Valvular Heart Disease

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The Cardiovascular Group

Mitral Valve Prolapse

- Incidence
- Pathophysiology
- Diagnosis
- Treatment

Incidence

- 4-6%
- #1 congenital heart defect
- Autosomal dominant with varying penetrance

Pathophysiology

- “Floppy” valve
  - “Critical Volume”
- Autonomic dysfunction
  - Hypervagal (33%)
  - Hyperadrenergic (10%)
  - Mixed (54%)

Diagnosis

- History
  - Multitude of complaints or no complaints
    - #1 chest pain
    - Palpitations
    - Anxiety
    - Syncope, emboli (<1%)
    - Fatigue
    - Neuropsychiatric symptoms (increased migraines, panic attacks, anxiety disorders)
    - Occasional postural problems

Floppy mitral valve. Graphic presentation of the morphologic characteristics of normal mitral valve and floppy mitral valve associated with severe mitral regurgitation. Valve diameter (mm), valve surface area (sq mm), and chordal length (cm) are presented.

Curr Probl Cardiol, May 1991
The decades of life when a heart murmur was first detected (clear bars) and when symptoms first developed (cross-hatched bars) are shown.


Diagnosis

- Physical
  - ECG -- usually normal
  - CXR -- possible skeletal abnormality
  - ECHO -- specific criteria (prior incidence up to 20%)

Variable Contours of the Murmur of Mitral Regurgitation

A. Classic systolic regurgitant flow configuration
B. Late systolic accentuation
C. Mid-systolic accentuation
D. Tapering holosystolic
E. Systolic ejection murmur


Three phases of LV systole.

From Abrams J. Essentials of Cardiac Physical Diagnosis. Lea & Febiger, 1987

THE VALSALVA MANEUVER

- Control
- Valsalva
- Mitral regurgitation
- Aortic stenosis
- Hypertrophic CM
- Mitral prolapse

DIMINISHED VENTRICULAR FILLING

Cur Prol Cardiol 1977; 1:18

SUSTAINED HANDGRIP

- Cardiac output
- Heart rate
- Arterial pressure
- Systemic resistance
- LV filling pressure

Cur Prol Cardiol 1977; 1:20
**Increased Ventricular Filling and Contractility**

**POSTURAL CHANGES**
- Sitting or Standing
- Squatting
  - Pulmonary stenosis
  - Mitral regurgitation
  - Hypertrophic CM
  - Aortic stenosis

**CIRCULATORY CHANGES IN NORMAL PREGNANCY**
- Cardiac Output (HR + SV)
  - Blood Volume (plasma volume)
  - Systemic Vascular Resistance

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Position</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valsalva</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handgrip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After a premature beat</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Response of the Click-Murmur Complex to Various Interventions

**MVP- Anatomic: The High Risk Patient**

**High Risk Subset**
- Left Ventricular Enlargement
- Floppy mitral valve
- Sex: male
- > 50 years old
- Systolic murmur of MR

Treatment
- Usually reassurance, observation
- SBE Prophylaxis in those with clear cut prolapse/MR
- ? MVR/repair
- ? EPS
- ? ASA
- Avoidance of stimulants (caffeine), alcohol, cigarettes, diuretics, etc.
- ? Screening of relatives

Valve Surgery in Nonischemic Severe Mitral Regurgitation-ACC guidelines
- Class I
  - 1:Acute symptomatic MR for which repair is likely
  - 2:NYHA II-IV w/LVEF>.60,ESD<45mm
  - 3:Mildly reduced EF.50-.60, and ESD 45-50mm
  - 4:Mod reduced EF.30-.50 and/or ESD50-55mm

Valve Surgery in Nonischemic Severe Mitral Regurgitation-ACC guidelines
- Class IIa
  - 1:Asymptomatic, nml EF, and Atrial Fibr
  - 2:Asymptomatic, nmlEF, and pulmonary hypertension(PAS>50mmHg at rest, or>60mmHg w/exercise)
  - 3:Asymptomatic, EF.50-.60, and ESD<45-55mm
  - 4:Severely reduced EF(<.30 and/or ESD>55mm) in whom chordal preservation is highly likely

Valve Surgery in Nonischemic Severe Mitral Regurgitation-ACC guidelines
- Class IIb
  - 1:Asymptomatic, chronic MR, nml EF in whom MV repair is likely
  - 2:MVP, nml EF, w/recurrent ventricular arrhythmias despite medical Rx

