

valvular_disease_notes

Tom Shannon

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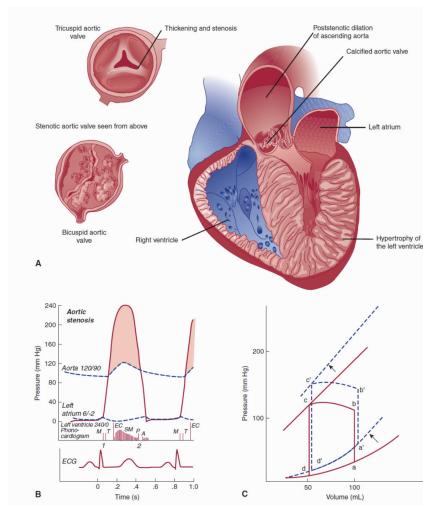
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1 Aortic Stenosis

- In descending order of frequency, the three characteristic symptoms of aortic stenosis are
 - chest pain (angina pectoris)
 - * Increased demand, decreased supply (compression)
 - * Sometimes coronary artery disease is present
 - syncope
 - heart failure
- On auscultation, a midsystolic murmur is heard, loudest at the base of the heart, and often with radiation to the sternal notch and the neck.
- Normal = $3.5 - 4.0 \text{ cm}^2$, critical at 0.8 cm^2
- Wall thickens symmetrically in an effort to reduce wall stress with very high pressure but cavity radius remains unchanged - **concentric hypertrophy**
- Pressure-volume loop in aortic stenosis.

- The left ventricle becomes thickened and less compliant, forcing the diastolic pressure-volume curve upward, which results in elevated left ventricular end-diastolic pressure.
- increased afterload
- hypertrophy of the ventricle results in increased inotropic force

Type	Pathology	Clinical Presentation
Congenital	The valve can be unicupid, bicuspid, or tricuspid with partially fused leaflets. Abnormal flow can lead to fibrosis and calcification of the leaflets.	Patient usually develops symptoms before age 30 years.
Rheumatic	Tissue inflammation results in adhesion and fusing of the commissures. Fibrosis and calcification of the leaflet tips can occur because of continued turbulent flow.	Patient usually develops symptoms between ages 30 and 70 years. Often the valve will also be regurgitant. Accompanying mitral valve disease is frequently present.
Degenerative	Leaflets become inflexible because of calcium deposition at the bases. The leaflet tips remain relatively normal.	The most likely cause of aortic stenosis in patients older than 70 years. Particularly prevalent in patients with diabetes or hypercholesterolemia.

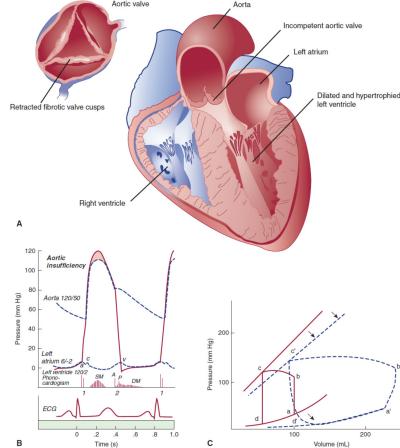


2 Aortic Regurgitation

- pounding pulse
- three murmurs may be heard:
 - a high-pitched early diastolic murmur
 - a diastolic rumble called the Austin Flint murmur - The Austin Flint murmur is thought to result from regurgitant flow from the aortic valve impinging on the anterior leaflet of the mitral valve, producing functional mitral stenosis.
 - a systolic murmur.
- Volume overload → eccentric hypertrophy where dilation and thickening takes place - the ventricular cavity enlarges laterally in the chest and becomes eccentric to its normal position
- Pressure-volume loop in chronic aortic insufficiency.

- Marked enlargement in left ventricular volume shifts the diastolic pressure-volume curve rightward.
- Hypertrophy of the ventricle shifts the isovolumic pressure-volume curve leftward (not shown), but ultimately the ventricle dilates and contractility decreases and the isovolemic pressure-volume curve shifts to the right.
- Stroke volume is enormous
- no isovolumic periods exist.

