



La correzione cardiocirurgica della cardiomiopatia ipertrofica ostruttiva. Indicazioni e tecnica

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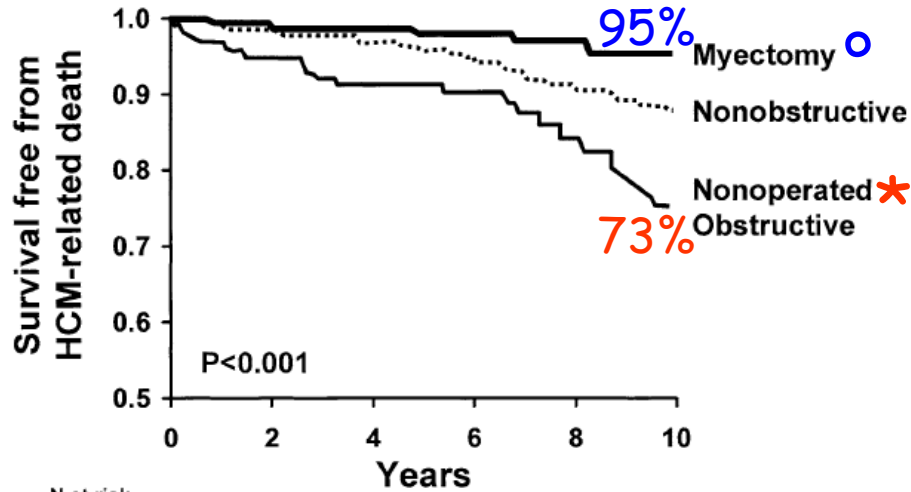
Hypertrophic Cardiomyopathy

- ▶ HCM is the most common inherited cardiovascular disease (1:500) and the most common cause of sudden death in young and athletes
 - 30% of sudden death during exercise
- ▶ 70% of HCM patients at rest or with exercise present outflow gradient
- ▶ **20% of patients with outflow gradient develop limiting symptoms requiring surgery**

Extended Myectomy: only for NYHA III-IV?

JACC Vol. 46, No. 3, 2005
August 2, 2005:470-6

Ommen *et al.*
Survival After Myectomy for HCM

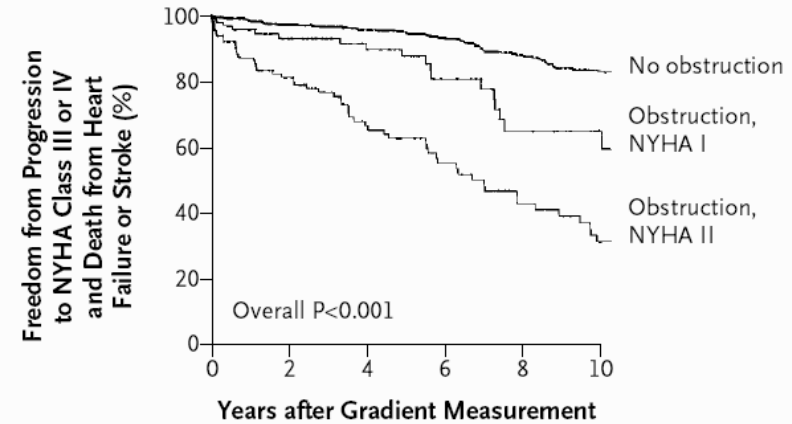


	N at risk					
	0	2	4	6	8	10
Myectomy	289	249	179	108	66	39
Nonobstructive	820	587	490	355	244	201
Nonoperated obstructive	228	146	106	69	42	28

Figure 3. Survival free from hypertrophic cardiomyopathy-related death among patients in three hypertrophic cardiomyopathy (HCM) subgroups: surgical myectomy (n = 289), nonoperated with obstruction (n = 228), and nonobstructive (n = 820). Overall log-rank, p < 0.001; myectomy versus nonoperated obstructive hypertrophic cardiomyopathy, p < 0.001; myectomy versus nonobstructive hypertrophic cardiomyopathy, p = 0.01.

○ 89% in NYHA III-IV
* 85% in NYHA I-II

Martin S. Maron, N Engl J Med 2003;348:295-303.



No. at Risk						
	0	2	4	6	8	10
No obstruction	770	557	464	334	231	188
Obstruction, NYHA I	106	69	52	31	18	11
Obstruction, NYHA II	118	75	51	35	21	14

Figure 2. Probability of Progression to Severe Heart Failure (NYHA Class III or IV) or Death from Heart Failure or Stroke among 224 Patients with Left Ventricular Outflow Tract Obstruction and 770 Patients without Obstruction.

Patients who were already in NYHA class III or IV at entry were excluded from the analysis.

