Septal Reduction in Hypertrophic Obstructive Cardiomyopathy

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Disclosures

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  + Medtronic
  + Boston Scientific
  + Abbot Vascular
HCM Definition

Unexplained LV hypertrophy associated with non-dilated ventricular chambers in the absence of another cardiac or systemic disease that itself would be capable of producing the magnitude of hypertrophy evident in a given patient.

- 0.2 % population
- 25-30% LVOT obstruction
- Most common genetic cardiovascular disease
Pathology

HCM Normal

Pathology
Pathology

Subaortic Fibrous Patch
HCM types

- LVOT Obstruction
  - Septal Hypertrophy + SAM
  - Dynamic
  - 1/3 patients
  - >30mmHg (surgery 50mmHg)
- Mitral Regurgitation
- Diastolic dysfunction
- Myocardial ischemia
- Autonomic dysfunction

Pathophysiology
Outflow Gradient
HOCM

PVC

Valsalva

Systolic Anterior Motion (SAM)

Causes dynamic obstruction and MR

Eject | Obstruct | Leak
Systolic Anterior Motion (SAM)

Clinical Presentation in HCM

- Asymptomatic
- Sudden cardiac death
- Congestive heart failure
- Atrial fibrillation
- Angina
Treatment Options

- High Risk of Sudden Death: ICD
- CHF:
  - Obstructive:
    - Drugs
    - Drugs + Surgery
    - Drugs + Septal Ablation
  - Non-Obstructive:
    - Transplant
- Asymptomatic: no treatment

Medical Therapy

- Betablockers
- Verapamil
- Disopyramide
Indications for Operation

- Symptomatic patients:
  - NYHA class III or IV
  - Angina
  - Syncope
- Unresponsive to medical therapy
- Peak LVOT gradient > 50 mmHg at rest or provoked
  - Resting >30 mmHg
  - Provoked >50 mmHg

Candidates represent only 5% of all HCM.

Standard Septal Myectomy
Morrow Procedure
Standard vs Extended

Standard septal myectomy
Extended septal myectomy
Results: Relieves LVOT obstruction

+ Before Myectomy

Results: Relieves LVOT obstruction

+ After Myectomy
Results: Relieves LVOT obstruction

Pre-Operative

Post-Operative
Results: Relieves LVOT obstruction

- LVOT gradient reduction
- Eliminates SAM
- Eliminates Mitral Regurgitation
- Decreases LA size and risk of atrial fibrillation
- Normalizes LV pressures and wall stress

NYHA class and Gradients

<table>
<thead>
<tr>
<th></th>
<th>Pre-Operative</th>
<th>Post-Operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYHA class III-IV</td>
<td>89%</td>
<td>6%</td>
</tr>
<tr>
<td>Mean NYHA class</td>
<td>2.9±0.7</td>
<td>1.5±0.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre-Operative</th>
<th>Post-Operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td>67 ± 41 mmHg</td>
<td>3±8 mmHg</td>
</tr>
</tbody>
</table>
Results: Operative Mortality

- Operative mortality: 0.5%
- New PPM < 5%
- New aortic regurgitation < 5%
- VSD: 0.5%

Results: Long Term Survival
Results: Long term survival

Restores normal life expectancy

Results: Long term survival
Results: freedom from cardiac death

![Graph showing survival free from sudden cardiac death over years with different therapies]

Table 1. Comparative Features of Septal-Reduction Therapies.

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Mortality</th>
<th>Residual Gradient</th>
<th>Effectiveness</th>
<th>Follow-up</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>mm Hg</td>
<td>% of Patients</td>
<td>% of</td>
<td>% of</td>
</tr>
<tr>
<td>Dual-chamber pacing</td>
<td>&lt;1</td>
<td>&gt;40</td>
<td>10–60</td>
<td>&gt;10</td>
<td>&lt;3</td>
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<tr>
<td>Septal myectomy*</td>
<td>&lt;2–3</td>
<td>&lt;10</td>
<td>&gt;80</td>
<td>&gt;10</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Septal ablation†</td>
<td>&lt;2–3</td>
<td>&lt;20</td>
<td>70–80</td>
<td>&lt;5</td>
<td>10–4</td>
</tr>
</tbody>
</table>

* Surgical septal myectomy is the only intervention that can treat concomitant problems, such as multivessel coronary artery disease, midventricular obstruction, and fixed subaortic obstruction.
† The true rates of death and complications may be underestimated, since complications may occur at a higher frequency and may be underreported.
Septal Ablation

Pre Post
**Septal Ablation**

**Pre**

**Post**

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**Spatial Ablation vs Myectomy**

**Table 1. Comparative Features of Septal-Reduction Therapies.**

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<thead>
<tr>
<th>Therapy</th>
<th>Mortality</th>
<th>Residual Gradient</th>
<th>% of Patients</th>
<th>% of Follow-up</th>
<th>Complications</th>
<th>Time to Resolution of Gradient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual-chamber pacing</td>
<td>&lt;1</td>
<td>&lt;40</td>
<td>10-40</td>
<td>10</td>
<td>Infection or perforation</td>
<td>&lt;2</td>
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<tr>
<td>Septal myectomy*</td>
<td>2-3</td>
<td>10</td>
<td>&gt;90</td>
<td>&gt;30</td>
<td>Complete heart block</td>
<td>&lt;3</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ventricular septal defect</td>
<td>&lt;1</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Aortic regurgitation</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Septal ablation†</td>
<td>2-3</td>
<td>20</td>
<td>70-80</td>
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<td>Ventricular septal defect</td>
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<td></td>
<td></td>
<td></td>
<td>Large myocardial infarction</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

* Surgical septal myectomy is the only intervention that can treat concomitant problems, such as multivessel coronary disease, intrinsic mitral-valve disease, midventricular obstruction, and fixed subaortic obstruction.

† The true rates of death and complications may be underestimated, since complications may occur at a higher frequency in the inexperienced centers and may be underreported.
Guidelines

Septal myectomy is the preferred treatment option for most severely symptomatic patients with obstructive HCM, especially in younger, healthy adults, whereas septal ablation is preferred in patients for whom surgery is contraindicated or considered high risk (particularly the elderly)