METABOLIC BONE DISEASE

DEGENERATIVE BONE DISEASE

AUTOIMMUNE AND INFLAMMATORY DISORDERS

INFECTIONOUS DISORDERS

CONNECTIVE TISSUE DISORDER

Lemone and Burke Chap 42

Metabolic Bone Disease

- Osteoporosis
- Gout
- Paget’s Disease
- Osteomalacia

Osteoporosis

- Porous bone
- Low bone mass
- Structural deterioration of bone tissue
- Increased bone fragility
- Known as the silent thief
  - Robs the skeleton of its banked resources
  - Associated with aging

Osteoporosis - Clinical Manifestations

- Back pain or spontaneous fracture
- Fracture from minimal trauma
- Hip, vertebral or wrist fracture
- Collapsed vertebrae resulting in loss of height and kyphosis
- Spinal deformities
- Severely stooped posture

Osteoporosis: Etiology and Pathophysiology

- Exact pathogenesis unclear
- Bone resorption exceeds bone deposition
- Bone mass loss
  - Older women – 35-50%
  - Older men – 20-35%
- Osteoporosis most commonly in the bones of the spine, hips, and wrists

Osteoporosis

- Risk factors
  - Family history
  - Female
  - Low bone mass
  - Caucasian or Asian
  - Small build
  - Life style
    - Insufficient calcium intake
    - Inactivity
    - Smoking
    - Excessive alcohol
    - Chronic diseases

Osteoporosis

- Dense bone
- High bone mass
- Stable bone tissue
- Decreased bone fragility
- Known as the healthy robber
  - Builds internal reserves
  - Associated with young adulthood

Osteoporosis

- Risk factors
  - Unpredictable bone resorption
  - Bone mass loss
  - Increased bone fragility
  - Known as the silent thief
  - Robs the skeleton of its banked resources
  - Associated with aging
Osteoporosis - Diagnosis

- H&P
- Bone density scan
- Lab tests
  - Alkaline Phosphatase (AST)
  - Serum bone Glaprotein
  - Serum Calcium
  - Thyroid function test

Osteoporosis – Collaborative Management

- Preventative
  - Health promotion
  - Nutrition
- Medication
  - HRT
  - Calcium supplements
  - Vitamin D
  - Biphosphonates
- Androgens
- Pain management
- Fall prevention
- Exercise

Osteoporosis - Nursing Diagnoses

- Risk for injury
- Impaired physical mobility
- Acute pain or chronic pain
- Impaired nutrition – less than body requirements
- Health seeking behavior

Osteopenia

- What is osteopenia?
  - Bone mineral density (BMD) that is lower than normal peak BMD, but not low enough to be classified as osteoporosis
  - Can be a precursor to osteoporosis

Gout

- Inflammatory response to high uric acid level
- Deposites of urates in connective tissue
- Inflammation causes nodules – tophi
- Primary or secondary disorder
- Affects >84% of all Americans

Gout - Clinical Manifestations

- Pain, swelling, redness, warmth, stiffness in affected joint
- Inflammation of tissues around joint causes skin to be swollen, tender - sore if even slightly touched
- Usually attacks the big toe (75% of first attacks)
- Acute onset and usually occurs at night
Gout - Manifestations

- Three stages:
  - Asymptomatic hyperuricemia
  - Acute gouty arthritis
  - Chronic (tophaceous) gout

Gout - Diagnosis

- By clinical symptoms
- Serum uric acid levels
- Urinary uric acid levels
- Evaluation of fluid aspirated from acutely inflamed joint or material aspirated from a tophus
  - This is the most definitive test for gout
- CBC (elevated WBC)
- Elevated ESR during acute attack

Gout –Interdisciplinary Care

- H&P
- Medication
  - Colchicine
  - Allopurinol
  - NSAIDs
- Diet
  - Vit E
  - Amino Acids
  - Dark berries
  - Low purine diet
- Weight loss for obese patients
- Liberal fluid intake
- Rest

Gout - Nursing Diagnosis

- Acute pain
  - Position affected joint for comfort
  - Protect joint from pressure
  - Take NSAIDs and anti-gout meds as prescribed
  - Bedrest
- Knowledge deficit
  - Disease and manifestation
  - Rationale for meds
  - Importance of increase fluids
  - Alcohol abstinence

Paget’s Disease (Osteitis Deforma)

- An excess of bone destruction and unorganized bone formation
- Cause is unknown
- Average age at dx is 50-60 yrs
- Affects the axial skeleton

Paget’s

- Pathophysiology:
  - Slow progression
  - Osteoclastic bone resorption
  - Osteoblastic bone formation
  - New bone larger and weak
  - Vascularity increases
  - Soft bone becomes hard and brittle
Paget's