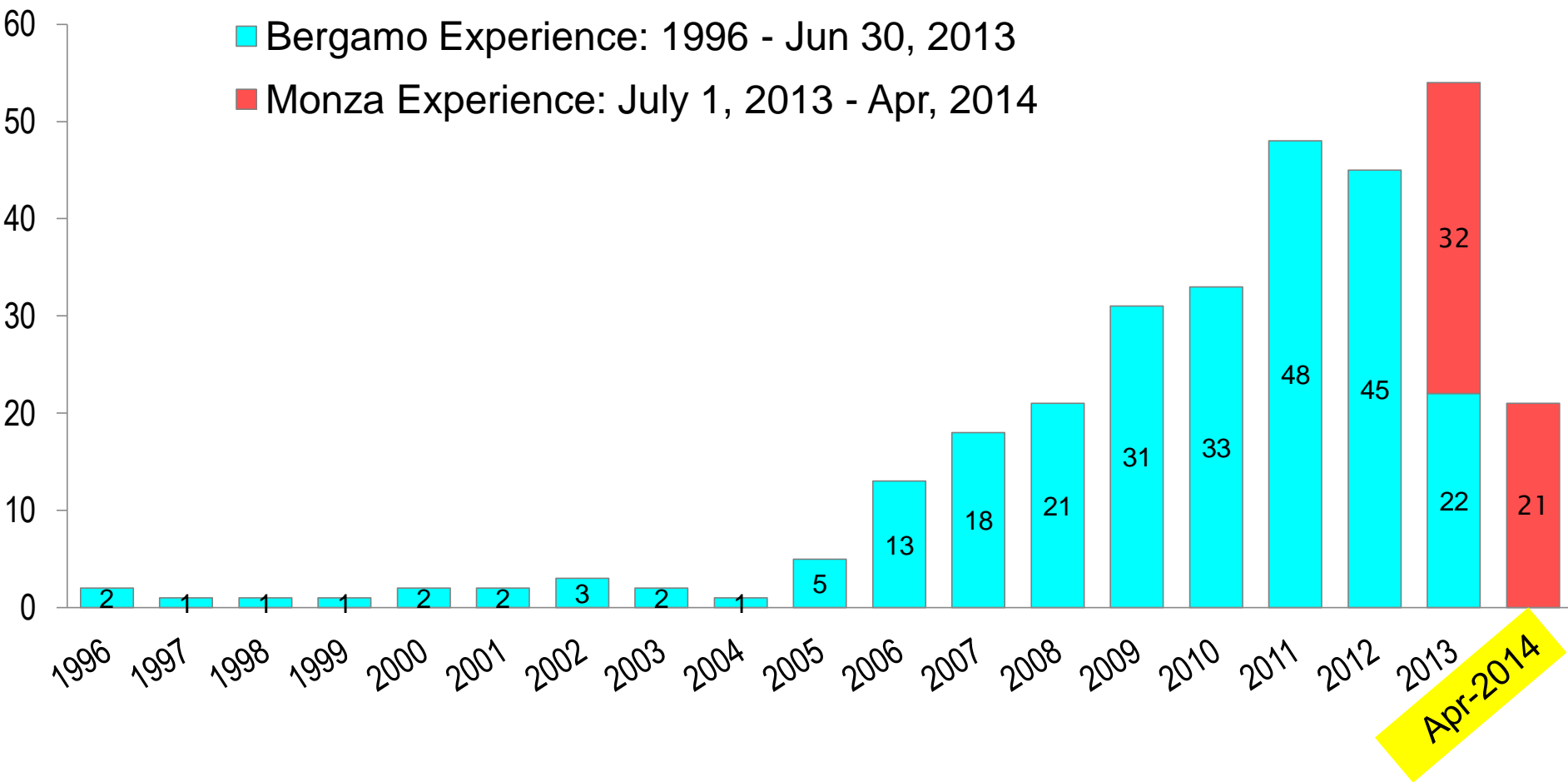
Recommendations for Invasive Treatment of LV Outflow Obstruction

– ACCF/AHA 2011 Guidelines on treatment of HCM –

“Surgical Myectomy is the first consideration for the majority of eligible patients with HCM”

“when surgery is contraindicated, or the risk is considered unacceptable because of serious comorbidity or advanced age, alcohol septal ablation can be beneficial in HCM patients with LVOT obstruction and severe drug-refractory symptoms.”

No. of 308 consecutive patients



A contemporary European experience with surgical septal myectomy in hypertrophic cardiomyopathy

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Giovanni Di Dedda¹, Paolo De Filippo¹, Samuele Pentiricci¹, Luca Boni³,
Michele Senni¹, Antonello Gavazzi¹, and Paolo Ferrazzi^{1*}

Aims

The recent American College of Cardiology and American Heart Association Guidelines on hypertrophic cardiomyopathy (HCM) have confirmed surgical myectomy as the gold standard for non-pharmacological treatment of obstructive HCM. However, during the last 15 years, an extensive use of alcohol septal ablation has led to the virtual extinction of myectomy programmes in several European countries. Therefore, many HCM candidates for myectomy in Europe cannot be offered the option of this procedure. The purpose of our study is to report the difficulties and results in developing a myectomy programme for HCM in a centre without previous experience with this procedure.