Valve Surgery in Nonischemic Severe Mitral Regurgitation-ACC guidelines
- Class III
  - 1:Asymptomatic w/preserved LV function for whom significant doubt exists about the feasibility of repair

Case #1
- A 45 year old male presents complaining of increasing shortness of breath and new onset of chest pain.
- A harsh, lengthy, late peaking systolic murmur is heard at the left upper sternal border.
Case #2
- A 25 year old male complaining of malaise, fever, six weeks post dental procedure.
- A 2/6 mid peaking systolic murmur is heard at the left upper sternal border and a 2/6 diastolic decrescendo murmur is also heard at the left upper sternal border.

Bicuspid Aortic Valve Disease
- Incidence
- Natural history
- Diagnosis
- Treatment

Incidence
- Most frequent malformation of the aortic valve
- Most common congenital malformation of the heart (excluding MVP): up to 2%(births)
- Male: female 66%-73%(male)

Congenital Malformations Associated with Bicuspid Aortic Valves Among 85 Patients Over the Age of 14
- Coarctation of the aorta 5
- Patent ductus arteriosus 1
- Congenital mitral regurgitation 1
- Ebstein malformation, tricuspid valve 1
- Right aortic arch 1
- Bicuspid pulmonic valve 1
- Spontaneously-closed VSD 1
TOTAL 11/85=13%

Roberts W the congenitally bicuspid aortic valve-study of 85 autopsy cases. Am J Cardio. 1970;26;72-83

Natural History of Non-Stenotic Bicuspid Aortic Valve (10.9 yr f/u)
- No clinical change: approximately 63%
- Normally functioning valves; 17-32% at necropsy

Natural History
- Aortic valve stenosis accounts for a greater portion of the deaths
- Bicuspid aortic valve accounts for 25% of the aortic valve replacements for mixed AS/AI and 25% of pure AI from the Mayo Clinic

11. CHANGING PATTERNS OF MIXED AS/AV

<table>
<thead>
<tr>
<th>Year</th>
<th>Post Inflammatory</th>
<th>Bicuspid</th>
<th>Unicuspidal</th>
<th>Endocarditis</th>
<th>Age Mean</th>
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<tbody>
<tr>
<td>1965</td>
<td>61%</td>
<td>20%</td>
<td>11%</td>
<td>4%</td>
<td>51%</td>
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<tr>
<td>1970</td>
<td>84%</td>
<td>9%</td>
<td>4%</td>
<td>2%</td>
<td>53%</td>
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<tr>
<td>1975</td>
<td>73%</td>
<td>24%</td>
<td>4%</td>
<td>3%</td>
<td>57%</td>
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<tr>
<td>1980</td>
<td>64%</td>
<td>24%</td>
<td>5%</td>
<td>3%</td>
<td>63%</td>
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<tr>
<td>TOTAL</td>
<td>69%</td>
<td>26%</td>
<td>6%</td>
<td>2%</td>
<td>55%</td>
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12. CHANGING PATTERNS OF PURE AS REQUIRING VALVE REPLACEMENT

<table>
<thead>
<tr>
<th>Year</th>
<th>Post Inflammatory</th>
<th>Aortic Dilation</th>
<th>Bicuspid</th>
<th>Endocarditis</th>
<th>Age Mean</th>
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<tbody>
<tr>
<td>1965</td>
<td>47%</td>
<td>19%</td>
<td>27%</td>
<td>11%</td>
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<td>1970</td>
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<tr>
<td>1975</td>
<td>53%</td>
<td>18%</td>
<td>24%</td>
<td>10%</td>
<td>46%</td>
</tr>
<tr>
<td>1980</td>
<td>53%</td>
<td>21%</td>
<td>24%</td>
<td>10%</td>
<td>48%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>46%</td>
<td>21%</td>
<td>24%</td>
<td>10%</td>
<td>48%</td>
</tr>
</tbody>
</table>


32. Diagnosis-Aortic Stenosis
Cardinal Features: History
- Symptoms often in the 6th decade
- History-Onset of symptoms to death
  - Angina: 5th year
  - Syncope: 3rd year
  - CHF: 2nd year

