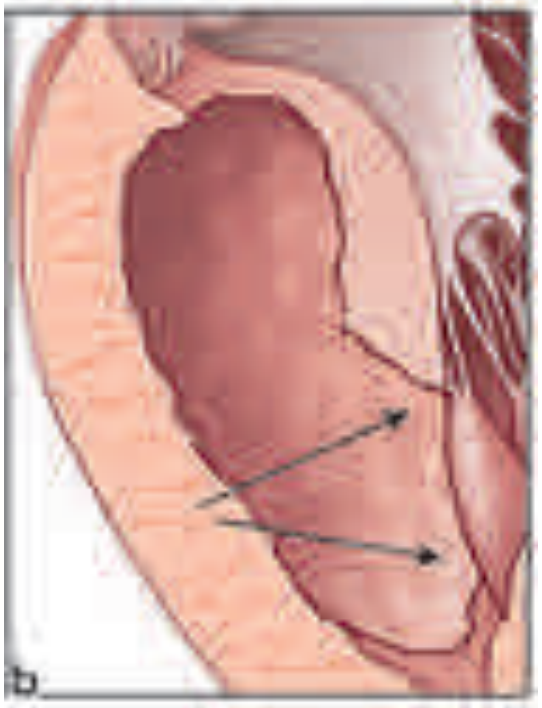
"Ommen SR et al. (2005) J Am Coll Cardiol 46: 470–476"

MORROW ➔ ***« the incisions are made quite close to the seat of the soul. »***



Original Morrow

Enlarged Morrow



Myectomy Guidelines

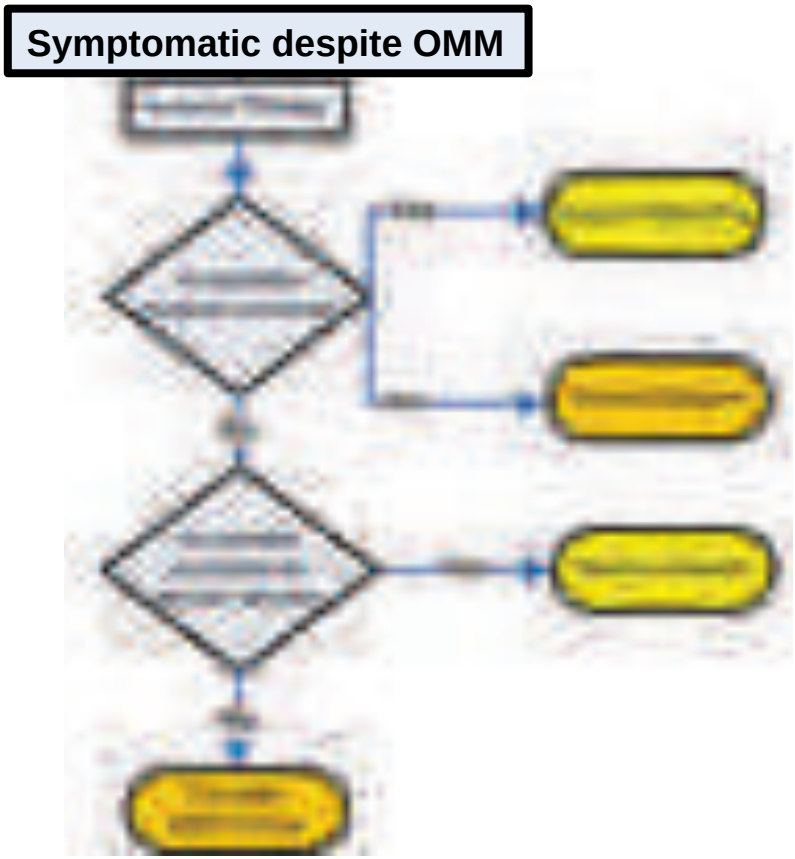
NYHA III / IV under OMM
+ gradient ≥ 50 mmHg (at rest or during stress)
+ Septum > 18 mm

- **Postop Mortality : 2%**
- **Complications**
  - **IAR, IVC**
  - **AV block**
- **Advantage ➔ Mitral correction**

Guidelines

Guidelines on the, diagnosis, and treatment of HCM

Heart team Concertation



"ACC/AHA Guidelines - 2011 »

1) **<u>Surgery</u> ➔ Young / MVR**
2) **Alcoolisation ➔ Suitable Septal / + 50 ans**
3) **Resynchr. ➔ More diffuse CMH Large QRS**

Randomized Studies

Is septal ablation preferable to surgical myomectomy for obstructive hypertrophic cardiomyopathy?

Barry J. Maron *Circulation. 2007*

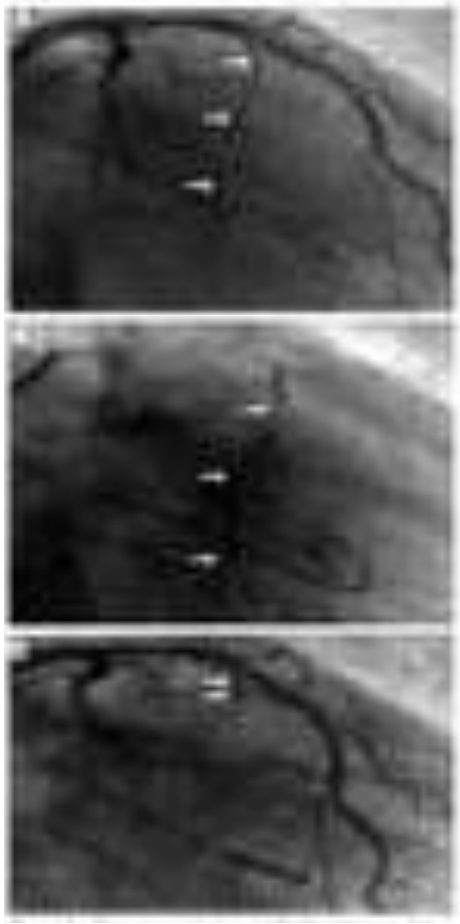
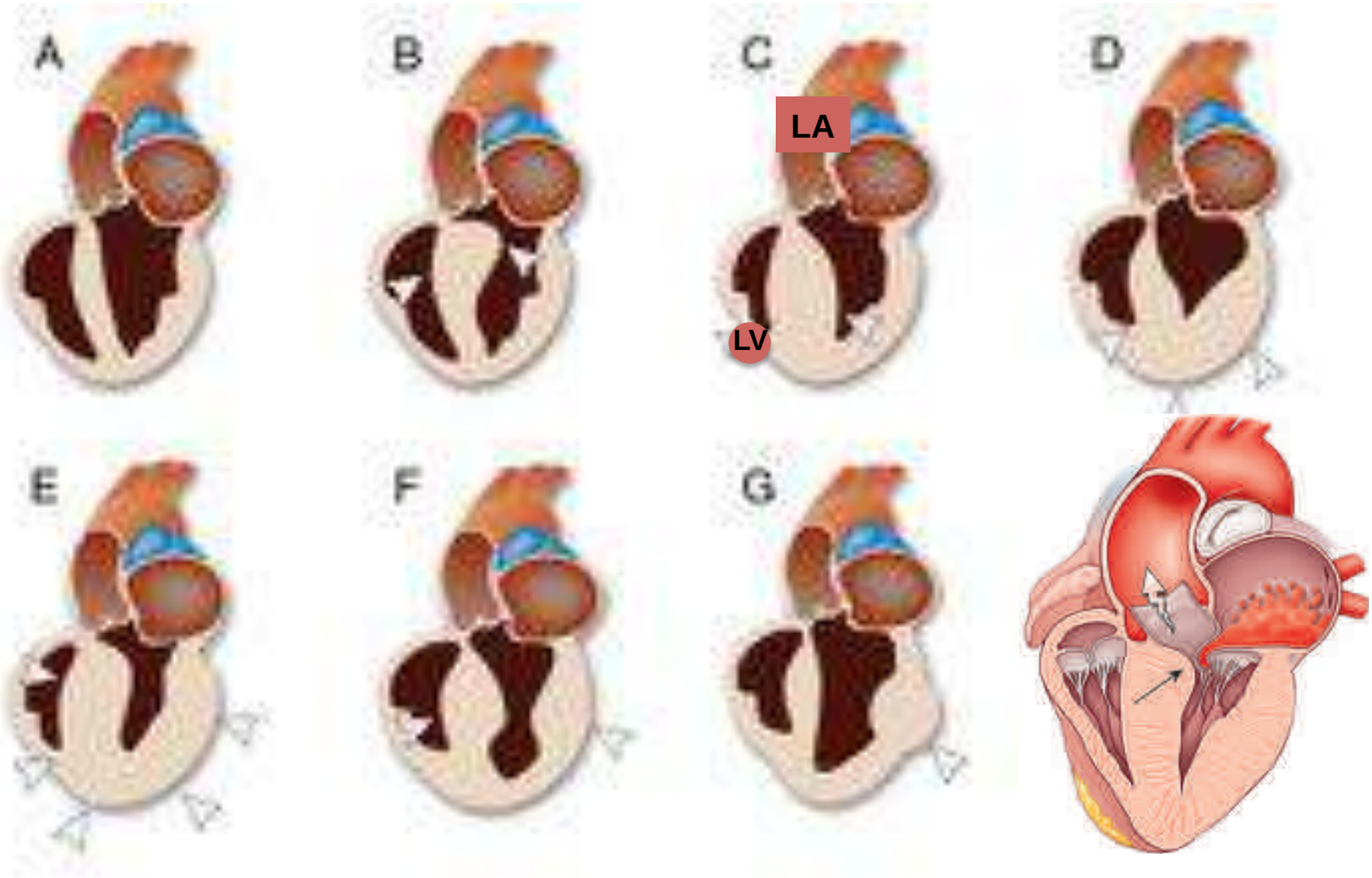


