INFECTIOUS CARDIAC DISORDERS

E. JEAN DUBOIS, RN, MSN, CRNP
October 31, 2000

OBJECTIVES

• Identify common pathologic organism and the treatment of these organisms in infectious cardiac disorders (ICD).
• Relate the effects of structural damage of the myocardium, pericardium, and endocardium to cardiovascular functioning.
• Identify common risk factors associated with three types of ICD.
• Differentiate among assessment findings in selected ICD.
• Formulate nursing diagnoses for patients experiencing the sequelae of ICD.
• Compare and contrast selected nursing and medical interventions in the collaborative management of ICD.

INFECTIOUS CARDIAC DISORDERS

• Pericarditis
• Myocarditis
• Endocarditis

PERICARDITIS

• DEFINITION
  - Inflammation of the pericardium. Can lead to swelling and abnormal fluid build-up around the heart.
• ACUTE
  - Rapid onset
  - Symptoms < 6 weeks
• CHRONIC
  - Fibrosis of pericardium
  - Symptoms > 6 weeks

CAUSES OF PERICARDITIS

• INFECTIOUS
  - Viral, Bacterial, TB, fungal, syphilis, HIV, toxoplasmosis
• POST CARDIAC INJURY
  - Acute MI, CABG, Trauma, Cardiac cath
• METABOLIC
  - Uremia from chronic renal failure
• AUTOIMMUNE COMPLICATIONS
  - RA, SLE
• NEOPLASM
  - Spread of cancer to pericardium
• MISCELLANEOUS
  - Drug induced, radiation therapy

RISK FACTORS

• Recent illness
• Heart attack
• Flu-like viral illness
• Rheumatic fever
• Uremia
SIGNS AND SYMPTOMS

- CHEST PAIN
  - Sharp, pleuritic pain that is aggravated by deep breathing, lying supine, or coughing.

- PERICARDIAL RUB
  - Hallmark clinical finding
  - High-pitched squeaking, grating, or creaking sound produced during cardiac contraction.
  - May be intermittent
  - Heard best leaning forward during expiration

- SIGNS OF INFECTION
  - Fever, dyspnea, tachycardia, ↑WBC, ↑ESR

- EKG CHANGES
  - Diffuse ST segment elevation

DIAGNOSTIC TESTING

- Chest x-ray
- Chest CT or MRI
- EKG
- Echocardiogram
- Heart Catherization
- CBC
- ESR
- Pericardiocentesis

MANAGEMENT

- MAINTAIN CARDIAC OUTPUT
  - Provide oxygen
  - Bed rest with acute symptoms

- ERADICATE INFECTION
  - Detect and treat underlying cause
  - Antibiotic therapy

- PAIN RELIEF
  - NSAIDS and/or Steroids
  - Position of comfort - ↑ HOB

- INVASIVE PROCEDURES
  - Pericardiocentesis
  - Pericardial window
  - Pericardectomy (chronic)

- MONITOR RESPONSE TO TREATMENT

- MONITOR FOR COMPLICATIONS

COMPLICATIONS

- Chronic pericarditis / fibrosis
- CHF
- Recurrence
- Pericardial effusion
- Cardiac tamponade
  - Triad of symptoms: ↓ B/ P, distended neck veins, pulsus paradoxus, and/ or distant heart sounds

OUTCOMES

- Home care is usually sufficient.
- Usually curable in 6 months unless pericarditis caused by cancer.
- After cure, there should be no functional disability.
MYOCARDITIS

• **DEFINITION**
  - Rare inflammatory disease characterized by cellular infiltration and necrosis. Focal or diffuse involvement. Acute or chronic.

• **ETIOLOGY**
  - Direct invasion of infective agent
  - Possible autoimmune response with myocardial autoantibodies

• **MORTALITY / MORBIDITY (rare)**
  - Dilated congestive cardiomyopathy

CAUSES OF MYOCARDITIS

• **INFECTIOUS**
  - Viral - most common (Coxsackie B)
  - Bacterial, fungal, protozoa

• **INFECTIOUS CARDIAC DISEASE**
  - Pericarditis, endocarditis
  - Rheumatic fever

• **METABOLIC DISORDERS**
  - SLE, Giant Cell Arteritis

• **MISCELLANEOUS**
  - Idiopathic, Radiation, Chemicals, Drugs

RISK FACTORS

• Anyone with an immune deficiency is especially vulnerable

SIGNS AND SYMPTOMS

• **NONSPECIFIC SYMPTOMS**
  - Fever, fatigue, myalgias, malaise
  - May range from vague symptoms of flu to acute stage of heart failure

• **CHEST PAIN**
  - Mild continuous pressure or soreness
  - Sharp, stabbing pleuritic pain
  - Substernal, squeezing, ischemic pain

• **CHEST ASSESSMENT**
  - S3, S4, murmurs
  - Palpitations
  - Signs of CHF - SOB, DOE, Crackles, Edema

SIGNS AND SYMPTOMS

• **EKG CHANGES**
  - Low voltage QRS
  - ST elevation
  - Heart blocks

DIAGNOSTIC TESTING

• **CXR, MRI, ECHO, EKG, WBC, ESR, Heart Cath - PLUS:**
  - **ENDOMYOCARDIAL BIOPSY**
    - Gold standard for diagnosis
  - **PERICARDIACENTESIS**
  - **24-HOUR HOLTER**
  - **CARDIAC ENZYMES**
    - Troponin I
  - **GALLIUM-67 SCANNING**
  - **BLOOD TESTS**
    - PCR, ANA
MANAGEMENT

