Overview of Valvular Heart Disease: What’s New

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No disclosures
Overview

• Common Valve Lesions
  – Case based discussion
  – Guideline based management

• Focus on physical exam findings, timing of referral and pearls in management

• Updated guideline recommendations and less invasive interventional options
Case 1

62F to establish primary care. She has hypertension and no known CAD. She does not exercise regularly however denies limitation and no exertional symptoms with 3 flights of stairs. She does not smoke. Medications are HCTZ and aspirin 81mg daily. She was known to have a murmur since early adult life. She has not seen a physician in 8 years as she has felt well.

Exam: 150/80, HR 80bpm, BMI 23
- Normal JVP. Normal S1, single S2, +S4
- 3/6 late-peaking systolic murmur best at the RUSB
- carotid upstrokes are mildly delayed
- No leg edema
Transthoracic echocardiogram:
- normal biventricular size and function, LVH
- Bicuspid aortic stenosis with aortic valve area 0.9cm², peak and mean gradients of 75 and 41mmHg respectively, RVSP 40mmHg

What is the most appropriate next step?
A) BP control, Cardiac CT angiography
B) Coronary angiography & surgical evaluation
C) Transesophageal echo
D) BP control, Cardiology referral, follow up transthoracic echo in 6 months
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Aortic stenosis:

- Supravalvular
- Valvular
  - Calcific/degenerative
  - Congenital
  - Rheumatic (rare)
  - Radiation (rare)
- Subvalvular
  - Subaortic membrane
  - Hypertrophic cardiomyopathy
Calcific/Degenerative Aortic Stenosis (AS)

- Age related degeneration
- Progressive disease
  - Systemic disease
- AS in 10% of octogenarians
- Risk factors mimic those for coronary atherosclerosis
Bicuspid Aortic Valve Disease

• Common: 1-2% of the population
• Complications:
  – aortic stenosis (75%)
  – aortic regurgitation (15%)
  – ascending aortic aneurysms (aortopathy)
  – endocarditis
• Mid systolic ejection click
• Among patients with aortic coarctation 50-60% have bicuspid aortic valves
Onset of symptoms portends poor prognosis

Severe Aortic Stenosis:

**Definition:**
- Mean pressure gradient $\geq 40\text{mmHg}$
- Peak velocity of $\geq 4\text{m/sec}$
- Aortic valve area of $\leq 1.0\text{cm}^2$

**Indications for intervention:**

- **Symptoms**
  - If symptoms equivocal:
    - Exercise provoked symptoms
  - If asymptomatic:
    - very severe stenosis (mean gradient $\geq 60\text{mmHg}$)
    - or ventricular compromise
How best to intervene?

• Balloon Valvuloplasty
  – Young: congenital aortic stenosis
  – Elderly: bridge to intervention or palliative

• Surgical Aortic Valve Replacement (SAVR)

• Transcatheter Aortic Valve Replacement (TAVR)
Transcatheter AVR (TAVR)

- Sapien Valve (Edwards)
- CoreValve (Medtronic)
Transcatheter or Surgical Aortic-Valve Replacement in Intermediate-Risk Patients


STS score 4-8% risk of peri-operative death, or <4% if comorbidities
Time to event for primary composite endpoint

A Intention-to-Treat Population

Hazard ratio, 0.89 (95% CI, 0.73–1.09)
P = 0.25

No. at Risk
TAVR 1011 918 901 870 842 825 811 801 774
Surgery 1021 838 812 783 770 747 735 717 695

B As-Treated Population

Hazard ratio, 0.87 (95% CI, 0.71–1.07)
P = 0.18

No. at Risk
TAVR 994 917 900 870 842 825 811 801 774
Surgery 944 826 807 779 766 743 731 715 694

Months since Procedure

Death from Any Cause or Disabling Stroke (%)
Surgery TAVR
Case II:

58M with history of hypertension, low back pain and obesity presents with new cough, exertional dyspnea for urgent care visit. Symptoms for about 2-3 weeks, inquires about antibiotics. Denies chest symptoms, notes some trouble sleeping at night due to cough and dyspnea while flat.

Exam: BP 148/90, HR 94, BMI 36
- JVP is normal
- S1 and S2 normally split, 2/6 holosystolic murmur at the apex, no diastolic murmurs
- Lungs: with crackles, bilaterally, R>L
- No leg edema
You order a chest X-ray

- **The next best step includes:**
- A) Antibiotics for atypical pneumonia
- B) Pulmonary function testing
- C) Echocardiogram to evaluate mitral regurgitation
- D) Echocardiogram to evaluate mitral stenosis
You order a chest X ray

• **The next best step includes:**
  • A) Antibiotics for atypical pneumonia
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  • C) Echocardiogram to evaluate mitral regurgitation
  • D) Echocardiogram to evaluate mitral stenosis
Mitral Regurgitation

**ACUTE**
- Acute chordal rupture (MVP)
- Ischemic MR
- Papillary muscle rupture
- Prosthesis failure

**CHRONIC**

Organic valve disease (primary)
- Mitral valve prolapse (MVP)
- Leaflet perforation (endocarditis)
- Congenitally abnormal MV

Functional regurgitation (secondary)
- Annular dilation
- Papillary muscle dysfunction
Mitral valve prolapse

- Degenerative myxomatous leaflets
- Displacement of MV leaflets towards the LA during systole, more than 2mm beyond the mitral annular plane
- Progressive chordal lengthening, rupture
- Mid systolic click and late systolic murmur; Severe MR will be holosystolic
Bileaflet Mitral Valve Prolapse