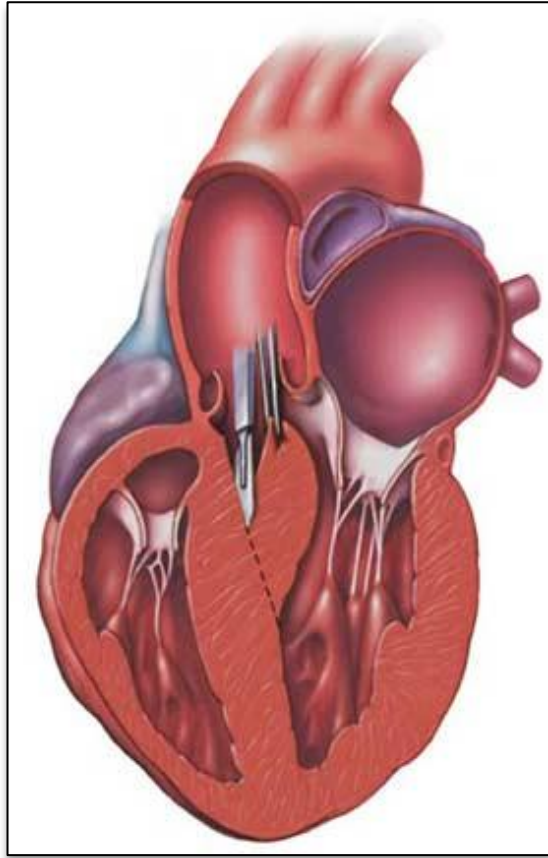
Methods and results

The clinical course is reported of 124 consecutive patients with obstructive HCM and heart failure symptoms who underwent myectomy at a single European centre between 1996 and 2010. The median follow-up was 20.3 months (inter-quartile range: 3.9–40.6 months). No patients were lost to follow-up. A cumulative incidence of HCM-related death after myectomy was 0.8, 3.3, and 11.2% at 1, 5, and 10 years, respectively, including one operative death (procedural mortality 0.8%). The left ventricular (LV) outflow gradient decreased from 95 ± 36 mmHg before surgery to 12 ± 6 mmHg at most recent evaluation ($P < 0.001$), with none of the patients having a significant residual LV outflow gradient. Of the 97 patients in New York Heart Association functional class III–IV before surgery, 93 (96%) were in class I–II at most recent evaluation ($P < 0.001$).

Conclusion

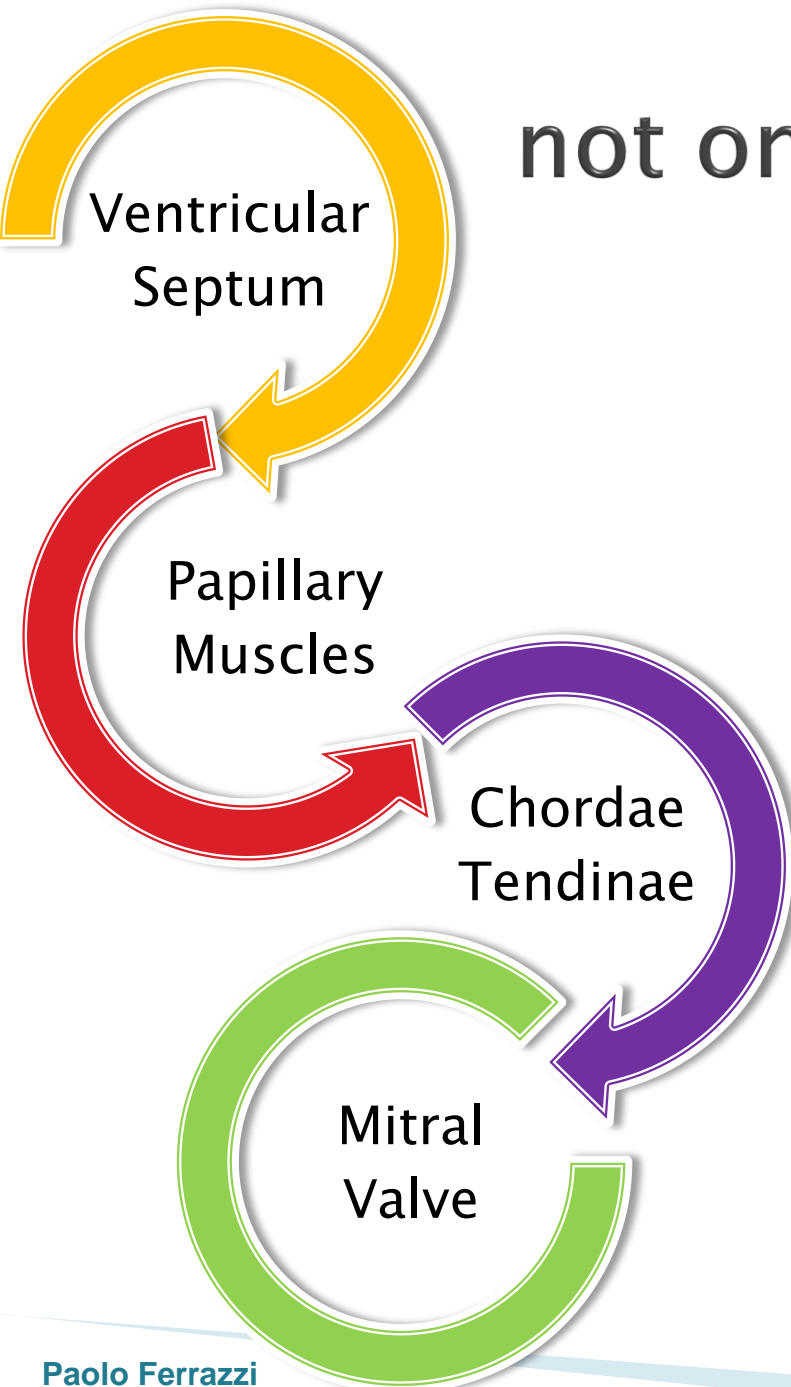
Our results show that the development of a myectomy programme at a centre without previous experience with this procedure is feasible and can lead to highly favourable clinical results.

Tailored Extended Myectomy Surgical Goals



- ▶ Relief of outflow gradient at rest and during exercise
- ▶ Abolition of mitral valve regurgitation (if present)
 - Avoiding any direct approach to mitral valve (repair/replacement)
- ▶ Long-term efficacy of results

