Management of Patients With Structural, Infectious, and Inflammatory Cardiac Disorders

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Classification of Valvular Disorders
Pathophysiology of Valvular Disorders
Medical Management: Surgical Treatment
Nursing Process
Classification of Cardiomyopathy
Medical Management: Heart Transplantation
Classification of Infectious Diseases of the Heart
Medical Management
BLOOD FLOW THROUGH THE CARDIAC VALVES

Tissue Paper My Assets

• Tricuspid
• Pulmonic
• Mitral
• Aortic
AUSCULATING HEART VALVE SOUNDS

Aortic  Pulmonic
APE

Tricuspid  To  Man

Coronary arteries
Aortic (semilunar) valve

Tricuspid valve
Mitral valve

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Heart Sounds

- **S1**
  - forms the "lubb" of "lubb-dub"
  - is composed of components M1 and T1 (closure of the atrioventricular valves)

- **S2**
  - forms the "dub" of "lubb-dub"
  - is composed of components A2 and P2 (closure of the aortic valve and pulmonary valve at the end of ventricular systole)

- **S3**
  - Rapid ventricular filling (when fail to eject all of their blood during systole), Gallop sound, lying on the left side for auscultation

- **S4**
  - During atrial contraction (enlarged resistant to filling)
Pressure Changes in Left Heart

- **Aortic Pressure**
  - Aortic valve closes
  - Aortic valve opens

- **Atrial Pressure**
  - AV valve closes
  - AV valve opens

- **Ventricular Pressure**

Heart Sounds

- S3
- S4
- S1
- S2
Valvular Disorders

- **Regurgitation**: the valve does not close properly and blood backflows through the valve.
- **Stenosis**: the valve does not open completely and blood flow through the valve is reduced.
- **Valve prolapse**: the stretching of an atrioventricular valve leaflet into the atrium during diastole.
Murmurs, created by turbulent flow of blood

(A) Blood volume ↑

(B) Narrowing of the valve (Stenosis)

(C) Blood backflows

(D) Does not open completely

Regurgitation

Shunt
Specific Valvular Disorders (pp. 879-883, pathophysiology, clinical manifestations, assessment and diagnostic findings, medical management)

- Mitral valve prolapse: enlargement of one of the leaflets
- Mitral regurgitation: thickened, fibrotic leaflets
- Mitral stenosis: narrowing
- Aortic regurgitation: flow back into the LV with diastole
- Aortic stenosis: narrowing of opening between LV and aorta
Pathophysiology: Left Heart Failure as a Result of Aortic and Mitral Valvular Heart Disease

Brunner & Suddarth’s textbook, Figure 29-2, pp. 916
Nursing Assessment

- Patient may become suddenly ill or slowly develop symptoms over many years
- Question patient about attacks of rheumatic fever, infective endocarditis, and possibility of IV drug abuse
- Obtain chest x-ray, echocardiogram, and exercise tolerance test
Nursing Diagnoses

- Decreased cardiac output related to altered stroke volume
- Impaired gas exchange related to ventilation perfusion imbalance
- Activity intolerance related to inability of the heart to meet metabolic demands during activity
- Acute pain related to physiologic injury agent (hypoxia)
Non-Surgical Management

- Drug therapy
  - Diuretics, $\beta$-blocker, Digoxin, Nitrates, anticoagulant, etc.
- Oxygen
- Prophylactic antibiotics
- Management of Af, cardioversion
- Rest with limited activity
Antibiotic Prophylaxis

- Mechanical valve replacements including annuloplasty or other prosthetic material
- Valvular defects including mitral click and murmur or mitral regurgitation, mitral stenosis, aortic stenosis, and aortic regurgitation
- A history of rheumatic heart disease, endocarditis, or myocarditis
- Antibiotic prophylaxis is required for dental procedures and surgical interventions, including GU and GI procedures, to prevent endocarditis
Valve Repair and Replacement Procedures

- Valvuloplasty
  - Commissurotomy: open or closed
  - Balloon valvuloplasty: open or closed
  - Annuloplasty
  - Leaflet repair
  - Chordoplasty
- Valve replacement
Balloon Valvuloplasty

Cross-section of heart illustrating the guide wire and dilation catheter placed through an atrial transseptal puncture and across the mitral valve. The guide wire is extended out from the aortic valve into the aorta for catheter support.
Annuloplasty Ring Insertion

Mitral valve regurgitation, leaflets do not close
Valve Leaflet Resection and Repair with Ring Annuloplasty

Approximation of edges and suturing

Mitral valve regurgitation, the section indicated by dashed lines is excised
Valve Replacement

Prosthetic tissue valve

Sutures already placed through valve’s ring

Sutures ready to be placed through valve’s ring

Valve orifice

Sutures placed around annulus to anchor prosthetic valve

Prosthetic valve in place at the completion of the procedure
Types of Replacement Valves

- Mechanical valves
  - Do not deteriorate or become infected as easily, but are thrombogenic and require life-long anticoagulation therapy

- Tissue (biologic) valves
  - Xenograft (heterograft): pig or cow valve
  - Homograft (allograft): human valve
  - Autograft: patient’s own valve
Mechanical Valves