- **MAINTAIN CARDIAC OUTPUT**
  - Provide oxygen
  - Bed rest with acute symptoms
  - IABP, VAD

- **ERADICATE INFECTION**
  - Detect and treat underlying cause
  - Antibiotic therapy

- **PAIN RELIEF**
  - Narcotic analgesic
  - NSAID’S and/ or Steroids (only with pericarditis)
  - Position of comfort - ↑ HOB

MANAGEMENT

- **CARDIAC TRANSPLANTATION**
- **OTHER MEDICATIONS**
  - Antidyssrhythmics
  - Digoxin, vasodilators, ACE inhibitors, inotropic agents (CHF treatment)
  - Immunosuppressive agents

COMPLICATIONS

- CHF
- Pulmonary edema
- Cardiogenic shock
- Cardiac failure
- Recurrent myositis
- Dysrhythmias

OUTCOMES

- Majority of cases are believed to be clinically silent and resolve spontaneously without sequelae
- CHF - leading to LV dysfunction
- ¾ that present with CHF will improve the remaining ¼ will deteriorate

ENDOCARDITIS

- **DEFINITION**
  - Infection of the heart valves and parts of the inside lining of the heart muscle.

- **TYPES**
  - Rheumatic Fever / Rheumatic Heart Disease
  - Bacterial (Infective)
  - Chronic Valvular Heart Disease

CAUSES OF RHEUMATIC ENDOCARDITIS

- Repeated attacks of rheumatic fever
- Rheumatic fever - systemic immune process following infection from Group A hemolytic strep
- Host immune response causes damage to connective tissues of the body - heart, joints, brain, or skin
- RF can be self-limiting or lead to gross valvular disorders (RHD)
CAUSES OF BACTERIAL ENDOCARDITIS
- Infection of the valves and endothelial surface of the heart caused by direct invasion of bacteria and fungi. Develops at sites of endothelial injury.
- Leads to deformity of valves
- Acute - sudden onset
- Subacute - slow onset

CAUSES FROM CHRONIC VALVULAR HEART DISEASE
- Preexisting conditions that increase likelihood of developing endocarditis:
  - Atrial Septal Defect
  - Patent Ductus Arteriosus
  - Prior Rheumatic Heart Disease
  - Cardiac Valve Anomalies
  - Prosthetic Heart Valves

PATHOPHYSIOLOGY
Infectious agent deposits on valves or endocardium
- Immune response
- Vegetations - Verrucae
  - Forms scar tissue or erodes the valve leaflets
  - Stenosis or incompetence of leaflets
  - Vegetations may break off
  - Systemic or Pulmonary emboli

PATHOPHYSIOLOGY
- 80% of cases from Gram + bacteria
  - Strep, Staph
- Can involve all 3 layers of the heart
- Valvular damage
  - Mitral 75-80%
  - Aortic 30%
  - Pulmonary / Tricuspid 5%

RISK FACTORS
- Immunosuppression
- Following procedures
  - Dental cleanings, extractions
  - Cystoscopy, catherizations
- Following acute infections
  - Respiratory, GU, GI, skin
- IV drug use
- Syphilitic/ degenerative CVD
- Central lines, Open heart surgery, Prosthetic valves
- Congenital disorders

SIGNS AND SYMPTOMS
- Fever
- New heart murmur
- Nonspecific Symptoms
  - Anorexia, malaise, headache, arthralgias
- Valvular disorders
  - Stenosis, regurgitation, murmurs, heart failure
- Embolic Complications
**EMBOLIC COMPLICATIONS**

*Skin / Eye Changes*
- Splinter Hemorrhages
- Roth’s spots
- Osler’s nodes
- Janeway’s lesions
- Petechiae

*Systemic*
- **CNS**
  - Headaches, TIA’s, Stroke
- **RESPIRATORY**
  - Recurrent pneumonia, pulmonary abscesses
- **RENAL**
  - Hematuria, renal failure
- **CARDIOVASCULAR**
  - Heart attack
- **PERIPHERAL VASCULAR**
  - Ischemia → necrosis

**DIAGNOSTIC TESTING**
- Strep testing
- Blood cultures
- Echocardiogram
- WBC, RBC (microcytic anemia), ESR, ASO
- CXR, CT Scan

**MANAGEMENT**

*PREVENTION*
- Prophylactic administration of antibiotics before procedures (Penicillin based)

*EARLY / ADEQUATE TX OF INFECTION*
- Appropriate antibiotics / antifungals
  - Penicillin (Erythromycin) / Amphotericin B
  - High doses to penetrate valves / 4-8 weeks

*ACTIVITY RESTRICTION*
- Until fever and ESR decreases

*SURGICAL INTERVENTION*
- Valve Replacement

*MONITOR FOR COMPLICATIONS*

**COMPLICATIONS**
- Embolic complications
- Severe valvular damage
- Blood clots
  - Individual or multiple organ involvement
  - Stroke
- CHF
- Dysrhythmias
  - Atrial fibrillation
- Glomerulonephritis
- Brain abscess

**OUTCOMES**
- Early treatment of bacterial endocarditis generally results in good outcome.
- Valvular damage may be present if diagnosis and treatment are delayed.