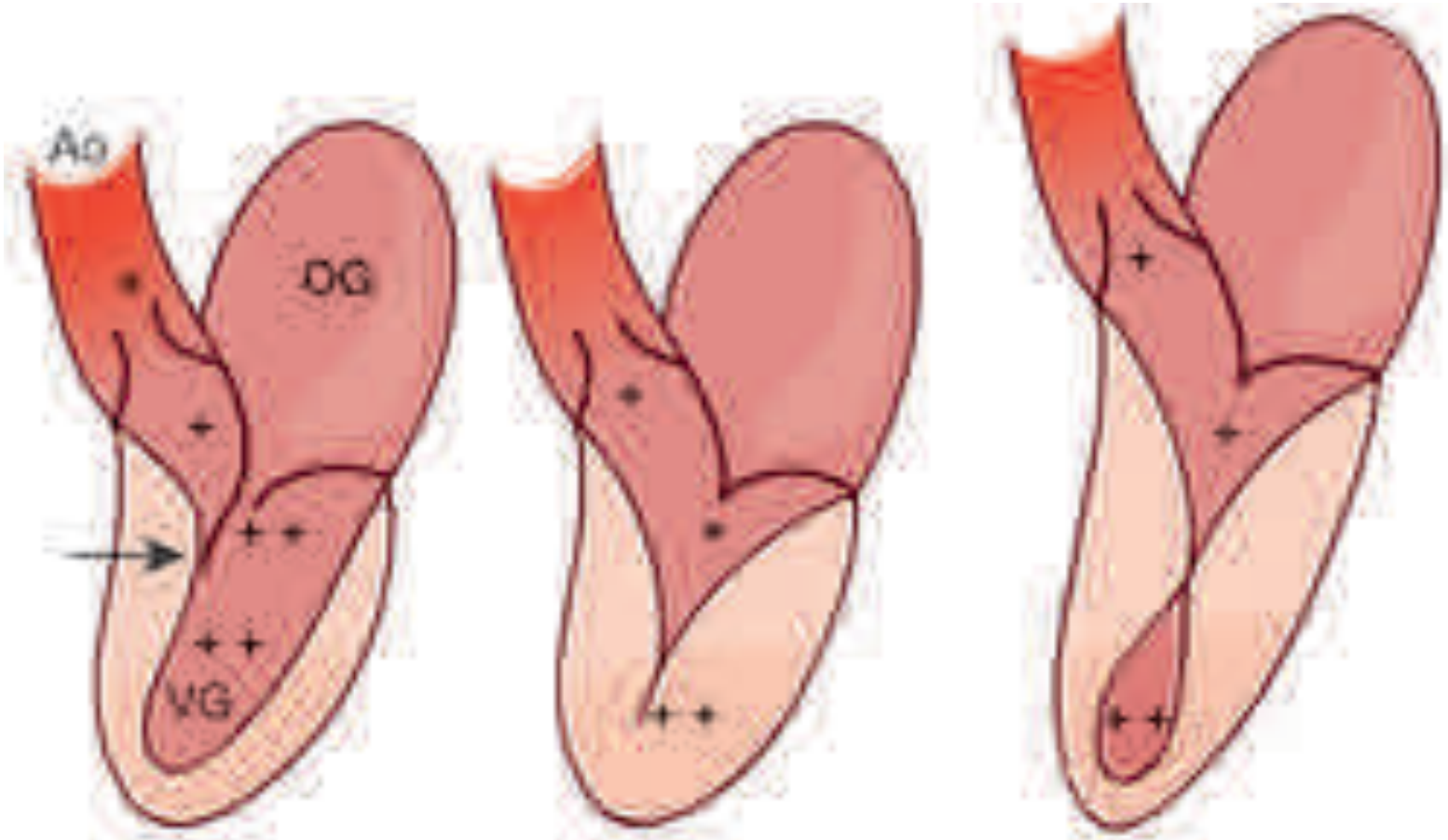
TABLE 2. Advantages and Disadvantages of Alcohol Septal Ablation

Advantages	Disadvantages
Percutaneous technique (does not require surgeon, cardiopulmonary bypass, or open heart operation)	Procedural mortality not insignificant
Short in-hospital stay	Produces large, transmural infarct with arrhythmogenic potential and possible increased sudden death risk
	Inflexible; confined to anatomic distribution of septal perforator artery, cannot be tailored to complex LVOT anatomy
	Not infrequently associated with CHB requiring permanent pacemaker
	Defibrillator implantation not uncommon because of heightened sudden death risk
	Not infrequently requires repeated interventions
	Relief of gradient not immediate, requiring several weeks to fully evolve
	Often ineffective in patients with highest gradients