- Manifestation
  - Musculoskeletal effects
  - Neurologic effects
  - Cardiovascular effects
  - Metabolic effects
- Diagnosis
  - X-ray
  - Bone scans
  - CT
  - MRI
  - Lab tests

Paget's Collaborative Management

- Relieve pain
- Prevent or minimize complications
- Medication
  - Pain relieve
  - Biphosphonates
  - Calcium supplement
- Surgery

Osteomalacia (Adult Rickets)

- Vitamin D deficiency resulting in decalcification and softening of the bone
  - Not enough Vitamin D in diet
  - Not enough exposure to sunlight
  - Impaired intestinal absorption of fats
  - Increased renal loss or decreased absorption of phosphate
- Same as Rickets in children

Paget's - Manifestation

Paget's Nursing Diagnosis

- Chronic pain
  - Assess location and quality
  - Heat therapy and massage
  - Teach – NSAID, placement of brace/corset
- Impaired physical mobility
  - Assistive device when ambulating
  - Teach – placement of brace/corset, good body mechanics

Osteomalacia -

- Pathophysiology
  - Vitamin D deficiency
    - Lack of intake
    - Lack of sunlight
  - Phosphate depletion
  - Acidosis
  - Bone mineralization inhibitors
  - CRF
  - Calcium malabsorption
Osteomalacia - diagnosis

- Health history
- X-ray

Lab tests
- Calcium
- Alk Phos
- Thyroid function

Osteomalacia - Collaborative management

- Correct Vitamin D deficiency
  - Increase diet intake
  - Expose to sunlight
- Calcium and Phosphate supplement
- Safety measures to prevent falls
- Encourage exercise
- Teach use of assistive devices

Degenerative Bone Disease

- Osteoarthritis (OA)
  - Most common of all arthritis
  - Leading cause of pain and disability in elderly
  - Loss of articular cartilage in joints
  - 90% people have x-ray evidence of OA by age 40
  - Gender and ethnicity effects
  - Localized
  - Generalized

OA - pathophysiology

- Articular cartilage loss
- Bone exposed
- Bone thickens
- Bone spurs develop
- Inflammation

OA - Clinical Manifestations

- Joint involvement
  - Joint pain
  - Joint stiffness
  - Crepitus
  - Joint enlargement
  - Decreased ROM
  - Flexion contractures
  - Rarely does joint appear to be hot and inflamed (secondary synovitis)
OA - manifestation – (cont)

- Heberden’s nodes
  - Most common
  - Distal joint
- Bouchard’s nodes
  - Less common
  - Proximal joint

OA - Diagnosis

- H&P
- X-ray
- Lab test
  - HA – hyaluronic acid

OA - Management

- Conservative
  - ROM
  - Ice and heat
- Medication
  - Analgesics
  - Topical
  - Corticosteroids
  - Muscle relaxants
- Surgery
  - Arthroscopy
  - Arthroplasty

OA – nursing Diagnosis

- Chronic pain r/t muscle spasms and cartilage deterioration
- Impaired physical mobility r/t pain and degenerative changes
- Self care deficit

Autoimmune and Inflammatory Disorder

- Rheumatoid Arthritis
- Systemic disease
- Causes inflammation of the connective tissue
- 3 times as likely in women
- Onset between age 20-40
- Cause unknown
- Possibly genetic link
- Possibly infectious link – Epstein - Barr

Rheumatoid Arthritis (RA) Patho

- Auto-antibodies (rheumatoid factors) formed - attack healthy tissue, esp. synovium, causing inflammation
- Inflammation occurs first in synovial membrane
- Inflammation spreads to articular cartilage, joint capsule, and surrounding ligaments and tendons
- Synovium thickens creating pannus:
  - Vascular granulation tissue - inflammatory cells
  - Erodes cartilage and destroys bone
  - Secondary osteoporosis
RA (Pathophysiology)

RA - Manifestation

- Fatigue
- Loss of appetite
- Low grade fever
- Anemia
- Muscle and joint aches
- Stiffness
  - Muscle and joint stiffness are usually most notable in the morning after periods of inactivity
- Multiple joints are inflamed in a symmetrical pattern
- Joints become red, swollen, painful, and tender

Systemic Symptoms of RA

- Sjogren’s syndrome
- Pleuritis
- Pericarditis
- Anemia: RA can reduce the number of RBCs and WBCs
- Vaculitis

Diagnosis of RA

- History and physical examination
- Abnormal blood antibodies called:
  - Rheumatoid factor (RF) found in 80% of patients
  - Antinuclear antibody (ANA) also frequently found in RA
- Erythrocyte Sedimentation Rate (ESR)
- CBC
- Joint X-rays: swelling of the soft tissue
- Bone scanning: can show inflamed joints
- CCP: New test can provide accurate detection of early RA
- Examination of the synovial fluid

