

Valvular Heart Disease- Cardiovascular

Mitral Stenosis

Stenosis=narrowing or restriction

Usually results from rheumatic carditis after rheumatic fever

Causes valve thickening by fibrosis and calcification

Characteristics of mitral stenosis:

- Valve leaflets fuse and become stiff
- Chordae tendinae contract and shorten
- Valve opening narrows and prevents normal blood flow from the left atrium to the left ventricle
- Increased left atrial pressure
- Left atrium dilates
- Increased pulmonary artery pressure
- Right ventricle hypertrophies

Pulmonary congestion and right sided heart failure occur and decreased cardiac output will result over time

Signs/symptoms:

- Dyspnea on exertion
- Orthopnea
- Paroxysmal nocturnal dyspnea
- Palpitations
- Dry cough
- Hemoptysis
- Pulmonary edema
- Right sided heart failure- hepatomegaly, neck vein distention, pitting edema

Mitral regurgitation (insufficiency)

Prevents mitral valve from closing all the way during systole. This results from fibrotic and calcific changes in the mitral valve

This causes **backflow** into the left atrium during systole. During diastole, the blood flows into the left ventricle which increases the amount of volume needing to be ejected. This increased volume and pressure cause the left atrium and ventricle to **dilate and hypertrophy**

Causes:

- Degenerative due to aging
- Infective endocarditis
- Rheumatic heart disease

Signs/symptoms:

Symptoms begin to develop when the left ventricle fails because of chronic fluid volume overload

- Fatigue, weakness- due to decreased cardiac output
- Dyspnea on exertion
- Orthopnea
- Anxiety
- Chest pain
- Palpitations
- Right sided heart failure- hepatomegaly, pitting edema, neck vein distention

Mitral Valve Prolapse

Mitral valve prolapse occurs because valvular leaflets enlarge and prolapse into the left atrium during systole. This can eventually lead to mitral regurgitation.

Most patients are **asymptomatic** but can experience chest pain, palpitations, and exercise intolerance.

Aortic Stenosis

Aortic stenosis is the most common valve dysfunction.

The aortic valve narrows and obstructs left ventricular output during systole. This eventually results in ventricular hypertrophy. This then causes the left ventricle to fail which leads to blood backing up in the atrium causing pulmonary congestion. Right sided heart failure can develop as a result.

Causes:

- Congenital abnormalities
- Rheumatic disease
- Atherosclerosis

Signs/symptoms:

- Dyspnea
- Angina
- Syncope
- Peripheral cyanosis

- Fatigue
- Crescendo-decrescendo murmur

Aortic Regurgitation (insufficiency)

Aortic valve leaflets do not close properly during diastole. This allows blood to backflow into the left ventricle during diastole.

This eventually results in left ventricular hypertrophy as the left ventricle dilates to compensate for the increase blood volume.

Causes:

- Infective endocarditis
- Congenital anomalies
- Hypertension
- Marfan Syndrome

Signs/symptoms:

Asymptomatic for many years

- Exertional dyspnea
- Orthopnea
- Paroxysmal nocturnal dyspnea
- Palpitations
- Nocturnal angina

Diagnostics for Valvular Heart Disease

Echocardiography- to visualize the structure and movement of the heart

Transesophageal echocardiography (TEE)- to assess for valve problems

Cardiac catheterization may be needed to assess severity

ECG- to assess for abnormalities. May see Atrial Fibrillation in mitral stenosis, mitral regurgitation, and atrial stenosis.

Nonsurgical Management of Valvular Heart Disease

Medication therapy:

Diuretics, beta-blockers, digoxin, and oxygen to improve symptoms of heart failure

Calcium channel blockers to decrease regurgitant flow with aortic and mitral stenosis

- ****Antibiotic prophylaxis before invasive procedures is imperative for patients with valve disorders****

If Atrial Fibrillation develops, then the patient will be at increased risk of thrombi formation. If A. Fib occurs, patients will need to be started on an **anticoagulant** such as **warfarin** to prevent thrombi formation.

Cardioversion may be needed for patients who develop A. Fib.

If a patient remains in A. Fib, then **amiodarone** can be used.

Noninvasive Repair of Valvular Heart Disease

Balloon valvuloplasty- for mitral or aortic stenosis. Rarely lasts longer than 6 months.

- Mitral valvuloplasty- balloon is inserted through femoral vein and fed to the atrial septum and then the mitral valve. The balloon is then inflated to enlarge the mitral orifice.
- Aortic valvuloplasty- balloon is inserted through the femoral artery and fed to the aortic valve. The balloon is then inflated to enlarge the aortic orifice.

Utilize post-angiogram precautions for patients who undergo balloon valvuloplasty

- Monitor for bleeding at insertion site
- Observe for signs of a systemic emboli

Surgical Management

Direct commissurotomy- cardiopulmonary bypass during open heart surgery. Surgeon removes thrombi from the atria, incises the fused leaflets, and debrides calcium from the leaflets

Mitral valve annuloplasty- regurgitation is eliminated or reduced by making the annulus smaller; leaflet repair is also done concurrently

Heart valve replacement:

Heart valve replacement is achieved by either using a biological/tissue valve replacement or a prosthetic/mechanical valve replacement

Biological/tissue valve

- Biological valves cannot be used for aortic stenosis
- Little risk associated with clot formation so long-term anticoagulation therapy is not indicated
- Must be replaced every 7-10 years
- Infections are easier to treat

Prosthetic/mechanical valves

- Requires lifelong anticoagulation therapy
- Subject to mechanical failure
- Infections are harder to treat

A preoperative dental examination will need to be completed before surgery. All periodontal disease and dental caries will need to be resolved.

Patients should stop taking anticoagulants at least 72 hours before the procedure.

Post-operative nursing interventions for heart valve replacement:

(Similar to those for a CABG)

- Monitor cardiac output and assess for signs of heart failure
- Monitor hemodynamic status for signs of compromise
- Monitor ECG continuously for disturbances in heart rate and rhythm
- Maintain patient's Mean Arterial Pressure (MAP) between 70-100 mmHg
- Check ABGs every 2-4 hours and adjust the ventilator settings as needed
- Assess chest tubes for signs of hemorrhage, excessive drainage, and a sudden decrease or cessation of drainage
- Administer analgesics for pain as prescribed and indicated
- Monitor for fluid and electrolyte imbalances, especially hypokalemia
- Teach patients how to care for their sternal incision and how to monitor for s/s of infection
- Teach patients to avoid heavy physical activity for 3-6 months
- Teach patient that they should wear a medical alert bracelet indicating they have had a valve replacement
- Teach patients they are at an increased risk of infective endocarditis
- Teach patients who have prosthetic valves that they will be on prophylactic anticoagulants. Teach them s/s to report to their provider such as excessive bleeding, excessive bruising, etc.
- Teach patients they should avoid dental procedures for 6 months after surgery