HCM : multiple disease



HCM : multiple disease

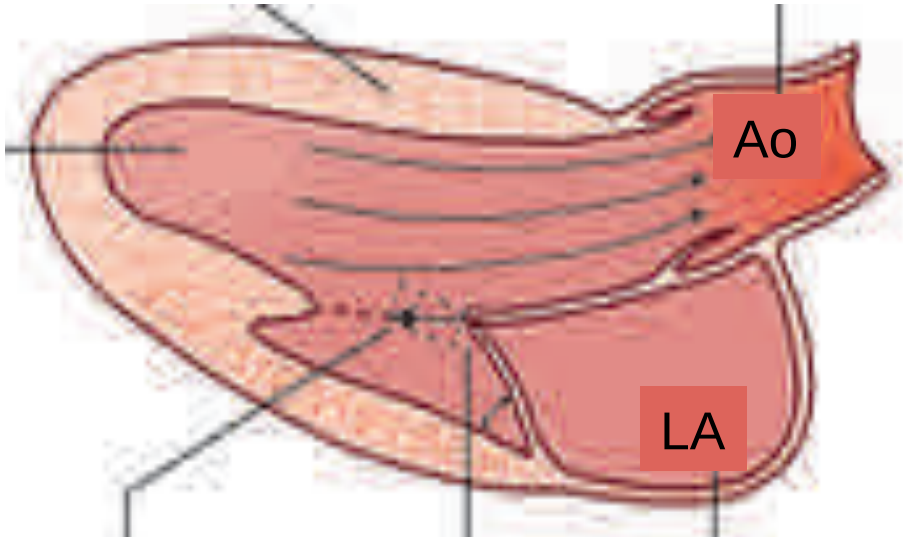


Sub-aortic Obstruction

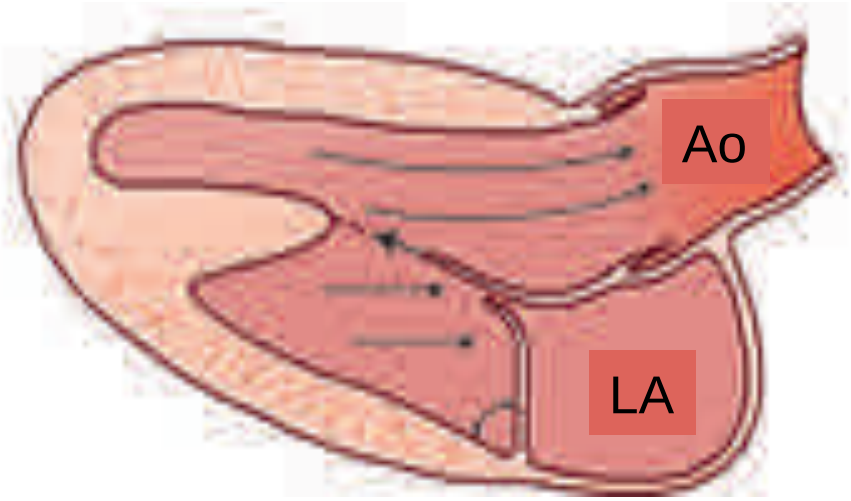
Apical Disease

Medio-ventricular Obstruction

HCM : multiple disease



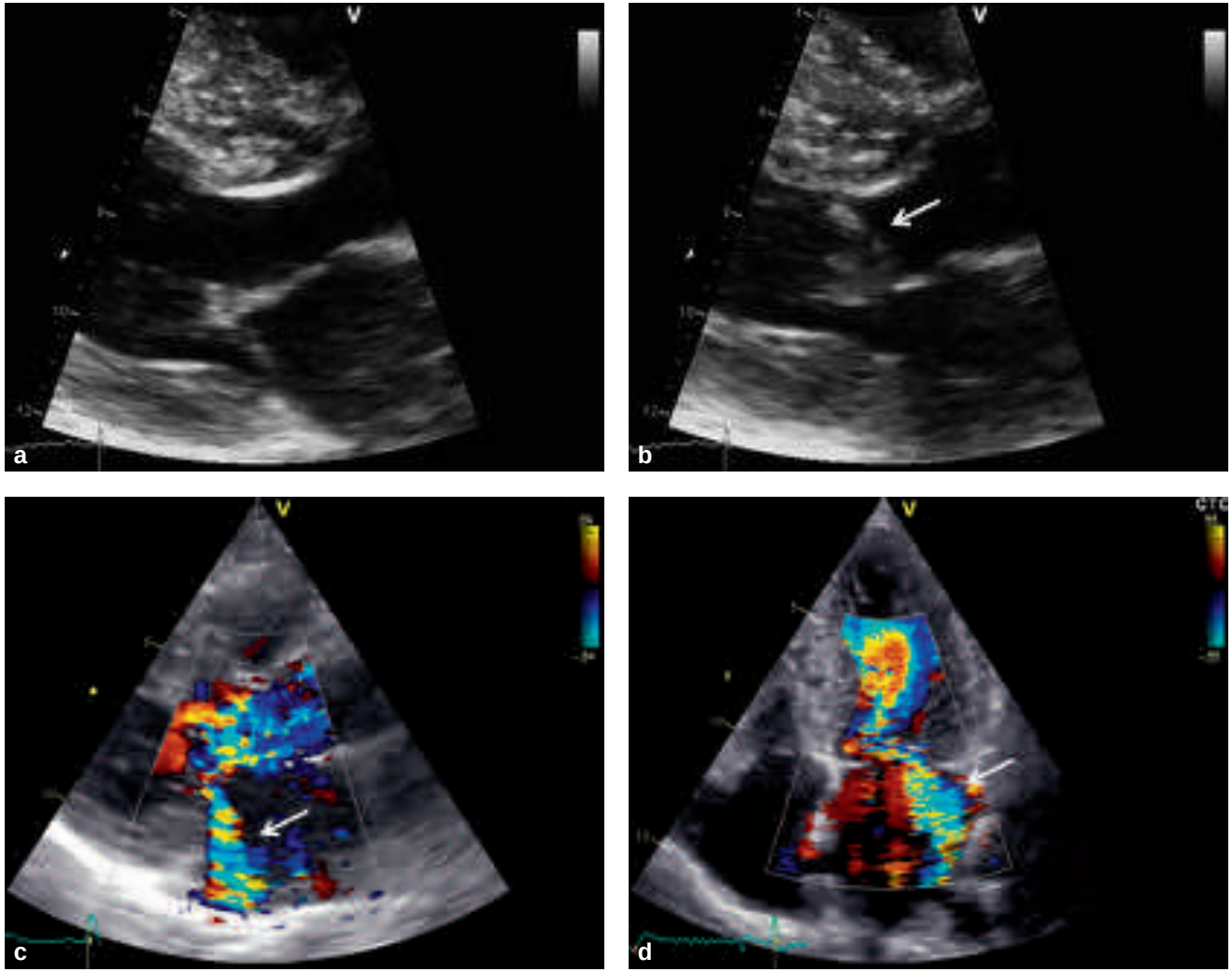
Normal Motion



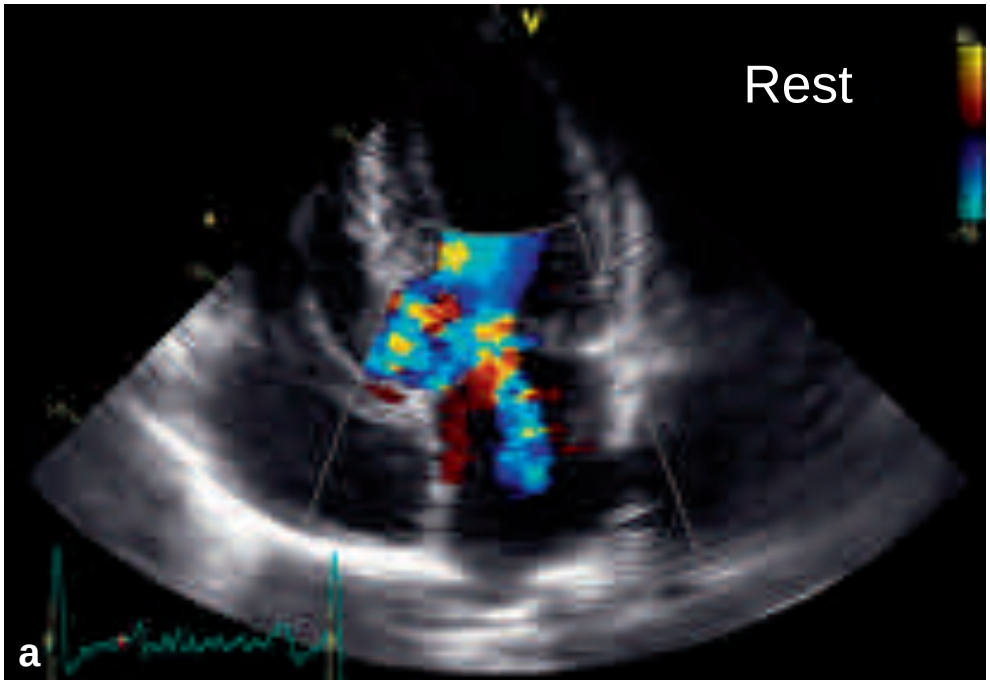
Ant PM Displacement

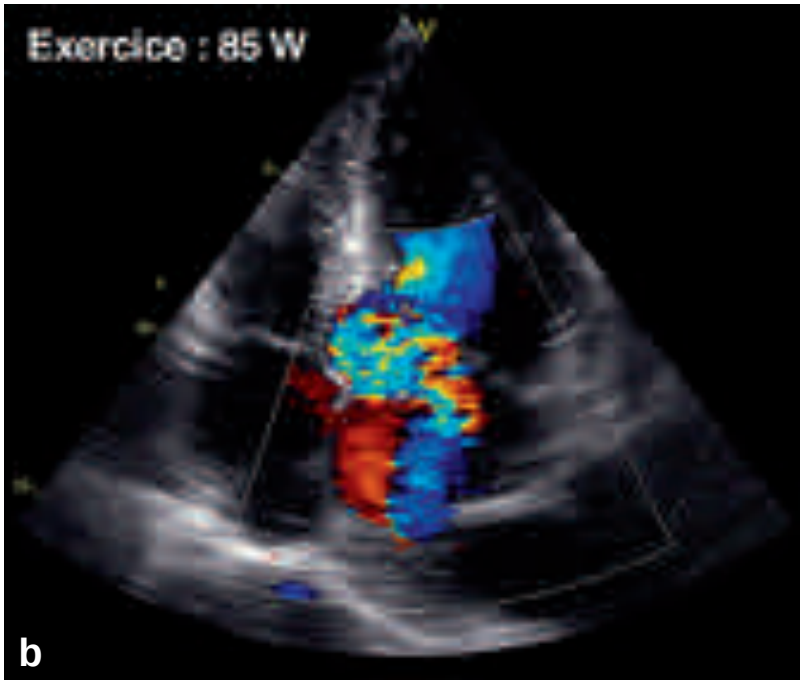
Prevalence : almost all HCM have a trivial MR
10 % significant MR
1/3 of surgical series
- 90 % functional
- 10 % organic

