The Management of Hypertrophic Cardiomyopathy
Evidence and Uncertainties

Banff 2013
Management of HCM

Key Elements

Screen
- 1° relatives for HCM
- Serial Echo
- Genetic testing

Avoid
- Competitive sport
- Volume depletion
- Isometric exercise
- Vasodilator, inotropic drugs
- Saunas, whirlpools

Unintended consequences

Control symptoms

Assess risk for and prevent SCD

Older, asymptomatic patients
- Reassurance
- Surveillance
- Exclude HTN

Control symptoms

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Yield of Genetic Testing

Screen 1st degree relatives for HCM

Genotype positive

<table>
<thead>
<tr>
<th>Age</th>
<th>Genotype positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65 years</td>
<td>38% (range 13-47%)</td>
</tr>
<tr>
<td>≥65 years</td>
<td>11% (6-30%)</td>
</tr>
</tbody>
</table>

Clinical markers of genotype positivity

- FH of HCM
- FH of SCD
- Reverse septal curvature
- LVW thickness >20 mm
- Age at Dx ≤45 yrs
- History of hypertension negative risk factor (-1)

Prediction of Positive Genetic Test (1,060 Pt)

Clinical markers present (no.)

Pt yield (%)
Medical Therapy in HOCM

Goals
- Exercise-induced gradient
- Oxygen demand
- Prolong diastolic filling period

If maximum dose fails
- Myectomy
- Septal ablation
- Pacing??

Drugs:
- Beta-blockers
- Verapamil
- Diltiazem
- Disopyramide
Pharmacologic Treatment Options in HCM

Literature search 1950-2011
- 45 studies
- ≥50 patients/study – 7 studies
- RC trials – 5

Determinants of success
- Symptoms
- Drug side effects
- Stress testing?

1,500 Consecutive HCM Patients
Meds only
Ablation
Myectomy

Spoladore: EHJ, 2012
Surgical Myectomy

Indications for myectomy

• LVOT obstruction
• Angina, dyspnea and/or syncope resulting in significant impairment in quality of life
• Symptoms persist despite adequate trial of medical therapy

Morrow, 1959; Braunwald: Circ, 1963
“Morrow myectomy,” 1968

“Mayo extended myectomy”
## Results

### Myectomy for Severely Symptomatic HOCM – Mayo Clinic 800 Patients

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative mortality</td>
<td>0.8%</td>
</tr>
<tr>
<td>Gradient reduction</td>
<td>67 → 3 mm Hg</td>
</tr>
<tr>
<td>Postop NYHA 1-2</td>
<td>94%</td>
</tr>
</tbody>
</table>
Results of Surgery in HOCM

Surgical pt – 353
Mayo Clinic 1983-2001
Nonoperated 1,101 pt
Florence
Naples
Minnesota
Maron: NEJM, 2003

Mayo isolated myectomy
Unoperated obstructive
Nonobstructive

P<0.0001

Ommen: JACC, 2005
Long-Term Survival After Surgical Myectomy

- 289 pt
- Mayo Clinic
- 1983-2001

Survival free from HCM related and SCD

<table>
<thead>
<tr>
<th></th>
<th>1 yr</th>
<th>5 yr</th>
<th>10 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCM related</td>
<td>99</td>
<td>98</td>
<td>95</td>
</tr>
<tr>
<td>SCD</td>
<td>100</td>
<td>99</td>
<td>99</td>
</tr>
</tbody>
</table>

P=0.2

Overall survival

Years

Ommen: JACC, 2005
Current observational data suggests that after surgical septal myectomy – *HCM related and SCD mortality rates are better than expected*

Data cannot be extended to other procedures

No data to support mortality benefit as the *sole indication* for myectomy, ie Indications for surgery – symptoms
Alcohol Septal Ablation

Indications for Ablation

- LVOT obstruction – suitable anatomy
- Symptoms persist despite appropriate medical therapy
- Suboptimal surgical candidate
- Pt preference after balanced discussion

Sigwart: Lancet, 1985
### Ablation Results

**19 Studies-1,052 Patients (1995-2005)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td>63</td>
<td>14 mm Hg</td>
</tr>
<tr>
<td>NYHA</td>
<td>2.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Complications</td>
<td>20%</td>
<td>(9-38%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>1.9%</td>
<td>(0-4%)</td>
</tr>
</tbody>
</table>
# 30-Day Clinical Events After Alcohol Septal Ablation

138 Patients

<table>
<thead>
<tr>
<th>Event</th>
<th>% Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>1.4</td>
</tr>
<tr>
<td>New PPM</td>
<td>20.4</td>
</tr>
<tr>
<td>Cardiac tamponade</td>
<td>3.5</td>
</tr>
<tr>
<td>Urgent or emergent cardiac surgery</td>
<td>1.3</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.7</td>
</tr>
<tr>
<td>Sustained VT cardiac arrest</td>
<td>2.0</td>
</tr>
</tbody>
</table>

## Complication Rate – Age and Gender Matched

![Graph showing comparison between Myectomy and Septal ablation with p-value](image)

- **Myectomy**: 3.5 Pt (%)
- **Septal ablation**: 20.4 Pt (%)

**P<0.0001**

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**Sorajja: Circ, 2008**
“efficacious procedure if performed in an experienced institution...