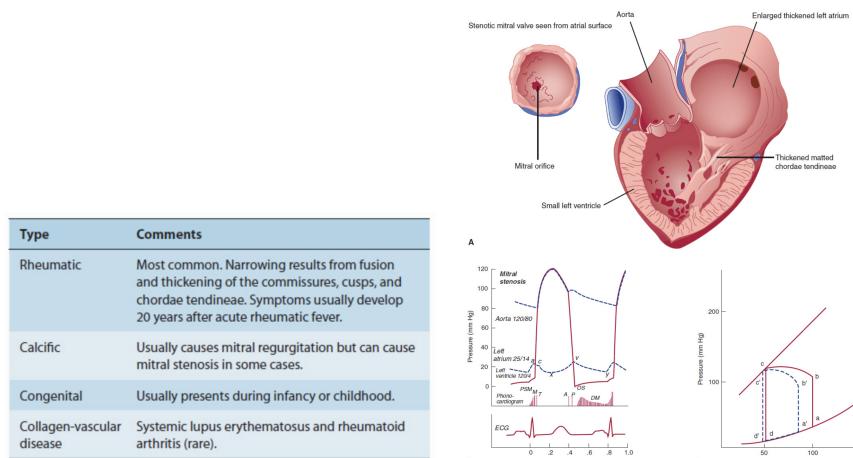
Site	Pathology	Causes	Time Course
Valvar	Cusp abnormalities		
	Endocarditis	Acute or chronic	
	Rheumatic disease	Acute or chronic	
	Ankylosing spondylitis	Usually chronic	
	Congenital	Chronic	
Aortic	Dilation		
	Aortic aneurysm	Acute or chronic	
	Heritable disorders of connective tissue	Usually chronic	
	Marfan syndrome		
	Ehlers-Danlos syndrome		
	Osteogenesis imperfecta		
	Inflammation		
	Aortitis (Takayasu)	Usually chronic	
	Syphilis	Usually chronic	
	Arthritic diseases	Usually chronic	
	Ankylosing spondylitis		
	Reiter syndrome		
	Rheumatoid arthritis		
	Systemic lupus erythematosus	Acute or chronic	
	Cystic medial necrosis		
	Tears with loss of commissural support		
	Trauma	Usually acute	
	Dissection, often from hypertension	Usually acute	



3 Mitral Stenosis

- The characteristic murmur of mitral stenosis is a late low-pitched diastolic rumble. In addition, an opening snap may be heard in the first portion of diastole.
- The mitral valve area is usually 5–6 cm²; clinically relevant mitral stenosis usually occurs when the valve area decreases to less than 1 cm².
- Atrial enlargement is characteristic and patients are prone to arrhythmias.
- Reduced outflow leads to dilation of the left atrium and stasis of blood flow. Thrombus in the left atrium is observed on echocardiography in approximately 20% of patients with mitral stenosis, and the prevalence increases with age, presence of atrial fibrillation, severity of stenosis,

and any reduction in cardiac output. Embolic events that lead to neurologic symptoms occur in 8% of patients in sinus rhythm and in 32% of patients with chronic or paroxysmal atrial fibrillation. In addition, left atrial enlargement can sometimes impinge on the recurrent laryngeal nerve and lead to hoarseness (Ortner syndrome).



4 Mitral Stenosis

- In the past, rheumatic heart disease accounted for most cases of mitral regurgitation. Mitral valve prolapse is now probably the most common cause, followed by coronary artery disease.
- Cardinal features include
 - left atrial enlargement
 - left ventricular enlargement (hypertrophy in acute lesions)
 - prominent v wave caused by filling from both the pulmonary veins and the regurgitant jet
 - holosystolic murmur - it is usually heard best at the apex and often radiates to the axilla.
- Pressure-volume loop in mitral insufficiency
 - Increased ventricular volumes shift the diastolic pressure-volume curve rightward
 - Stroke volume is increased

- isovolemic pressure-volume curve eventually shifts to the right with chronic volume overloads

Type	Causes
Acute	
Ruptured chordae tendineae	Infective endocarditis Trauma Acute rheumatic fever "Spontaneous"
Ruptured or dysfunctional papillary muscles	Ischemia Myocardial infarction Trauma Myocardial abscess
Perforated leaflet	Infective endocarditis Trauma
Chronic	
Inflammatory	Rheumatic heart disease Collagen-vascular disease
Infection	Infective endocarditis
Degenerative	Myxomatous degeneration of the valve leaflets Calcification of the mitral annulus
Rupture or dysfunction of the chordae tendineae or papillary muscles	Infective endocarditis Trauma Acute rheumatic fever "Spontaneous" Ischemia Myocardial infarction Myocardial abscess
Congenital	
	Developmental anomalies