HCM : MR quantification



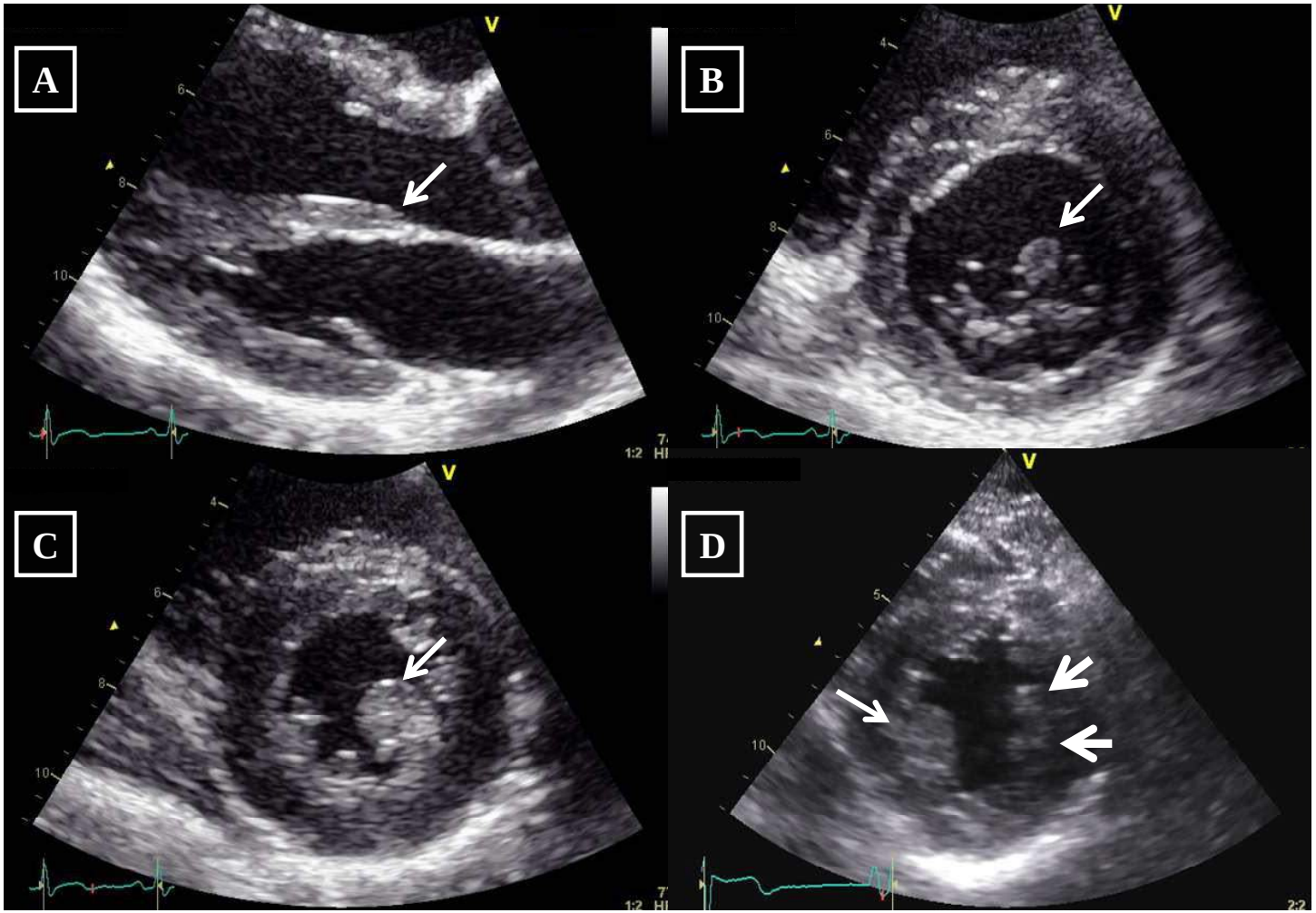
MR in HCM: Difficult quantification



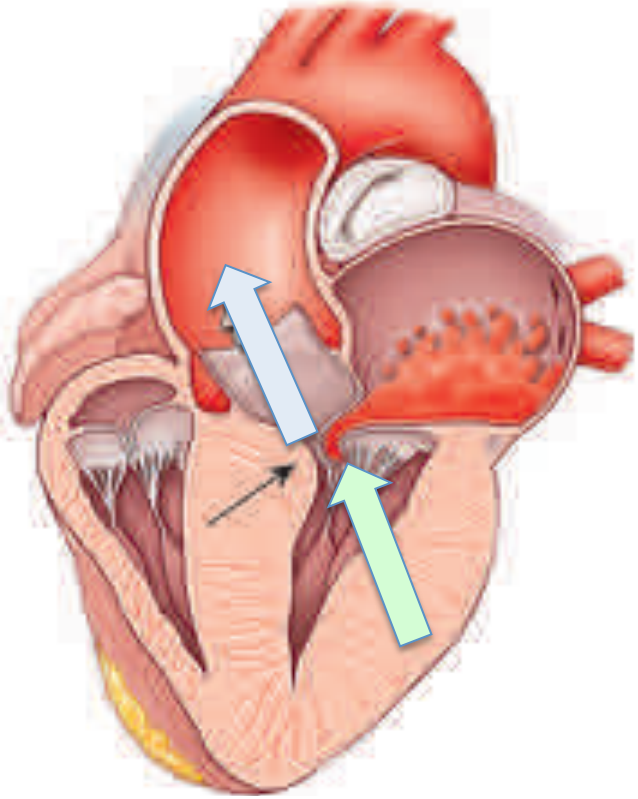


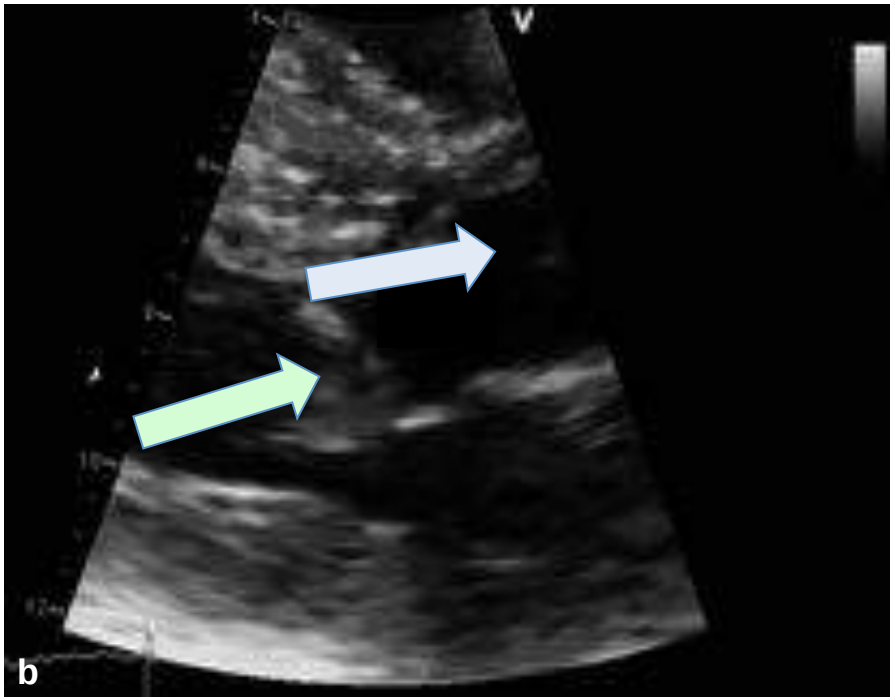
Superposition of the PISA and the AS

HCM : MR lesion



MR in HCM: multiple mechanism

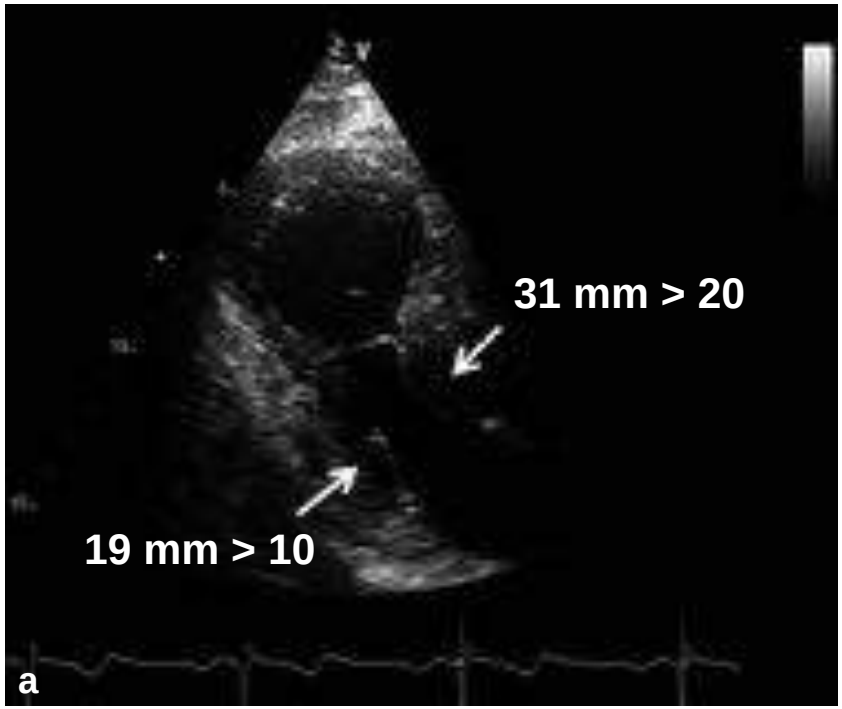


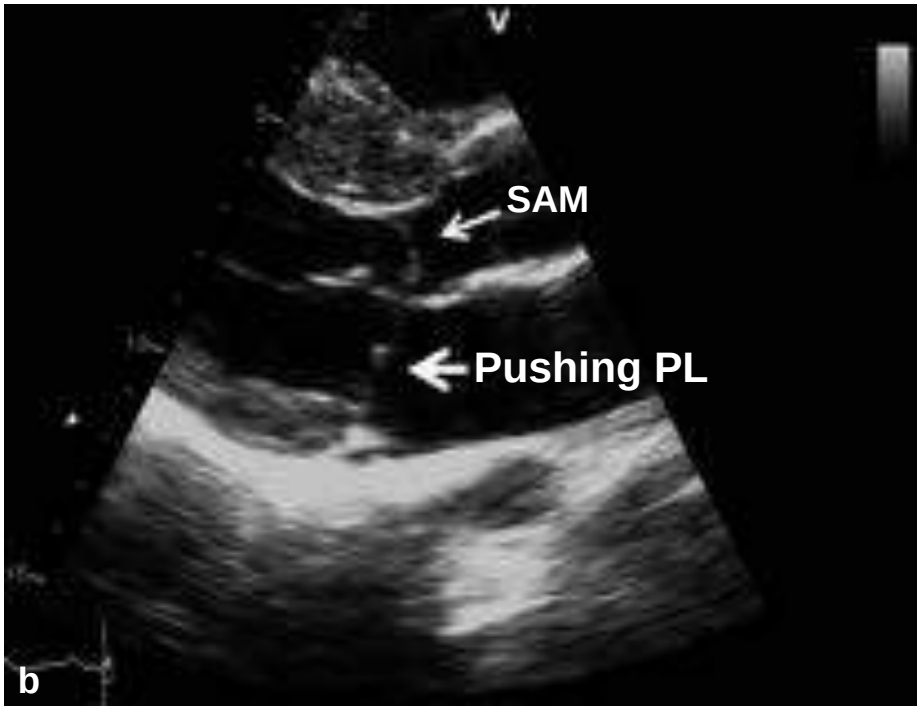


1) Pulling Mechanism ➔ Venturi effect

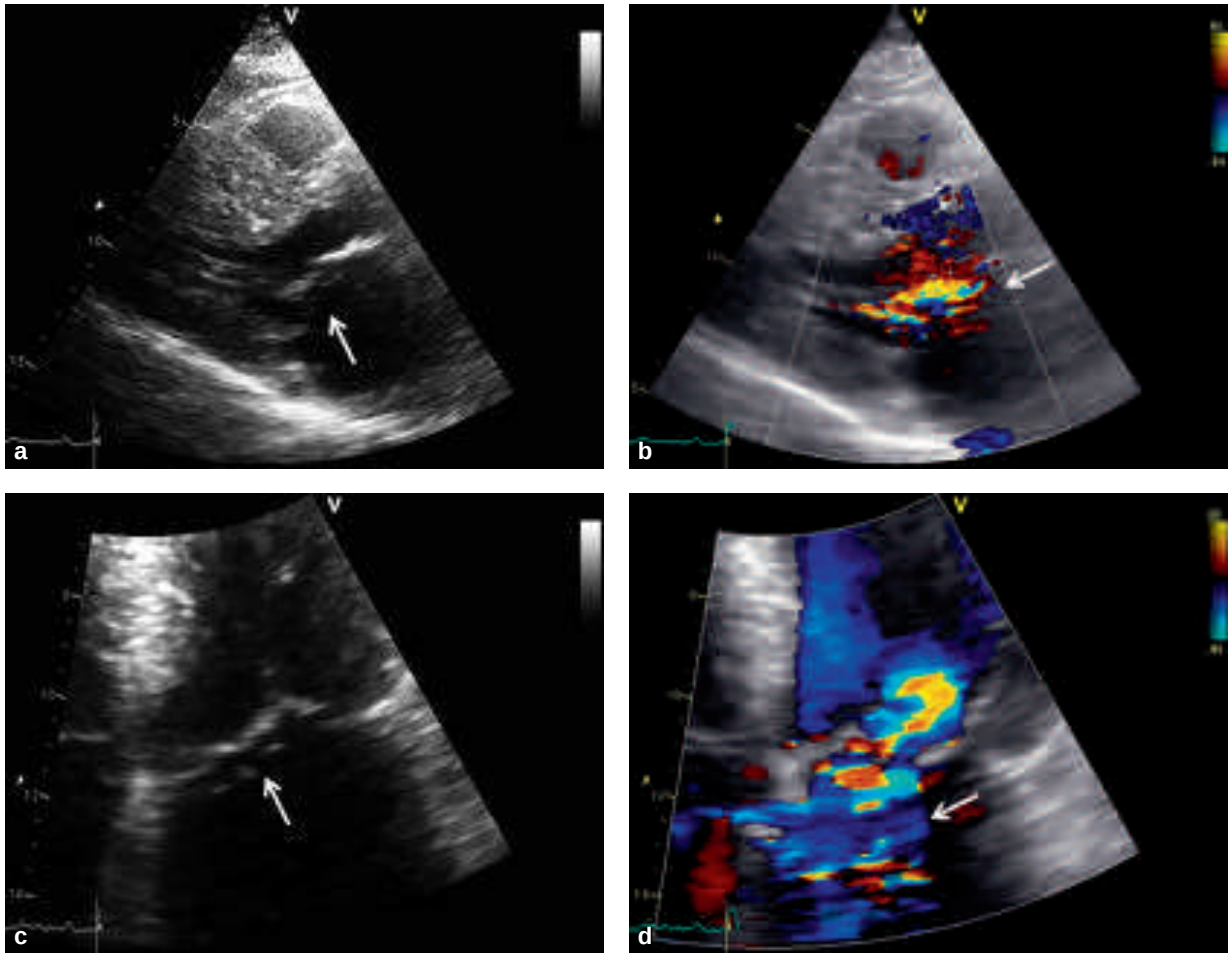
2) Pushing Mechanism ➔ Direct flow

MR in HCM: multiple mechanism





MR in HCM: multiple mechanism

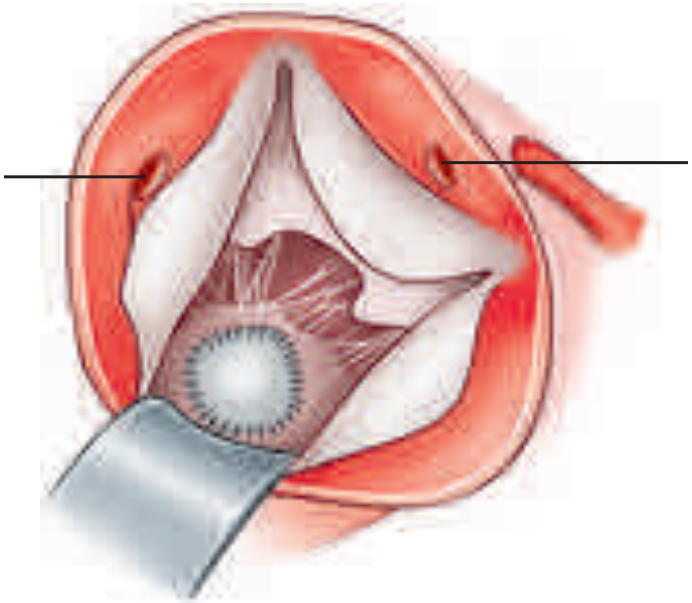


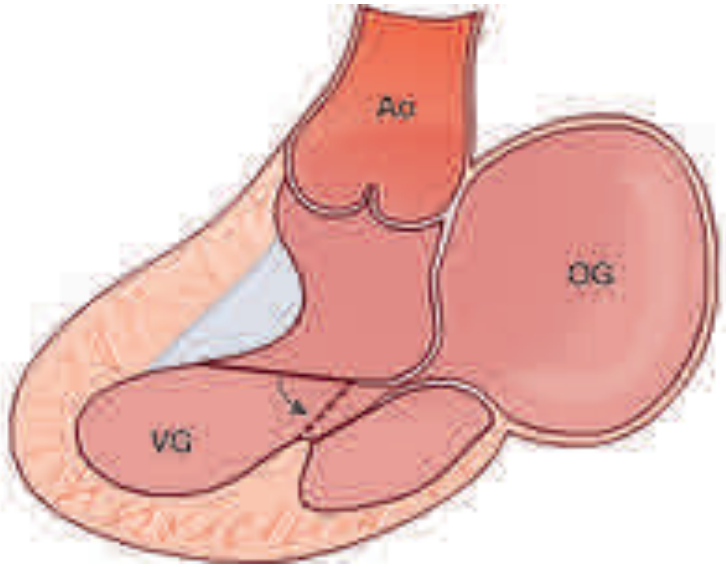
Prolapsus ➔ 3 %

"Septal myectomy for OHCM— the Mayo Clinic experience. Dearani JA. Nat Clin Pract Cardiovasc Med 2007;4: 503–412"

Surgeon	Year	Procedure
Cleland	1958	Transaortic septal myectomy
Morrow	1960	Transaortic myotomy/myectomy
Kirklin	1961	Transaortic/transventricular myectomy
Lillihei	1963	Transatrial myectomy, detachment mitral valve
Johnson	1964	Transatrial mitral valve replacement, myectomy
Cooley	1967	Trans-right ventricular septal myectomy
Stinson	1968	Cardiac transplantation
Cooley	1970	Mitral valve replacement without myectomy
Rastan, Konno	1975	Aortoventriculoplasty
Bernhard, Cooley	1976	Apicoaortic conduit
Vouhe	1984	Trans-right ventricular myectomy
Alvarez-Diaz	1984	Trans-right ventricular myectomy, patch