A. Caged ball valve
B. Tiling-disk valve
C. Porcine heterograft valve
Cardiomyopathy

- Cardiomyopathy is a series of progressive events that culminates in impaired cardiac output and can lead to heart failure, sudden death, or dysrhythmias.
- Types:
  - Dilated cardiomyopathy
  - Hypertrophic cardiomyopathy
  - Restrictive cardiomyopathy
  - Arrhythmogenic cardiomyopathy
  - Unclassified cardiomyopathies
Types of Cardiomyopathy

Figure 37-13, pp. 887
Medical Management

- Non-surgical management
  - Deceased oxygen consumption
  - Increased oxygen supply

- Surgical management
  - Cardiomyoplasty
  - Heart transplantation

- Nursing process (pp. 887 & 889)
Postoperative Complications

- Rejection
  - Hyperacute rejection
  - Acute rejection
  - Chronic rejection

- Infection
  - Cyclosporin
  - Imuran
  - Corticosteroids
  - Anti-Lymphocytic Globulin
Steroid Free Immunosuppression

- Benefits
  - Prevent the long-term adverse effects of long-term steroid therapy

- Protocol (by UCLA Medical Center)
  - Cyclosporine 2-4mg/kg is initiated before surgery (600~800ng/ml)
  - Solumedrol 500mg & 125mg every 12 hours for three doses
  - Prednisone 1mg/kg/day & 0.1mg/kg/day in 3~4 months
  - Imuran 2mg/kg/day (4000/mm³)
Late Complications Post Transplant

- Hypertension
- DM
- Hyperlipidemia
- Bone disease
- Liver dysfunction
- Renal dysfunction
- GI tract
- Dermatologic
- Psychologic
- Malignancy
Left ventricular assist device

Can be combined with an oxygenator, is called extracorporeal membrane oxygenation (ECMO)
Infectious Diseases of the Heart

- Any of the layers of the heart may be affected by an infectious process.
- Diseases are named by the layer of the heart that is affected.
- Diagnosis is made by patient symptoms and echocardiogram.
- Blood cultures may be used to identify the infectious agent and to monitor therapy.
- Treatment is with appropriate antimicrobial therapy. Patients need to be instructed to complete the course of appropriate antimicrobial therapy, and require teaching about infection prevention & health promotion.
Rheumatic Endocarditis

- Occurs most often in school-age children, after group A beta-hemolytic streptococcal pharyngitis
- Injury to heart tissue is caused by inflammatory or sensitivity reaction to the streptococci
- Impaired contractile function of the myocardium, thickening of the pericardium, and valvular damage
- Need to promptly recognize and treat “strep” throat to prevent rheumatic fever
- S/S: tachycardia, cardiomegaly, new or changed murmur, pericardial friction rub, precordial pain, changes in ECG, indications of HF, existing streptococcal infection
Infective Endocarditis

- A microbial infection of the endothelial surface of the heart. Vegetative growths occur and may embolize to tissues throughout the body.
- Possible ports of entry: mouth, skin rash, lesion, abscess, infections, surgery, or invasive procedures including IV line placement.
- Usually develops in people with prosthetic heart valves or structural cardiac defects. Also occurs in patients who are IV drug abusers and in those with debilitating diseases, indwelling catheters, or prolonged IV therapy. See Table 37-3, pp.867.

- Types
  - Acute
  - Subacute
Manifestations

- Murmur
- Heart failure
- Arterial embolization
- Splenic infarction
- Neurologic changes
- Petechiae (pinpoint red spots)
- Splinter hemorrhages
Medical Management

- Antimicrobials
- Rest, balanced with activity
- Supportive therapy for heart failure
- Anticoagulants
- Surgical management
Pericarditis

- Inflammation or alteration of the pericardium, the membranous sac that encloses the heart
- Myocardial and pericardial tissue is also affected, but endocarditis results in permanent changes in the valves
- Nursing diagnosis: pain
- Potential complications
  - Pericardial effusion
  - Cardiac tamponade
Which lubricates the surface of the heart and reduce friction during systole.
Nursing Assessment

- Substernal precordial pain radiating to left side of the neck, shoulder, or back
- Grating, oppressive pain, aggravated by breathing, coughing, swallowing
- Pain worsened by the supine position; relieved when the patient sits up and leans forward
- Pericardial friction rub
Medical Management

- Hospitalization for diagnostic evaluation, observation for complications, and symptom relief
- Nonsteroidal anti-inflammatory drugs
- Corticosteroid therapy
- Comfortable position, usually sitting
- Pericardial drainage
- Chronic pericarditis: radiation or chemotherapy
- Uremic pericarditis: dialysis
- Pericardectomy
Cardiac Tamponade

- An extreme emergency
- Increased fluid volume
- Hemodynamic monitoring
- Pericardiocentesis
- Pericardial window: opening to relieve pressure of the heart
- Pericardiectomy
Talking Points

- Compare the valvular disorders
- Discuss the surgical treatment of valvular disorders
- Describe the nursing management of the patient with valvular disorders
- Compare the cardiomyopathy
- Explain the potential complications of heart transplantation
- Compare the infectious diseases of the heart
- Describe the medical management of the patient with infectious diseases of the heart