However the procedural complication rate exceeds that of myectomy.

Pt ≤65 yr of age have better symptom resolution with myectomy

No impairment in short-term survival was noted…but the long-term outcome remains unknown”
Ablation had lower rates of in-hospital mortality and new-onset hemodialysis with no significant difference in rates of stroke or placement of permanent pacemakers and implantable cardioverter-defibrillators.
Comparison of Registry Surgical Results and Mayo Data

<table>
<thead>
<tr>
<th></th>
<th>Registry</th>
<th>Mayo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical mortality</td>
<td>5.4%</td>
<td>0.5%</td>
</tr>
<tr>
<td>PPM</td>
<td>13%</td>
<td>2%</td>
</tr>
<tr>
<td>MVR</td>
<td>27%</td>
<td>2%</td>
</tr>
</tbody>
</table>

2000-2010, 242 underwent myectomy at 97 hospitals

2.5 per hospital each decade
Anatomic Consequences of Myectomy and Ablation-MRI Study

Surgical septal myectomy – 34 patients

Resected tissue
2.7±1.4% of LV mass
Range 0.8-5.9

Alcohol septal ablation – 45 patients

Infarcted tissue
8±3% of LV mass
Range 3.6-13.6

Valeti, JACC 2007
Rates of Sustained VT/VFib or Appropriate ICD Discharges

<table>
<thead>
<tr>
<th>Study</th>
<th>Secondary prevention</th>
<th>Primary prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICD Registry (Maron 2007)</td>
<td>11.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Alcohol Septal Ablation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Composite (4 series)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ten Cate (2010)</td>
<td>4.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Cuoco (2008)</td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Noseworthy (2009)</td>
<td></td>
<td>4.7</td>
</tr>
<tr>
<td>Mayo (McLeod EHJ 2007)</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

*1° and 2° prevention  **2.8% in pt without SCD risk factors
Alcohol Septal Ablation Outcomes
Multicenter North American Registry – 874 Patients

Symptomatic status (776±26 days)

“Average annual rate of ventricular tachycardia/ventricular fibrillation was 3.9%/year. ICD discharges – 1.2%/year.”

Nagueh: JACC 2011
Survival After Ablation
Mean Follow-Up 5-7 Years
Mayo Clinic 177 Patients

- Age 65 years mean (26-80 yrs.)
- Women - 68%
- NYHA class 3-4 dyspnea -100%

Sorajja et al: Circ, 2012
Advantages of Septal Myectomy

• Higher success rate
• Sustained ‘immediate’ relief of LVOT obstruction
• Long-term durability of benefit
• Lower rate of PPM, *Fewer late arrhythmias*?
• Address other obstructions or lesions

Advantages of Alcohol Septal Ablation

• Patient satisfaction
  - Pain
  - Recovery time
• Impact of older age and comorbidities on surgical risk
• Lower cost
Indications for Septal Reduction Therapy When Performed in Experienced Centers

- **Trial of medical therapy**
- **Persistent symptoms**
- **Acceptable surgical candidate**
  - Yes: **Surgical myectomy** (Class IIa)
  - No: **Acceptable candidate for alcohol ablation**
    - Yes: **Alcohol ablation** (Class IIa)
    - No: **Consider DDD pacing** (Class IIb)

*After balanced and reasonable discussion*

Gersh and Maron: ACCF/AHA Guidelines, 2011
Class 3

Alcohol septal ablation should not be done in patients with HCM who are less than 21 years of age and is discouraged in adults less than 40 years of age if myectomy is a viable option. *(Level of Evidence: C)*
Legislation and Sausages

Those who love the product would do well not to examine the process too closely.

Attributed to Bismarck: Time, October 1991
Rahimtoola SH
Factors Influencing Therapeutic Decision

Ablation

- Elderly
- Co-morbidities
- Limited expected life-span
- Sedentary

Other factors
- Risk of CHB
- Need for ICD

Myectomy

- Younger
- Healthy
- Long expected life-span
- Active
“I wouldn’t recommend sex, drugs or insanity for everyone, but it has always worked for me”

Hunter Thompson
Unresolved Questions

• No randomized trials and none likely – large prospective registries needed

• No conclusive data on impact of both procedures on life expectancy

• Potential for late ventricular arrhythmias after septal ablation – long term data needed

• Impact of relief of obstruction on traditional risk factors for SCD and indications for ICD, eg, exercise-induced hypotension

Answers not readily forthcoming