

**emergent valvular disorders**  
[created by Paul Young 11/10/07]

**general**

- includes both acute valve dysfunction resulting in acute heart failure & chronic valve disease with decompensation due to increased metabolic demands
- regurgitation is the most common type of acute valve dysfunction; with rare exceptions stenosis is a chronic, slowly progressive condition.
- in patients with asymptomatic chronic stenosis, decompensation can occur due to a superimposed haemodynamic burden
- examples of this include mitral stenosis presenting with acute pulmonary oedema in the setting of systemic infection & aortic stenosis presenting with cardiogenic shock in the setting of acute GI bleeding

**causes of acute valve dysfunction**

- mitral regurgitation:**
  - myxomatous disease with flail leaflet
  - spontaneous chordal rupture
  - endocarditis
  - in acute myocardial infarction due to:
    - (i) papillary muscle rupture
    - (ii) regional wall motion abnormality
    - (iii) left ventricular dilation and systolic dysfunction
- aortic regurgitation:**
  - endocarditis
  - spontaneous rupture of a congenital fenestration
  - aortic dissection
- tricuspid regurgitation:**
  - endocarditis
  - penetrating chest trauma
  - blunt chest trauma
- prosthetic valves:**
  - endocarditis
  - valve thrombosis
  - paravalvular dehiscence
  - leaflet tear

**mitral regurg**

- general:**
- MR may be caused by disease of distortion of any component of the mitral valve apparatus including the mitral valve annulus, leaflets, chordae & papillary muscles as well as by alterations in left ventricular geometry or systolic function
- clinical presentation:**
- although patients with chronic mitral regurgitation may be asymptomatic for many years, the regurgitant lesion imposes a volume load on the left ventricle because an increased total stroke volume is needed to maintain a normal forward cardiac output
  - chronic mitral regurgitation is usually well tolerated even when there is a superimposed haemodynamic load such as systemic infection, pregnancy or trauma
  - chronic mitral valve severity may suddenly worsen due to:
    - (i) a sudden increase in afterload for example due to hypertensive crisis
    - (ii) alteration in LV geometry resulting in a larger regurgitant orifice area (for example left ventricular dilatation due to decompensated heart failure)
  - acute mitral regurgitation presents with pulmonary oedema and is a surgical emergency
- management:**
- in chronic MR and heart failure, management is directed at treating the process that lead to decompensation & optimising loading conditions
  - acute severe MR is a surgical emergency. Medical stabilisation should occur concurrently with cardiac surgical referral. Acutely, placement of an IABP provides optimal afterload reduction while improving diastolic coronary blood flow.
  - timing of surgical intervention depends on the aetiology of the acute MR:
    - (i) spontaneous chordal rupture can usually be treated with mitral valve repair
    - (ii) timing of repair in endocarditis varies but most centres favour repair as early as possible and recent studies suggest delaying surgery does not decrease infection
    - (iii) acute ischaemic MR due to RWMA may improve after percutaneous revascularisation & IABP and medical therapy may be sufficient to get patient through as myocardial function improves
    - (iv) acute ischaemic MR due to papillary muscle rupture requires urgent surgery [urgent surgery has a 50% mortality; however, without surgery complete rupture has a 95% two week mortality]. Some surgeons advocate a period of medical stabilisation in the presence of partial papillary muscle rupture

**mitral stenosis**

- general:**
- mitral stenosis is nearly always due to Rheumatic heart disease & is a slowly progressive disease with insidious onset over many years
  - rarer causes are left atrial myxoma, ball-valve thrombus, annular calcification, SLE
- clinical presentation:**
- in asymptomatic patients with compensated moderate or severe mitral stenosis, acute decompensation can occur in the setting of increased systemic haemodynamic demands
  - because mitral stenosis most commonly occurs in women (80%) and occurs in the reproductive years, the most common emergency presentation is of a pregnant or post-partum woman with heart failure
  - the clinical presentation may also be caused by or exacerbated by atrial fibrillation
  - main symptoms are breathlessness on exertion, recurrent bronchitis, fatigue, palpitations, AF, haemoptysis and stroke
  - classic signs are mitral facies, small volume pulse, right ventricular hypertrophy, a tapping apex due to a palpable first heart sound, a loud first heart sound & an opening snap with a diastolic murmur
- management:**
- most patients with mitral stenosis and acute decompensation can be managed conservatively with treatment of the superimposed illness
  - efforts should be directed towards increasing oxygen delivery and decreasing oxygen demand
  - if atrial fibrillation is present rate and/or rhythm control is required
  - beta blockers may improve ventricular function by improving diastolic filling
  - in patients who do not respond to conservative therapy, urgent percutaneous balloon mitral valvotomy should be performed; patients with left atrial thrombus, co-existing moderate to severe MR or deformed valves may require urgent valve replacement