33. Diagnosis-Aortic Stenosis
Cardinal Features: Physical
- Carotid upstroke: delayed, diminished (possibly with a thrill)
- PMI: sustained
- Auscultation: positive S4
  - S2 may be single late peaking systolic murmur to S2
Treatment

- Severe aortic valve stenosis is a surgically corrected disease
- Medicines to ameliorate symptoms

Valve Replacement in Aortic Stenosis-ACC guidelines

- Class I
  - 1: Symptomatic patients and severe AS
  - 2: Patients w/severe AS undergoing CABG
  - 3: Patients w/severe AS undergoing surgery of the aorta or other heart valves

Valve Replacement in Aortic Stenosis-ACC guidelines

- Class IIa
  - 1: Patients w/moderate AS undergoing CABG or surgery on the aorta or other heart valves
  - 2: Asymptomatic patients, severe AS and
    - LV systolic dysfunction
    - Abnormal response to exercise (eg, hypotension)

Valve Replacement in Aortic Stenosis-ACC guidelines

- Class IIb
  - 1: Abnormal response to exercise (eg, hypotension)
    - Ventricular tachycardia
    - Marked or excessive LVH (≤15mm)
    - Valve area <0.8 cm²

Valve Replacement in Aortic Stenosis-ACC guidelines

- Class III
  - 1: Prevention of SCD in asymptomatic patients with none of the above
Prevention Of Infective Endocarditis

- Procedural Incidence of bacteremia
- Estimated risk of infective endocarditis
- Recommendations for prophylaxis during various procedures that may cause bacteremia

Durack, D. NEJM, Jan. 5, 1995;332:1:38-44

Procedural Incidence of Bacteremia

- None (spontaneous bacteremia) <1 (0-3)
- Oral cavity
  - Tooth extraction 60 (16-85)
  - Periodontal surgery 88 (60-90)
  - Brushing teeth or irrigation 40 (7-50)
  - Tonsillectomy 40 (33-38)
- Respiratory tract
  - Tracheal intubation <10 (0-16)
  - Nasotracheal suctioning 16
  - Bronchoscopy
    - Rigid bronchoscope 15
    - Flexible bronchoscope 0
  - Genitourinary tract
    - Catheter insertion or removal 13 (0-26)
    - Prostatectomy
    - Sterile urine 12 (11-13)
    - Infected urine 60 (56-82)
    - Dilation of strictures 28 (19-86)
    - Normal delivery 3 (1-5)
    - Insertion or removal of intrauterine device 0

Durack, D. NEJM, Jan. 5, 1995;332:1:38-44

Estimated Risk of Infective Endocarditis Associated with Preexisting Cardiac Conditions: Relatively High Risk

- Prosthetic heart valves
- Previous infective endocarditis
- Cyanotic congenital heart disease
- Patent ductus arteriosus
- Aortic regurgitation and stenosis
- Mitral regurgitation and stenosis
- Ventricular septal defect
- Coarctation of the Aorta
- Surgically repaired intracardiac lesions with residual hemodynamic abnormality

Durack, D. NEJM, Jan. 5, 1995;332:1:38-44

Estimated Risk of Infective Endocarditis Associated with Preexisting Cardiac Conditions: Intermediate Risk

- Mitral valve prolapse with regurgitation
- Pure mitral stenosis
- Tricuspid-valve disease
- Pulmonary stenosis
- Asymmetric septal hypertrophy
- Bicuspid aortic valve or calcific aortic sclerosis with minimal hemodynamic abnormality
- Degenerative valvular disease in elderly patients
- Surgically repaired intracardiac lesions with minimal or no hemodynamic abnormality less than six months after operation

Durack, D. NEJM, Jan. 5, 1995;332:1:38-44

Estimated Risk of Infective Endocarditis Associated with Preexisting Cardiac Conditions: Very Low or Negligible Risk

- Mitral-valve prolapse w/o regurgitation
- Tricuspid valvular regurgitation on echocardiography w/o structural abnormality
- Isolated atrial septal defect
- Arterial sclerotic plaques
- Coronary artery disease
- Cardiac pacemaker
- Surgically repaired intracardiac lesions with minimal or no hemodynamic abnormality more than six months after operation

Durack, D. NEJM, Jan. 5, 1995;332:1:38-44
Recommendations for Prophylaxis During Various Procedures that may Cause Bacteremia