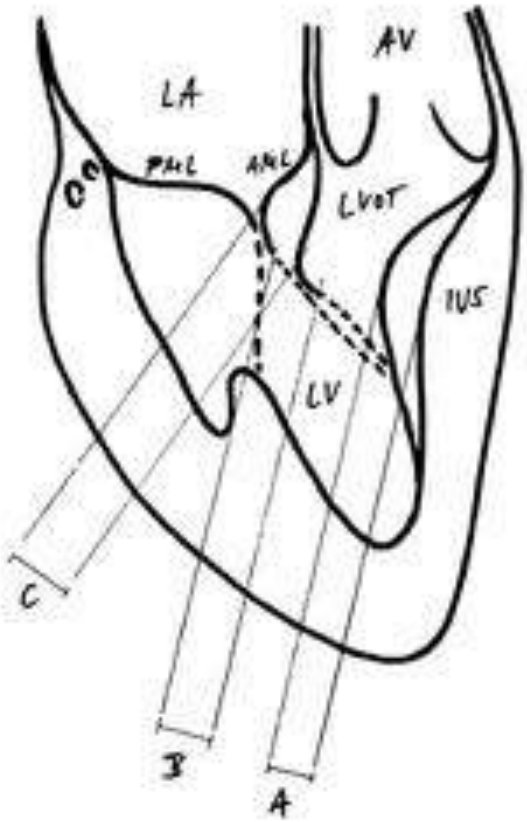
Several Situations ➔ Several Techniques

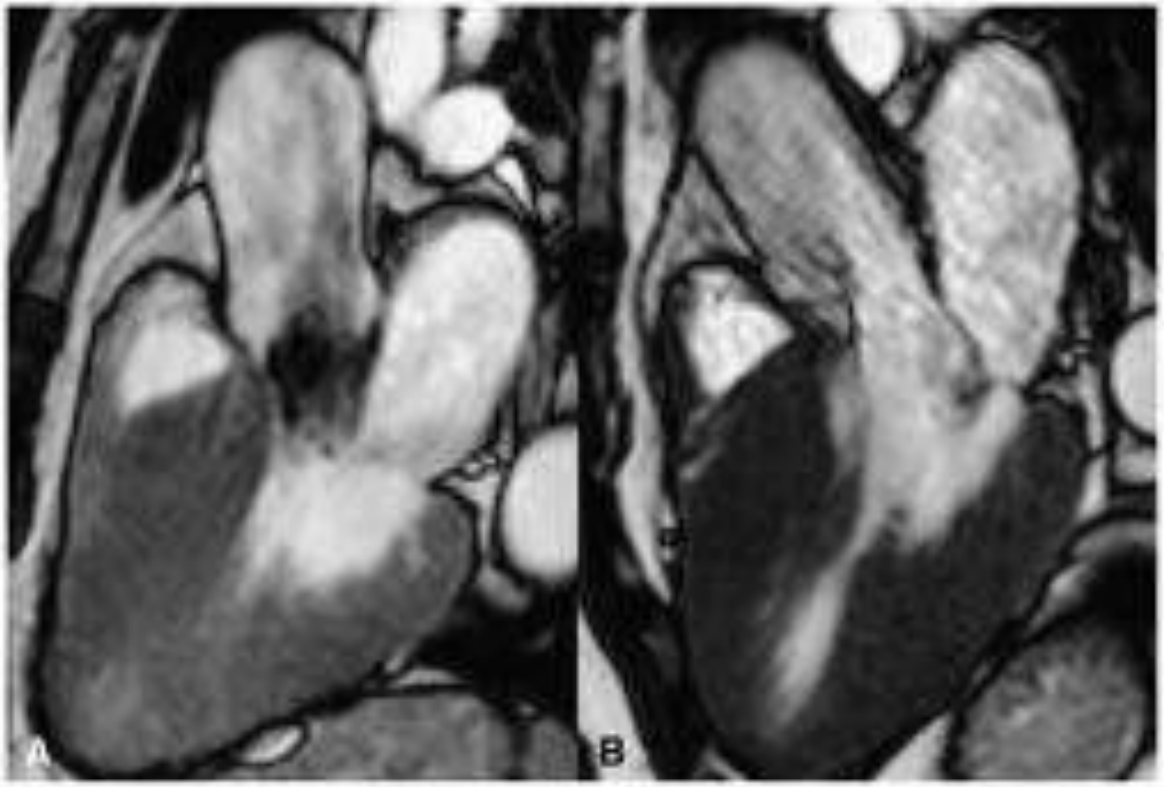




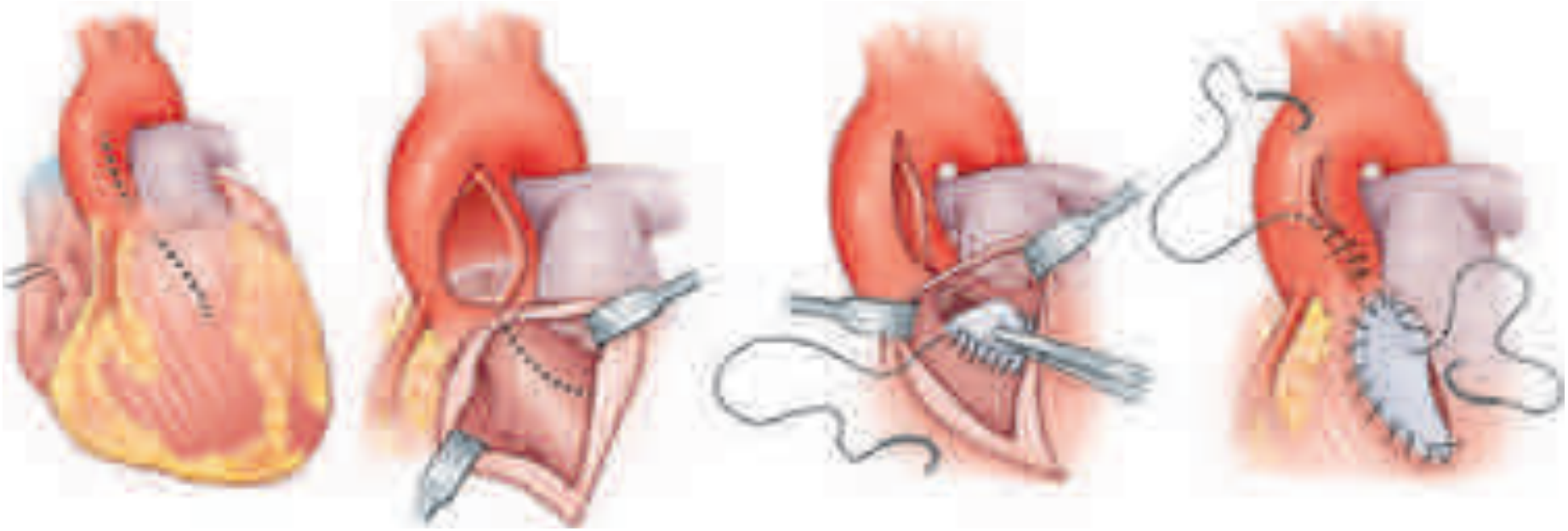
A new concept for correction of systolic anterior motion and mitral valve regurgitation in patients with hypertrophic obstructive cardiomyopathy

Joerg Seeburger, MD, Jurgen Passage, MBBS, Michael A. Borger, MD, PhD, and Friedrich Wilhelm Mohr, MD, PhD, Leipzig, Germany





Modified Konno



HCM : multiple disease ➔ multiple techniques

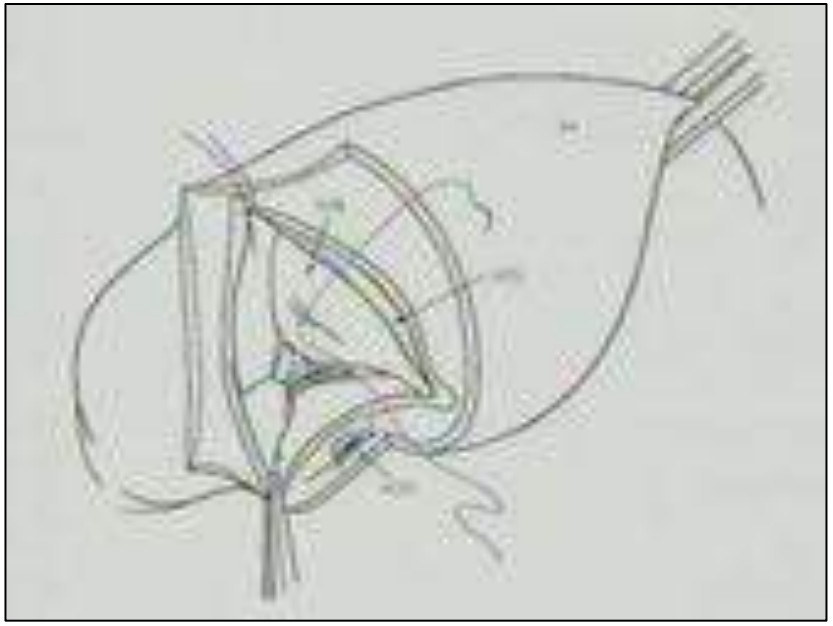
Resection-Plication-Release for Hypertrophic Cardiomyopathy: Clinical and Echocardiographic Follow-Up

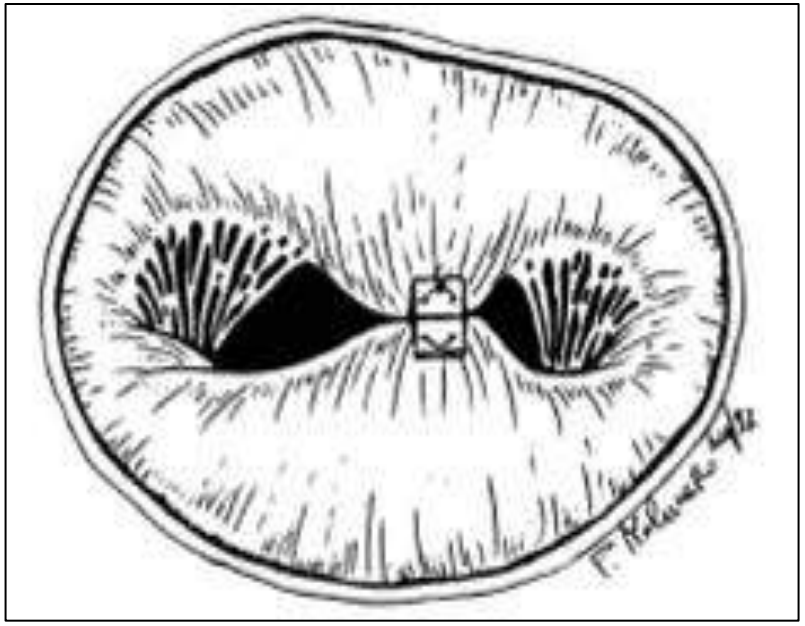
Sandhya K. Balaram, MD, PhD, Leslie Tyrie, MD, Mark V. Sherrid, MD, John Afthinos, MD, Zak Hillel, MD, PhD, Glenda Winson, RN, and Daniel G. Swistel, MD

Division of Cardiothoracic Surgery, Department of Surgery, Hypertrophic Cardiomyopathy Program, Division of Cardiology, and Department of Anesthesia, St. Luke's-Roosevelt Hospital Center, Columbia University College of Physicians and Surgeons, New York, New York