RA - Management

- Relieve pain
- Reduce inflammation
- Rest and exercise
- Plasmapheresis
- Alternative treatments
- Medication
  - NSAIDs
  - Corticosteroids (oral)
  - Antirheumatic
  - Corticosteroids (injection)

RA – Nursing Diagnosis

- Chronic pain
- Fatigue
- Ineffective role performance
- Disturbed body image
### Infectious Disorder

- Osteolytis

### Osteomyelitis

- Bacterial infection of bone
  - Cause can also be fungus, parasites, and virus
  - Staphylococcus Aureus most common bacteria
- Acute: new bone infection lasting less than 6 weeks
- Chronic: bone infection present longer than 6 weeks or bone infection that has recurred
  - Symptoms: low grade fever, pain, and a draining sinus tract

### Osteomyelitis - Patho

- Most common cause direct contamination of bone
- Invasion from adjacent soft tissue infection
- Peripheral artery disease
- Bacteria lodge and multiply in bone

### Osteomyelitis - Patho (continued)

- Phagocytosis
- Pus
- Periosteum lifts
- Ischemia and necrosis

### Etiology

- Hematogenous Osteomyelitis: pathogens carried in blood to the bone from sites of infection elsewhere in body
  - Spine is usual site of infection in adults
  - UTI, soft tissue infections, endocarditis, and infected IV sites are sources of pathogens
  - Affects older adults, IV drug abusers, those with sickle cell anemia
- Surgical prosthesis
  - when a piece of metal has been surgically attached to a bone
  - hip and knee replacements

### Etiology (continued)

- Osteomyelitis from a contiguous infection
  - Extension of infection from adjacent soft tissues
  - Most common cause of osteomyelitis in adults
  - Can occur due to direct penetrating wounds
  - Decubitus ulcers
  - Neurosurgery
- Osteomyelitis associated with vascular insufficiency
  - Those with DM and PVD are at risk
  - Neuropathy exposes foot to trauma and pressure ulcers
  - Infection can spread to bone, client unaware
  - Poor perfusion impairs wound healing
Manifestations of Osteomyelitis

- Cardiovascular effects
  - Tachycardia
- GI effects
  - Nausea and vomiting
  - Anorexia
- MS effects
  - Limp in involved extremity
  - Localized tenderness
- Integumentary effects
  - Drainage and ulceration at involved site
  - Swelling, erythema, and warmth at involved site
  - Lymph node involvement

Osteomyelitis

- Diagnosis
  - Based on bone scans
  - MRI and CT scan
  - Biopsy
  - Blood tests
    - Erythrocyte sedimentation rate (ESR) will be elevated
    - Elevated C-Reactive protein
    - CBC (WBC will be elevated)
    - Blood cultures

Osteomyelitis - Management

- Medication
  - Antibiotic therapy
  - Analgesics
- Surgery
  - Debridement

Osteomyelitis – Nursing Diagnosis

- Risk for infection
- Hyperthermia
- Impaired physical mobility
- Acute pain

Connective Tissue Disorder

- Scleroderma
- Sjogren’s Syndrome

Scleroderma - Etiology

- A chronic autoimmune disease
- 300,000 people in the US
- Ages affected 25-55 (Female > male)
- No known cause
- 2 Types
  - Localized
  - Systemic
Scleroderma
Localized vs systemic

- LOCALIZED
  - Thickened, hardened skin and scarring
  - Skin appears tight, reddish, or scaly.
  - Extreme itching
  - Can be limited around fingers or in large areas such as limbs.
  - Disabling but not fatal

- SYSTEMIC
  - All skin symptoms
  - CREST
  - Complications
    - Musculoskeletal
    - Lungs
    - Heart
    - Digestive tract
    - Kidneys

Scleroderma - diagnosis

- Diagnosis is usually due to clinical suspicion.
- ANA – id autoimmune process
- ESR – up in inflammatory process
- CBC – anemia
- Bone biopsy – confirm dx

Scleroderma Collaborative Management

- Treatment based on symptoms
- Medication
  - Calcium channel blocker (Raynaud’s)
  - ACE inhibitors
  - H2 receptor blocker
- Physical therapy
  - Stretching of muscles important
- Dialysis

Sjogren’s Syndrome

- Causes inflammation of exocrine glands
- Mucosal dryness
  - Mouth
  - Eyes
  - Throat
  - Lungs
  - Vagina
  - Skin

Sjogren’s

- Diagnosis
  - H&P
  - Schirmer’s test
- Treatment
  - Supportive
  - Artificial tears
  - Increased fluid intake
  - Avoid med that dry mucous membranes (i.e. decongestants)