Normal
Mitral regurgitation due to bileaflet prolapse
Indications for Intervention with Mitral Regurgitation

- **Class I:**
  - Severe symptomatic primary MR
    - LVEF > 30%
  - Severe asymptomatic primary MR
    - Mild-moderate reduced LVEF 30-60%

- **Class IIa:**
  - Asymptomatic severe MR with normal LVEF
    - *AND:* high likelihood of successful repair
    - *OR:* new onset atrial fibrillation or pulmonary hypertension

Nishimura Circ 2014
Quadrangular Resection of the Posterior Leaflet

Foster NEJM 2010
Mitral Valve Prolapse Repair:
Surgery was superior to MitraClip in MR reduction;
MitraClip was safer than surgery due to lower risk of transfusion.
Catheter-Based Mitral Valve Repair:
Case III

65F with history of anxiety presents for evaluation of exertional dyspnea and palpitations. No recent illnesses, fever, dental work or sick exposure. She takes no medications. She endorses orthopnea, but no chest symptoms, nocturnal dyspnea or syncope.

Exam: 122/80, HR 86bpm and irregular, BMI 28
- JVP 12cmH$_2$O
- Irregular loud S1, normal S2, 2/6 holosystolic murmur at the apex, 3/4 low pitched diastolic murmur following an opening snap
- Lungs are clear bilaterally without dullness
- 1+ leg edema
TTE with normal BiV size and function, left atrial enlargement, rheumatic mitral stenosis with mean gradient of 12mmHg, mitral valve area of 0.9cm², moderate mitral regurgitation, PASP 50-55mmHg

Which is the best treatment option?

A) aspirin and beta blocker
B) anticoagulation and mitral balloon valvuloplasty
C) anticoagulation and mitral valve surgery
D) anticoagulation, follow up in one year
E) aspirin, follow up and repeat echo in 6 months
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Mitral stenosis

• **Etiology:**
  – Rheumatic (>80%)
  – Calcific (renal failure, calciphylaxis, advanced HTN)
  – Congenital (parachute mitral valve, repaired cleft MV)
  – Status post repair/replacement

• **Severe Mitral Stenosis:**
  – Mitral valve area < 1.5cm$^2$ *(very severe MS < 1.0cm$^2$)*
  – (mean gradient >10mmHg)
  – PA Systolic Pressure > 50mmHg

• Elevated LA pressures ➔ Atrial fibrillation
Management

• **Anticoagulation for AF with MS is a must**
• Rate control to improve diastolic filling time
• Diuretics to reduce LA pressure
• If severe and symptomatic intervention is necessary
Mitral Stenosis Intervention:

**Symptomatic Severe MS**
- Percutaneous Balloon Commissurotomy (PMBC)
  - Favorable mitral anatomy (minimal calcification and thickening)
  - ≤ mild mitral regurgitation
  - Complications: stroke, increased MR, tamponade
- Surgical Mitral Valve Replacement
  - If unfavorable mitral anatomy for PBV or concomitant MR

**Asymptomatic Severe MS**
- Intervention:
  - New onset atrial fibrillation
    (Class I if very severe, class IIa if severe)
**Anticoagulation for AF with MS is a must**
Summary

• Severe valvular disease warrants intervention if symptoms or ventricular compromise

• Careful physical exam and review of all primary data is absolutely critical

• Endocarditis prophylaxis and education for patients at high risk of mortality if endocarditis is acquired
Thank You!

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Abnormal Aortic Valve With Reduced Systolic Opening

Severe AS
$ V_{\text{max}} \geq 4 \text{ m/s} $
$ \Delta P_{\text{mean}} \geq 40 \text{ mm Hg} $

Symptomatic (stage D1)

Asymptomatic (stage C)

LVEF <50% (stage C2)

Other cardiac surgery

$ V_{\text{max}} \geq 5 \text{ m/s} $
$ \Delta P_{\text{mean}} \geq 60 \text{ mm Hg} $
Low surgical risk

Abnormal ETT

$ \Delta V_{\text{max}} > 0.3 \text{ m/s/y} $
Low surgical risk

AVR (I)

AVR (IIa)

AVR (IIb)

$ V_{\text{max}} \geq 3 \text{ m/s} - 3.9 \text{ m/s} $
$ \Delta P_{\text{mean}} 20 - 39 \text{ mm Hg} $

Symptomatic

LVEF <50%

YES

DSE with AVA $\leq 1 \text{ cm}^2$ and $ V_{\text{max}} \geq 4 \text{ m/s} $ (stage D2)

AVA $\leq 1 \text{ cm}^2$ and LVEF $\geq 50\%$ (stage D3*)

AS likely cause of symptoms

AVR (IIa)

Asymptomatic (stage B)

Other cardiac surgery

Class I

Class IIa

Class IIb
Endocarditis prophylaxis

• ACC/AHA 2007 Recommendations (Dental):
  – Previous endocarditis
  – Prosthetic heart valve
  – Heart transplant recipients
  – Congenital Heart Disease (CHD)
    • Unrepaired cyanotic CHD
    • Repaired CHD with prosthetic material (first 6 months post procedure)
    • Repaired CHD with residual defects at the site or adjacent to prosthetic patch material or device

**VSD, Bicuspid Aortic Valves, MVP are higher risk lesions and discussion may be warranted**