Prophylaxis recommended:
- Dental procedures known to induce gingival or mucosal bleeding including professional cleaning and scaling
- Tonsillectomy and adenoidealctomy
- Surgery involving gastrointestinal or upper respiratory mucosa
- Bronchoscopy w/ rigid bronchoscope
- Sclerotherapy for esophageal varices
- Esophageal dilatation

Durack, D. NEJM, Jan. 5, 1995;332;1:38-44

Recommendations for Prophylaxis During Various Procedures that may Cause Bacteremia

Prophylaxis recommended:
- Gallbladder surgery
- Cystoscopy, urethral dilatation
- Urethral catheterization if urinary infection is present
- Urinary tract surgery including prostatic surgery
- Incision and drainage of infected tissue
- Vaginal hysterectomy
- Vaginal delivery complicated by infection

Durack, D. NEJM, Jan. 5, 1995;332;1:38-44

Recommendations for Prophylaxis During Various Procedures that may Cause Bacteremia

Prophylaxis not recommended:
- Dental procedures not likely to cause bleeding
- Intraoral injection of local anesthetic
- Shedding of primary teeth
- Tympanostomy-tube insertion
- Bronchoscopy w/ flexible bronchoscope, with or w/o biopsy

Durack, D. NEJM, Jan. 5, 1995;332;1:38-44

Recommendations for Prophylaxis During Various Procedures that may Cause Bacteremia

Prophylaxis not recommended:
- Cardiac catheterization
- Gastrointestinal endoscopy, with or w/o biopsy
- Cesarean section
- In the absence of infection: urethral catheterization, dilatation and curettage, uncomplicated vaginal delivery, therapeutic abortion, insertion or removal of an IUD, sterilization procedures, laparoscopy

Durack, D. NEJM, Jan. 5, 1995;332;1:38-44

WEB PAGES – ABOUT

- The Auscultation Assistant - Hear Heart Murmurs, Heart Sounds, and Breath Sounds
  The Auscultation Assistant provides heart sounds, heart murmurs, and breath sounds in order to help medical students and...
  www.med.ucla.edu/wilkes/intro.html

- Synapse Publishing Inc. Cool Stuff - heart beats, heart sounds
  Synapse Publishing Inc. has provided these sounds solely to educate those who wish to know more about heart beats. This blog contains...
  www.medlib.com/spicoolstuff2.htm

- Normal and abnormal EKGs and heart sounds
  Normal and abnormal EKGs and Heart Sounds EKGs: Normal EKG with horizontal axis Normal EKG with vertical axis
  www.bioscience.org/atlases/heart

- Auscultation assistant
  Auscultation assistant This resource provides audio files with examples of heart sounds, heart murmurs, and breath sounds in order to help medical students and others improve their physical...
  www.wilkes.med.ucla.edu/intro.html

REFERENCES

- (Body Text)
  - (Table)
  - (Figure)
  - (Diagram)
<table>
<thead>
<tr>
<th>Indication</th>
<th>Class</th>
</tr>
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<tbody>
<tr>
<td>Discontinuation of the progestin drug</td>
<td>I</td>
</tr>
<tr>
<td>Cardiac physical examination</td>
<td>I</td>
</tr>
<tr>
<td>Phonocardiography in patients with arrhythmias, heart murmurs, or associated physical findings</td>
<td>I</td>
</tr>
<tr>
<td>Doppler echocardiography in patients for whom cardiac auscultation cannot be performed adequately because of body habitus</td>
<td>I</td>
</tr>
<tr>
<td>Repeat physical examination in 4 to 8 months for those without murmurs</td>
<td>Ib</td>
</tr>
<tr>
<td>Echocardiography in all patients before dental procedures in the absence of symptoms, heart murmurs, or associated physical findings</td>
<td>Ib</td>
</tr>
<tr>
<td>Echocardiography in patients without heart murmurs</td>
<td>II</td>
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</table>

*References: or demonstrate some or the combination of levofluridine-phenolamine or verapamil-phenolamine.

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective. Class II: Conditions for which there is conflicting evidence and/or a lack of efficacy of a procedure or treatment. For weight of evidence/opinion is in favor of usefulness/efficacy. Class III: Evidence/efficacy is less well established by evidence/opinion is in favor of usefulness/efficacy. Class IV: Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful and in some cases may be harmful.