HOCM... not only a thick septum



...but a complex interaction causing obstruction and mitral valve regurgitation

HOCM... not only a thick septum

Ventricular
Septum

Extensive Myectomy
down to LV equator

Papillary
Muscles

Papillary Mobilization

Chordae
Tendinae

Secondary chordae cutting

Mitral
Valve

Tailored
Extended
Myectomy

HOCM Pre-operative characteristics

Bergamo & Monza Experience 1996 - 2013
n. 272 pts

Age, mean yrs	51±18
Male, %	51.1
Follow-up, mean yrs	2.0

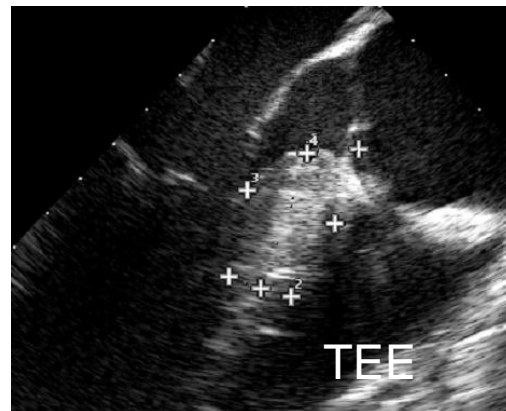
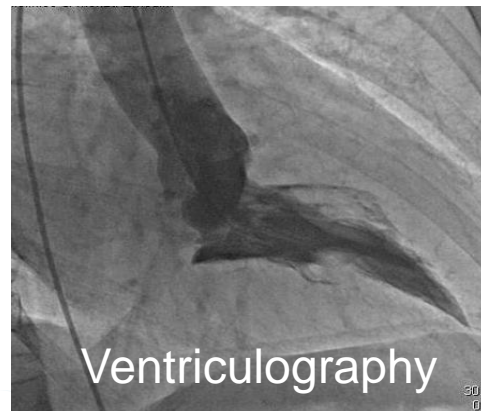
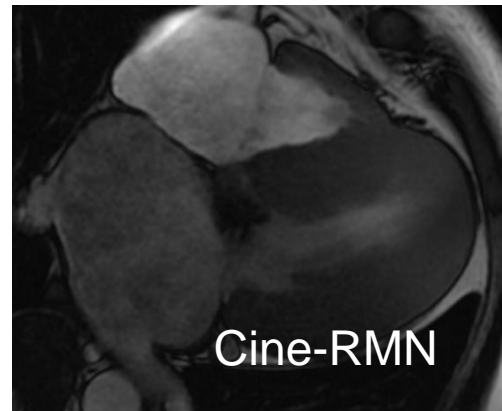
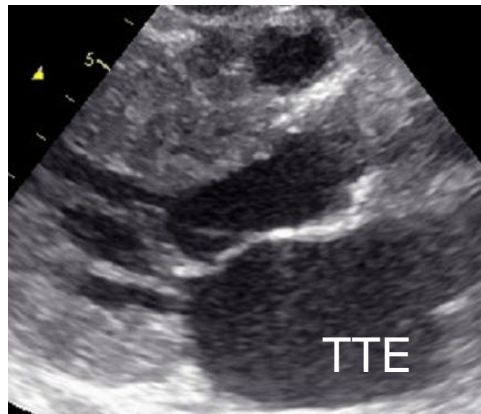
NYHA III-IV	203 (75%)
Syncope	55 (21%)

MI moderate/severe, %	95 (35%)
LVOT gradient, mean mmHg	86.7 ±37.4
IVS, mm	22.4±5