Alfieri Stich

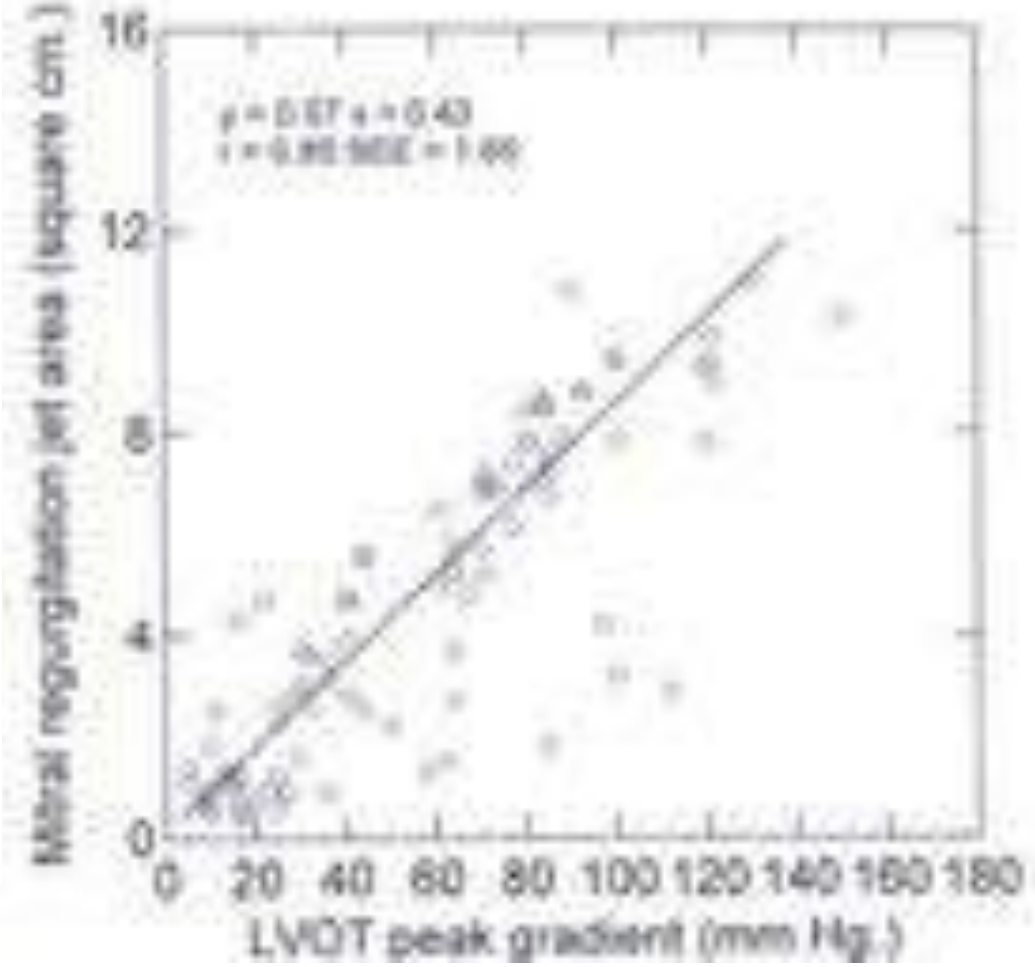
Edge to Edge ➔ ANTI sam





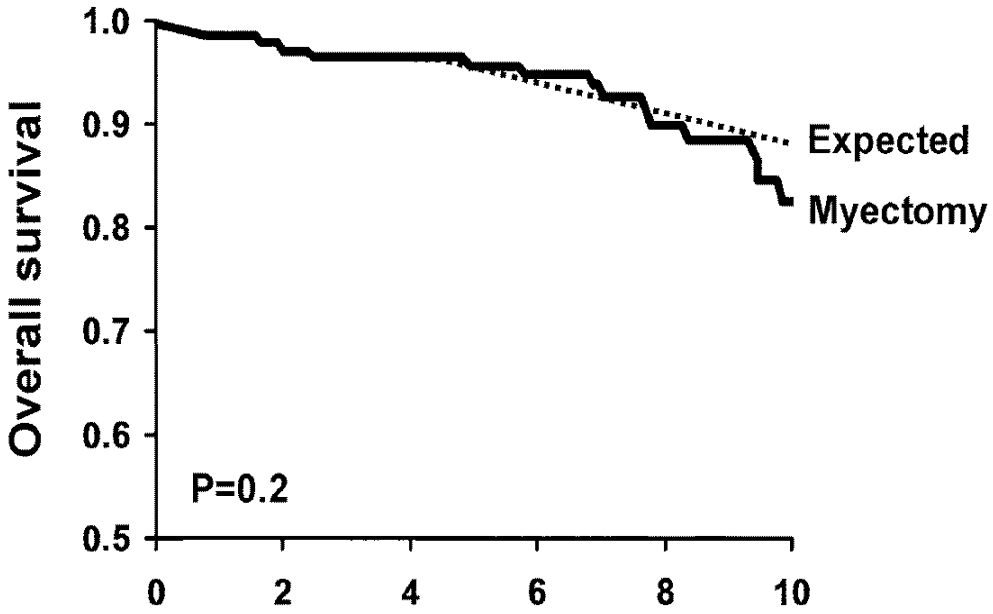
HCM : multiple disease → multiple techniques

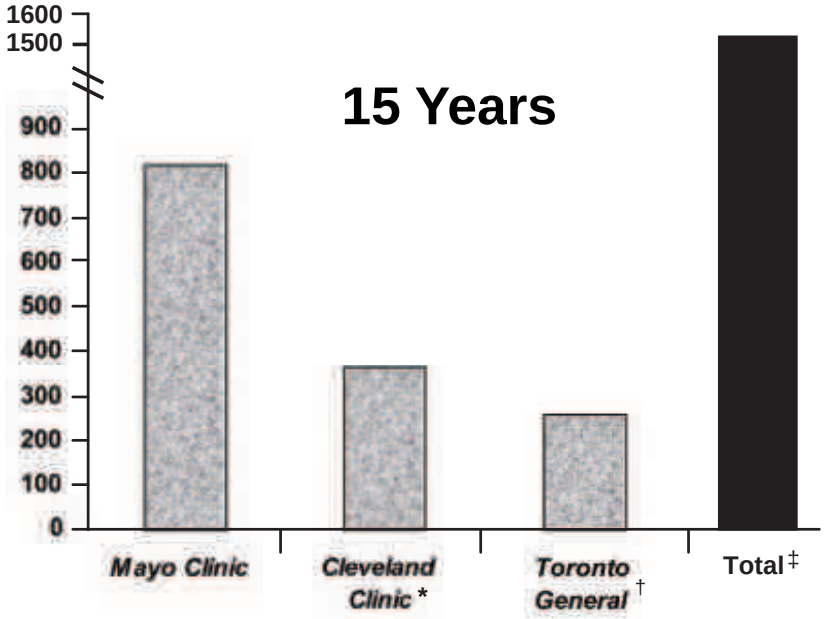
Mitral Regurgitation in HOCM and Obstruction and Relief With Myectomy,



CONTROVERSIES IN CARDIOVASCULAR MEDICINE

Is septal ablation preferable to surgical myomectomy for obstructive hypertrophic cardiomyopathy? *Barry J. Maron Circulation. 2007*



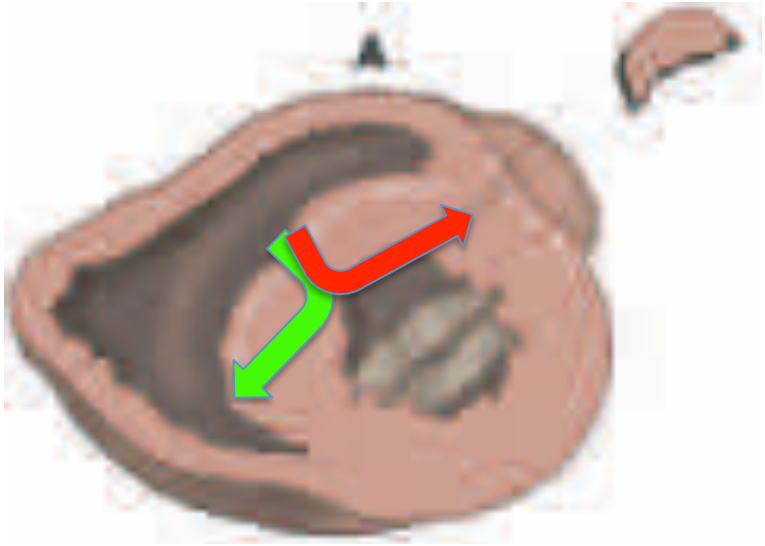


Comparison of Surgical Septal Myectomy and Alcohol Septal Ablation With Cardiac Magnetic Resonance Imaging in Patients With Hypertrophic Obstructive Cardiomyopathy

J Am Coll Cardiol 2007;49:350–7

	Septal Myectomy (n = 24)	Alcohol Septal Ablation (n = 24)
Age (yrs)	50 ± 20	62 ± 12*
Gender (male/female)	15/9	12/12
LVOT gradient preprocedure (mm Hg)	75 ± 41	76 ± 40
LVOT gradient immediately postprocedure (mm Hg)	3 ± 3	7 ± 6
Ventricular septal thickness preprocedure (mm)	22 ± 4	23 ± 4
LV mass preprocedure (g)	220 ± 88	216 ± 104
Ejection fraction preprocedure (%)	68 ± 7	69 ± 9

Septal Myectomy

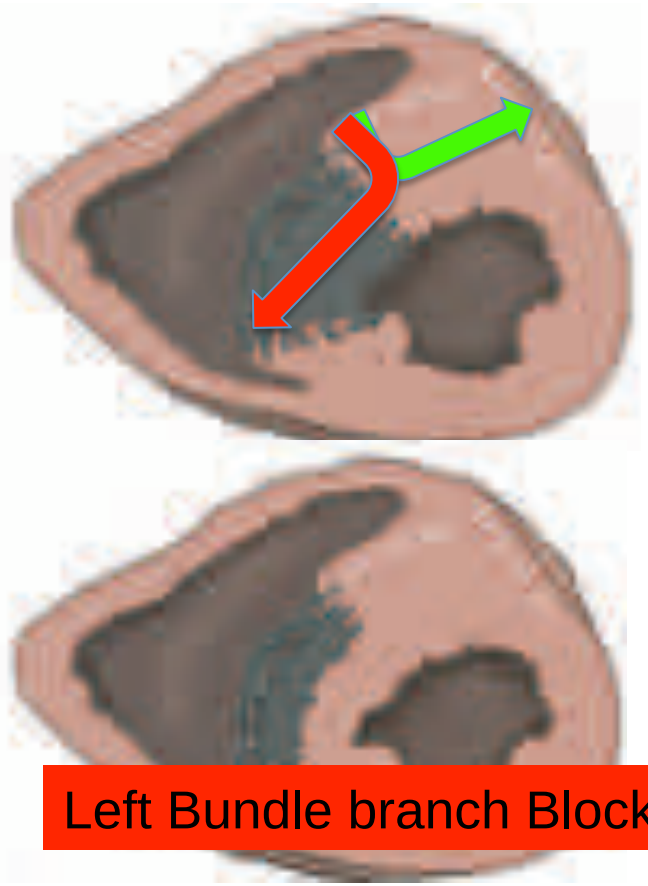


Right Bundle Branch Block

Depth = 10 mm

Weight = 6 g ± 4

Alcohol Septal Ablation



Left Bundle branch Block

Depth = Transmural / Inf

Weight = 16 g ± 7

Comparison of septal myectomy and percutaneous alcohol septal ablation*

Parameter	Myectomy	Ablation
Operative mortality	1–2%	1–2%
Gradient reduction (at rest)	to <-10 mm Hg	to < 25 mm Hg
Symptoms (subjective)	decreased	decreased
Symptoms (objective)	decreased	decreased
Effective with anatomic variability in septum	usually	uncertain
Pacemaker (high grade AV block)	1–2%	5–10%
Estimated patient selection	x	15–20x
Sudden death risk (long-term)	very low	uncertain
Available follow-up	> 40 years	~ 6 years
Intramyocardial scar	absent	present