**aortic stenosis**

- general:**
- valvular aortic stenosis in adults is most commonly due to calcification of a normal trileaflet or bicuspid aortic valve
- clinical features:**
- aortic stenosis is a chronic, slowly progressive disease that presents acutely only at a late stage or in the face of increased haemodynamic demands due to intercurrent illness
  - the main symptoms are angina, syncope & breathlessness
  - typical signs are a slowly rising pulse, evidence of LVH & a harsh systolic murmur radiating into the neck
- management:**
- most patients with decompensated aortic stenosis can be managed conservatively by treating the underlying disease process that led to the acute decompensation
  - a preliminary study has shown that cautious use of nitroprusside may improve haemodynamics before valve replacement in patients with severe decompensated aortic stenosis and a mean arterial pressure greater than 60mmHg

**right-sided disease**

- pulmonic valve disease is nearly always congenital in origin with a chronic disease course
- tricuspid valve stenosis is rare and usually accompanies rheumatic mitral valve disease
- tricuspid regurgitation can present acutely with severe aortic regurgitation due to endocarditis or to blunt or penetrating chest wall trauma

**mechanical valves**

- mechanical heart valves are very durable and complications are most often due to valve thrombosis or paravalvular regurgitation
- valve thrombosis occurs in the setting of inadequate anticoagulation & may result in either functional stenosis or regurgitation (depending on whether the clot impedes opening or closing of the valve)
- treatment of valve thrombosis is controversial with options including systemic anticoagulation, thrombolysis and occasionally urgent surgery
- paravalvular regurgitation early after valve replacement may be related to suture dehiscence at a site of annular calcification. There may be associated haemolytic anaemia.
- can be treated conservatively, but may require re-operation if severe
- new onset of paravalvular leak should prompt careful evaluation for endocarditis

**tissue valves**

- tissue valves are subject to degeneration of the leaflets with superimposed calcification that may result in stenosis or regurgitation
- degeneration is usually a slowly progressive process with presentation 10-15 years after valve replacement
- as with native valve disease, acute decompensation can occur with superimposed haemodynamic stress

**aortic regurg**

- general:**
- chronic aortic regurg is most often due to a congenital bicuspid aortic valve, rheumatic valve disease or aortic root dilation
  - there are numerous causes of aortic root dilation including hypertension, cystic medial necrosis, Marfan syndrome & congenital bicuspid aortic valve
  - the most common causes of acute aortic regurgitation are endocarditis, rupture of a congenital fenestration and acute aortic dissection
  - endocarditis results in aortic regurgitation by destruction of valve leaflet tissue & is often associated with paravalvular abscess
  - aortic dissection can cause AR by either enlargement of the aortic annulus or extension into the valve region causing flail
- clinical presentation:**
- acute backflow from the aorta into the LV results in elevated LVEDP which leads to acute pulmonary oedema
  - because there is no time for compensatory LV dilatation, forward cardiac output falls abruptly due to regurgitant flow in diastole so that patients with acute AR may be in cardiogenic shock
  - decreased coronary perfusion pressure results in subendocardial ischaemia further impairing LV function
- management:**
- acute aortic regurgitation is a surgical emergency
  - preoperative management is supportive with ventilatory support and haemodynamic monitoring
  - if aortic aortic regurgitation is due to aortic dissection, acute surgical intervention is needed.
  - The surgical approach may be replacement of the ascending aorta and valve with a Dacron or Gore-Tex valved conduit. When the valve leaflets are normal, some centres will preserve the native valve in a prosthetic conduit (called the David procedure)
  - when acute aortic regurgitation is due to endocarditis, surgical options include a mechanical valve, heterograft tissue valve or cryopreserved homograft aortic valve