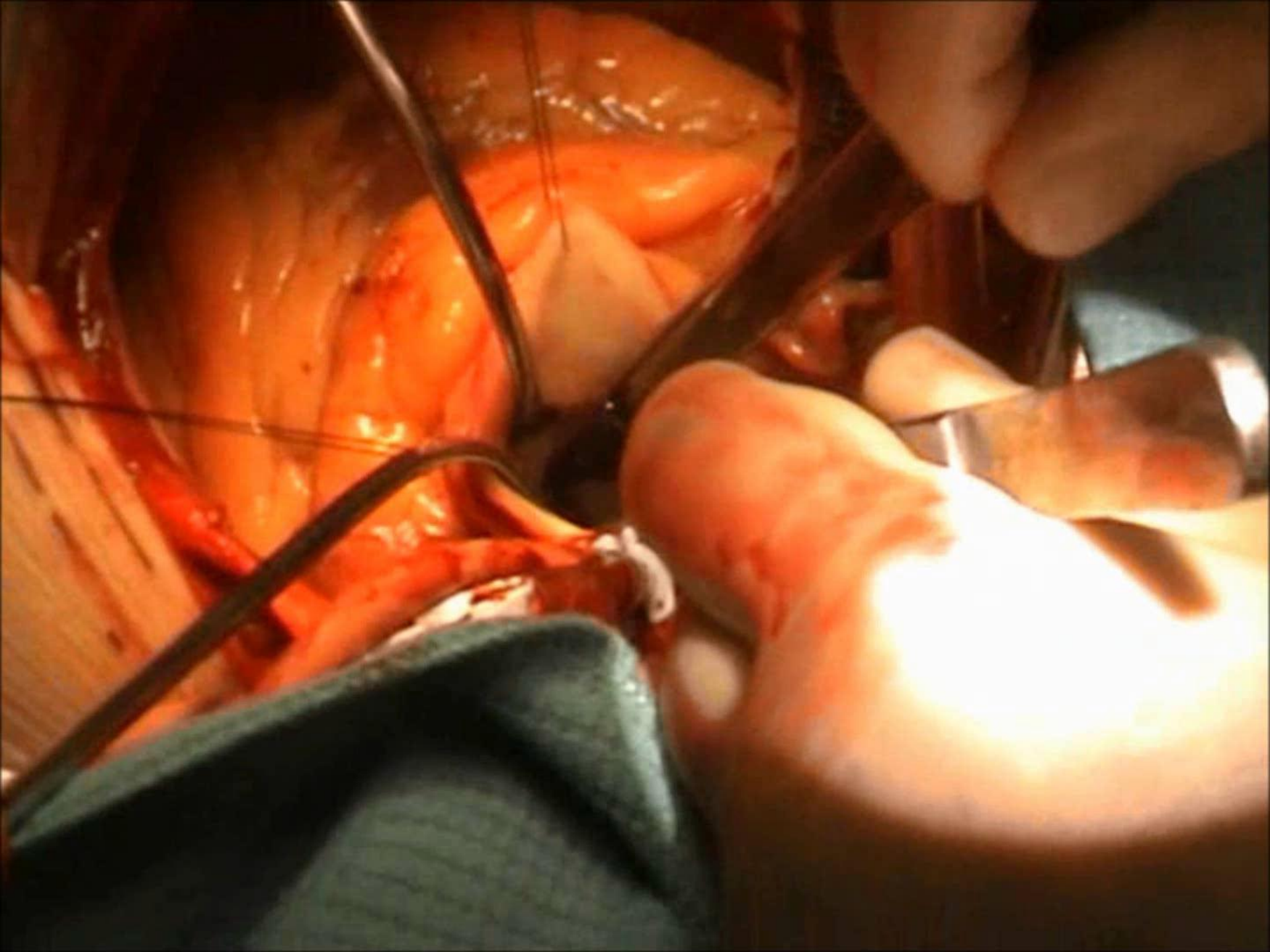
HOCM: Tailored Extended Myectomy

Imaging Evaluation & Measurements

The evaluation of pre-operative imaging allows a tailored extended myectomy by trans-aortic approach

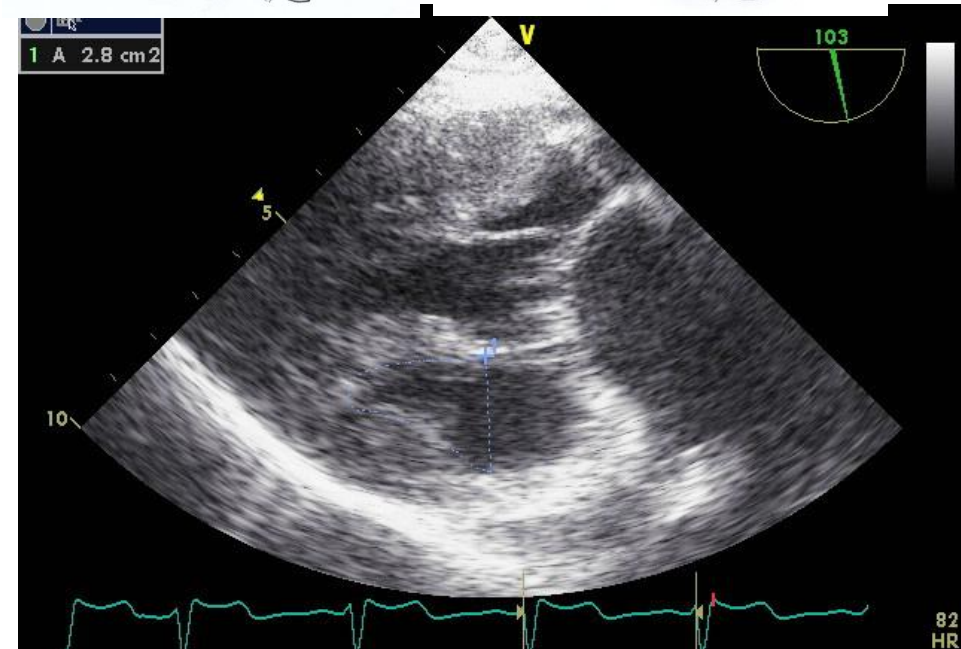
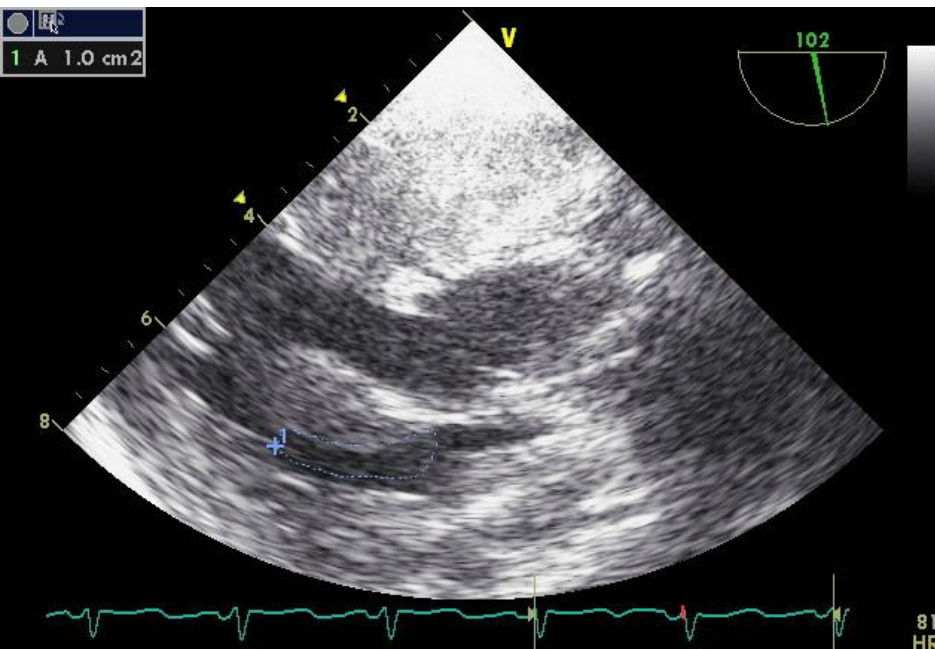
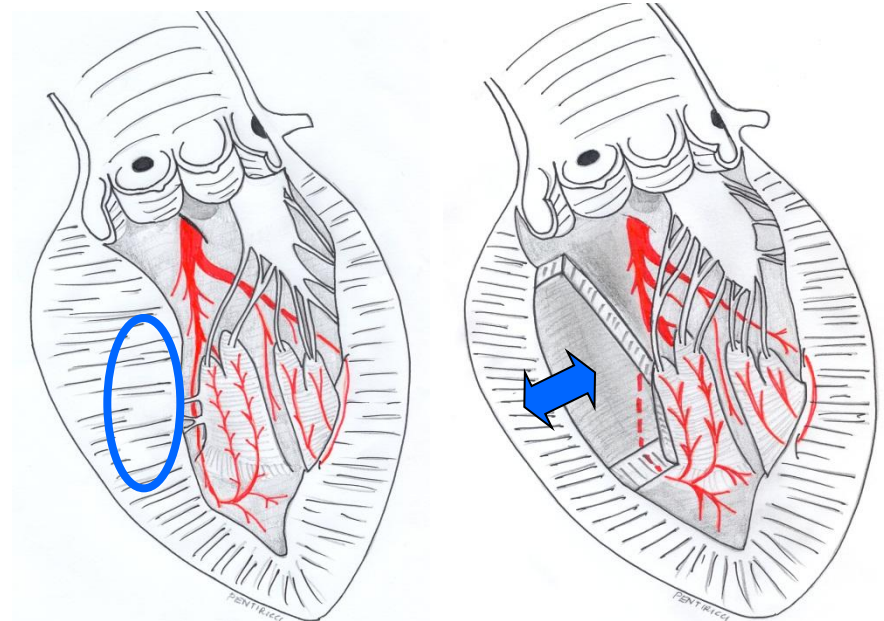