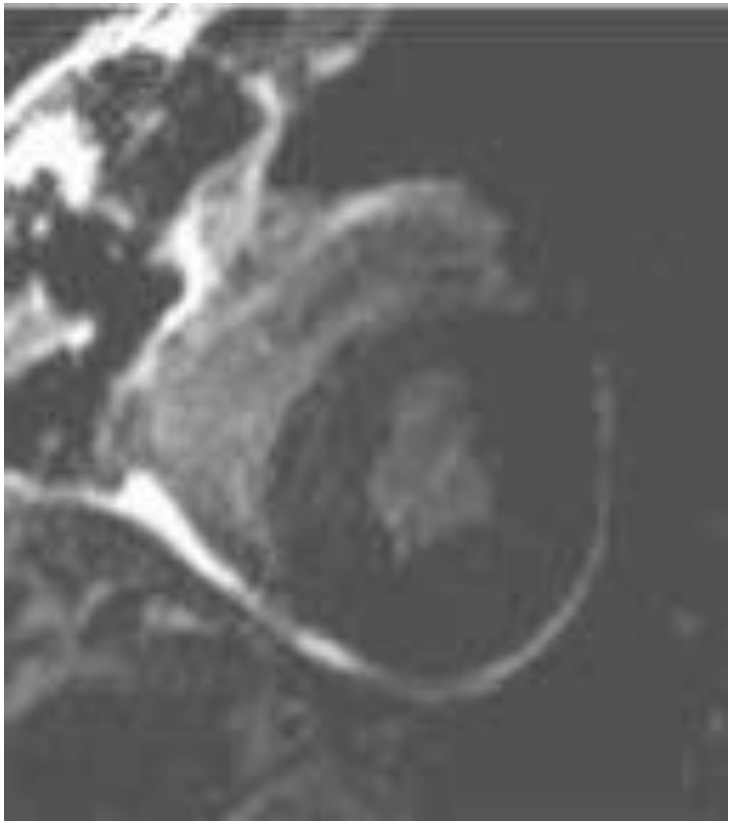
AF ablation 25% Oui Non

Comparison of septal myectomy and percutaneous alcohol septal ablation*

Parameter	Myectomy	Ablation
Operative mortality	1–2%	1–2%
Gradient reduction (at rest)	to <-10 mm Hg	to < 25 mm Hg
Symptoms (subjective)	decreased	decreased
Symptoms (objective)	decreased	decreased
Effective with anatomic variability in septum	usually	uncertain
Pacemaker (high grade AV block)	**50 / 85% ←==**	5–10%
Estimated patient selection	x	15–20x
Sudden death risk (long-term)	very low	uncertain
Available follow-up	> 40 years	~ 8 years
Intramyocardial scar	absent	present

Ablation de la FA - 25% Oui Non

Septal Myectomy



Depth = 10 mm

Weight = 6 g ± 4

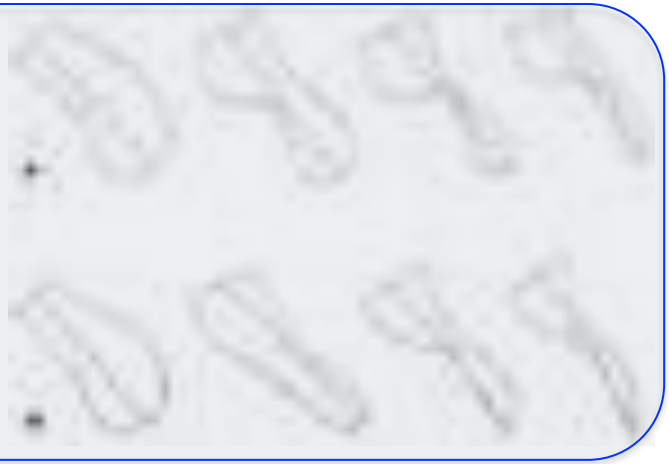
Alcohol Septal Ablation

Depth = Transmural / Inf

Weight = 16 g ± 7

« Lancet 1992;339:1318-23 »

Anterior movement of the mitral valve during systole was never abolished but was smaller during the DDD mode than during sinus rhythm.



Placebo Effect of Pacemaker Implantation in Obstructive Hypertrophic Cardiomyopathy

Cecilia Linde, MD, Fredrik Gadler, MD, Lukas Kappenberger, MD, and Lars Rydén, MD, for the PIC Study Group

„Am J Cardiol 1999;83:903–907“

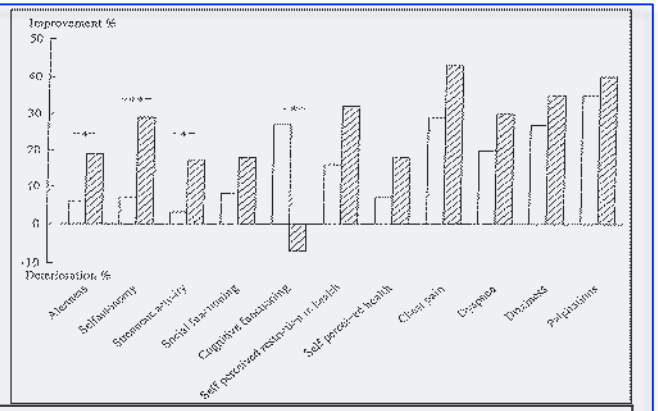


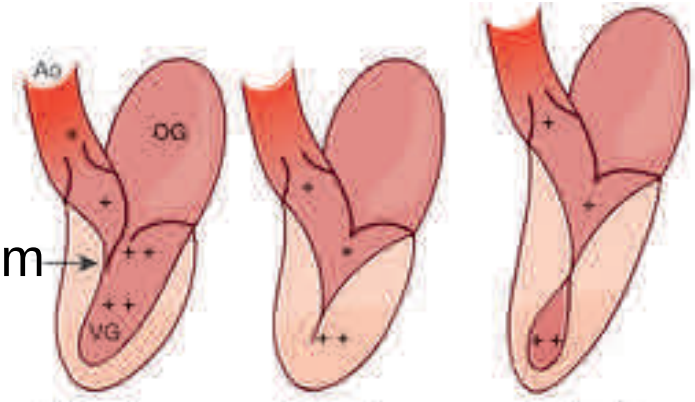
TABLE II Baseline and Follow-up Parameters After Inactive and Active Pacing

Parameter	Inactive Pacing (n = 40) Baseline	Inactive Pacing (n = 40) End of Study	p Value	Active Pacing (n = 41) Baseline	Active Pacing (n = 41) End of Study	p Value
NYHA functional class (I–IV)	2.5 ± 0.5	2.2 ± 0.6	NS	2.6 ± 0.5	1.7 ± 0.7	<0.0001
LV outflow tract obstruction (mm Hg)	71 ± 32 **- 20**	52 ± 34	0.04 **- 40**	70 ± 24	33 ± 27	<0.0001
Systolic anterior movement (I-IV)	0.9 ± 0.3	0.9 ± 0.4	NS	0.9 ± 0.3	0.7 ± 0.5	NS
Exercise time (min)	13.1 ± 4.4	12.6 ± 4.3	NS	12.1 ± 5.6	12.9 ± 4.2	0.02
Peak oxygen uptake ml/kg/min	19.9 ± 5.7	18.2 ± 5.0	NS	17.1 ± 5.6	18.7 ± 5.5	0.06
Peak heart rate during exercise	121 ± 29	117 ± 25	NS	113 ± 25	118 ± 24	0.006

HCM surgical Techniques

- Heart Transplantation
- Mitral Valve Replacement
- Extended Myect. + MV plasty

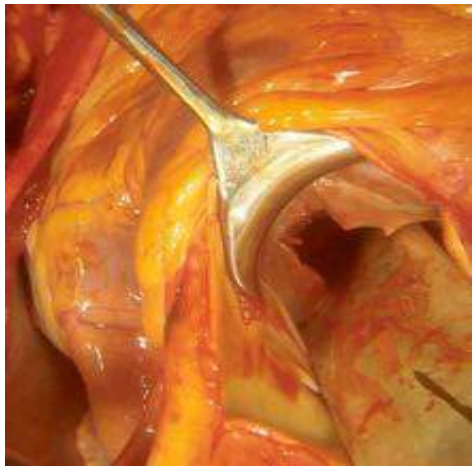
CONCLUSION



HCM ➔ multiple obstruction mechanism
➔ Multiple MR mechanism

The traditional Morrow technique safe / effective
1) the obstruction
2) the MR

MV Replacement / complex repairs…exceptional



Clear message ➔ Surgery remains the reference

Morrow + Papillary Muscle resection

Kono + Septal resection