1. Distance between aortic valve plane and the beginning of the hypertrophy
2. Max. depth of septum and posterior wall
3. Extension of hypertrophy (Mid-ventricular Obstruction)
4. Anomalies of papillary and chordae on LAM
5. Organic anomalies of mitral valve



Mobilization of Anterior and posterior papillary muscles

Resection of fibrotic chordae between anterior and posterior papillary and septum (100% of the cases)



Extended Myectomy for Hypertrophic Obstructive Cardiomyopathy

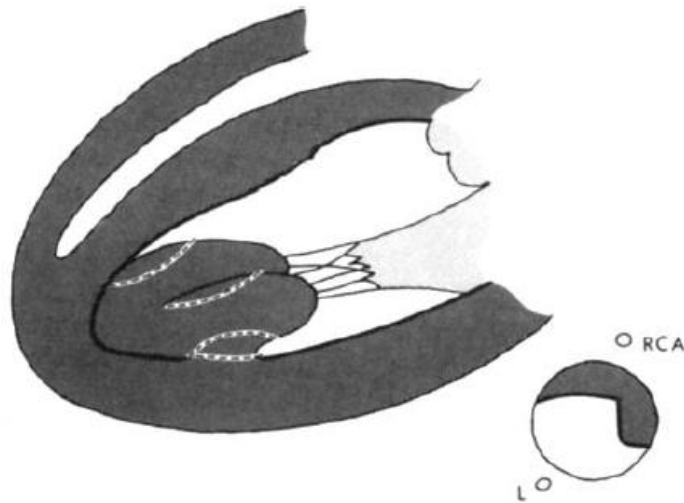
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An extended surgical technique for better relief of the obstruction as well as of mitral valve incompetence in patients with hypertrophic obstructive cardiomyopathy is presented. In addition to the traditional septal myectomy facilitated by insertion of a sharp triple-hook retractor, operation is extended to the hypertrophied and

malattached papillary muscles primarily responsible for the systolic anterior motion and mitral insufficiency, respectively. Long-term results confirm the accuracy of our operative strategy.

(Ann Thorac Surg 1994;58:575-7)



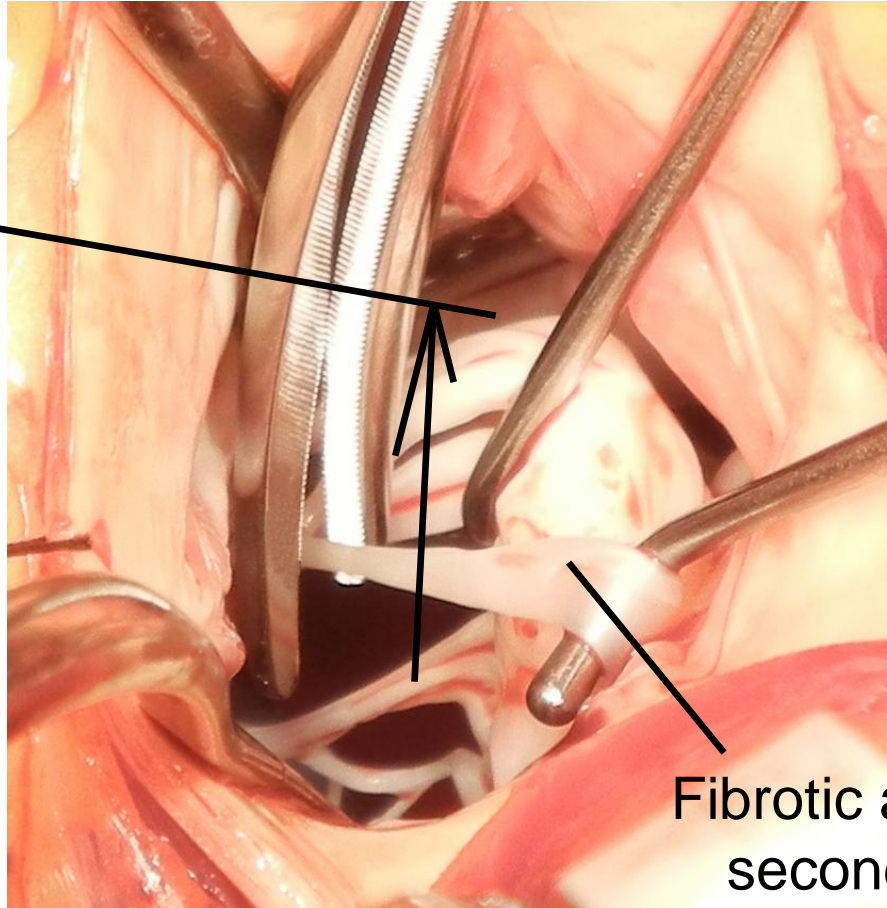
Pre-operative



Post-operative

Secondary chordae resection Technique

Primary chordae



Fibrotic and retracted
secondary chordae

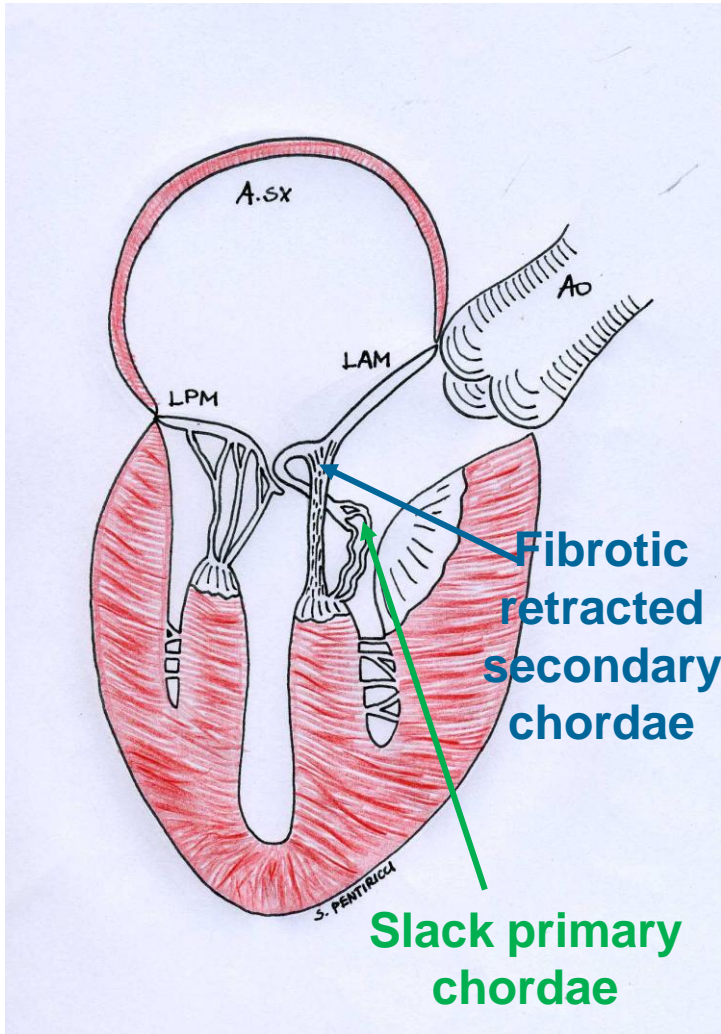
An original technique under investigation (2009) in
selected patients

HOCM: Mitral Regurgitation

FUNCTIONAL

Retraction of secondary
tendinae Chordae

ORGANIC



- Fibrosis of secondary chordae due to the contact with the septum
- Thickening of secondary chordae due to increased stress
- Thinning of the primary chords due to relaxation

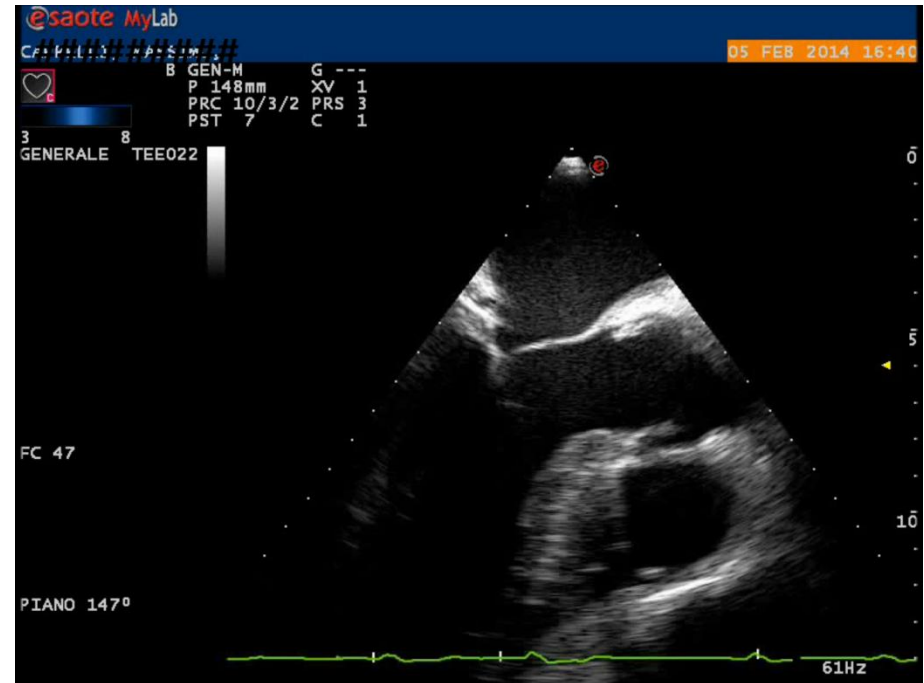
Secondary chordae resection



ECHO PRE vs POST-Surgery



PRE



POST

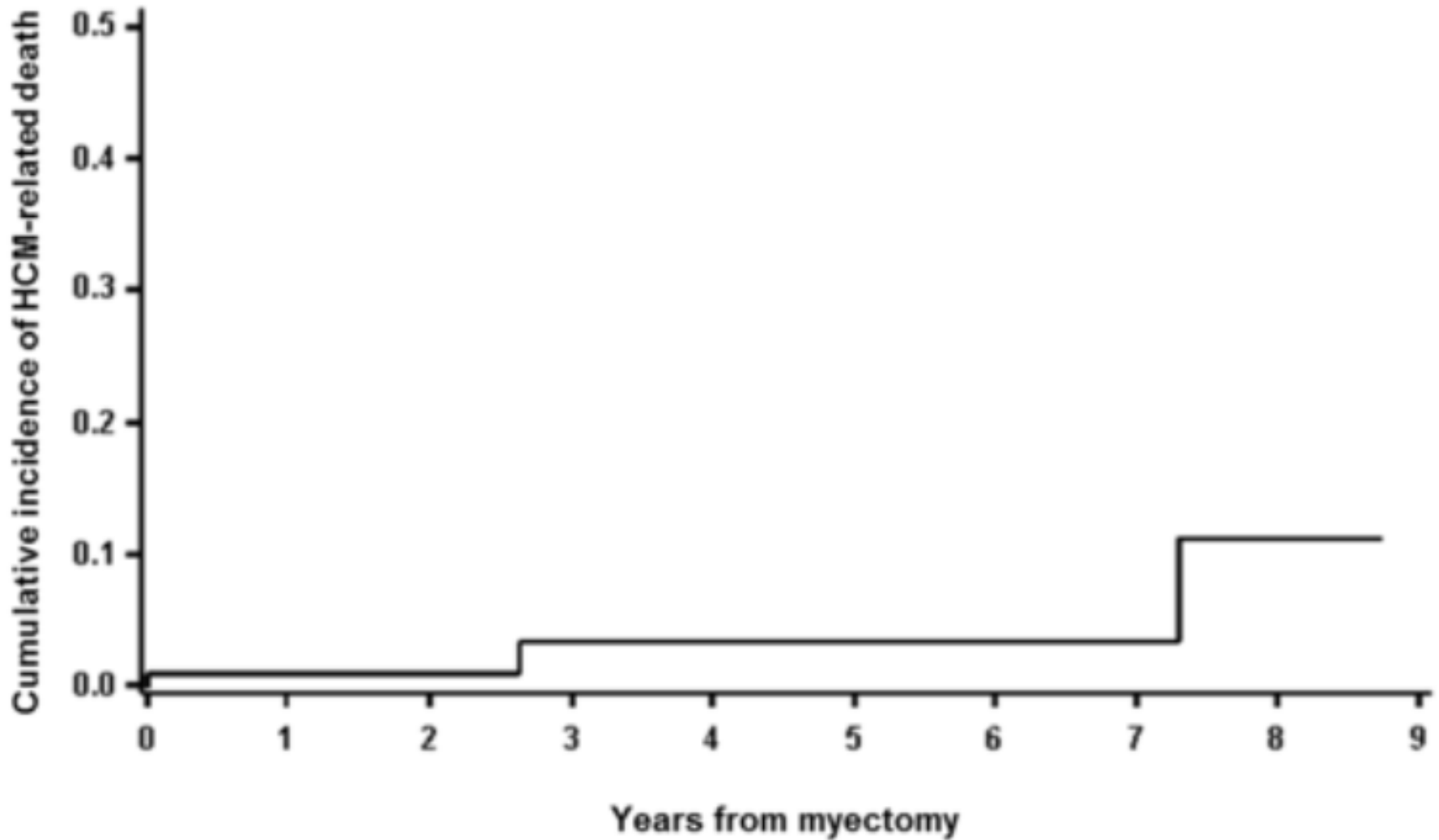
Results

Monza & Bergamo Experience 1996 - 2013
n. 272 pts

Early (<30d Post myectomy)	n	(%)
▶ Permanent PM implantation	6	(2.1)
▶ LBB	65	(24)
▶ Death	5	(1.8)

Long-term (>30d Post myectomy) FUP	n	(%)
<i>Cardiovascular Death</i>	3	(1.1)
▶ Sudden Death	1	(0.4)
▶ Cerebral Ischaemic Events	1	(0.4)
<i>Non cardiovascular Death</i>	4	(0.7)

Cumulative incidence of HCM related death



Cleveland Clinic Experience

The Surgical Spectrum of Hypertrophic Cardiomyopathy

Need for mitral valve procedure
related to septal thickness

Septum <2cm 74/181(41%) MV procedures
Septum ≥ 2cm 129/518(25%) MV procedures

Tot. 203/699 (29.04%) MV procedures

Monza & Bergamo Experience

IVS <2cm	3.9% MV procedures
IVS ≥2cm	6.2% MV procedures
<i>Tot.</i>	5.5% MV procedures

Conclusions

- The **myectomy** is the **gold standard** for the treatment of severely symptomatic patients:
 - Low risk
 - Excellent long term resultsACCF/AHA guidelines HCM Circulation 2011
- The trans-aortic surgical approach allows personalization of the treatment on the basis of anatomical characteristics of the patient
 - Treating the subvalvular mitral apparatus
 - Eliminating obstruction
 - Restoring native mitral valve competence
- **Our experience emphasizes the importance of a multidisciplinary approach** in a surgical center dedicated to the treatment of HOCM