

METABOLIC BONE DISEASE

DEGENERATIVE BONE DISEASE

AUTOIMMUNE AND INFLAMMATORY DISORDERS

INFECTIOUS DISORDERS

CONNECTIVE TISSUE DISORDER

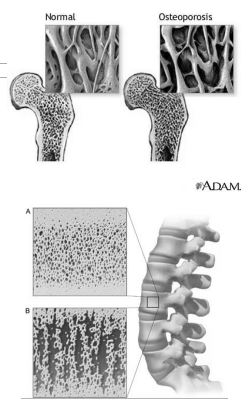
Lemone and Burke Chap 42

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 it's banked resources
 - Associated with aging



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: Etiology and Pathophysiology

- Exact patho 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 - 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 - 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, warmness, 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 - Manifestation



Paget's Collaborative Management

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

Paget's Nursing Diagnosis

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

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


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



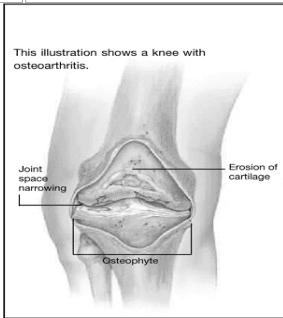
Osteomalacia - Collaborative management

- 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 has x-ray evidence of OA by age 40
 - Gender and ethnicity effects
 - Localized
 - generalized

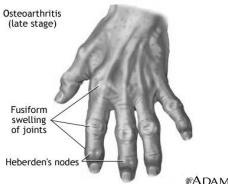
OA - pathophysiology



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

OA- risk factors

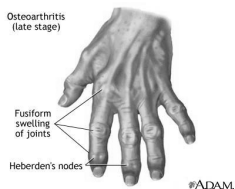
- Increasing age
- Genetic
- Trauma
- Overweight
- Inactivity
- Hormonal



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)



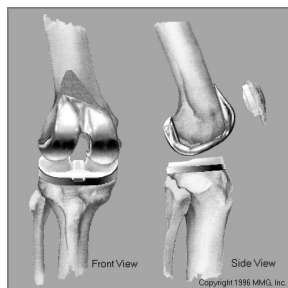
- Heberden's nodes
 - ▣ Most common
 - ▣ Distal joint
- Bouchard's nodes
 - ▣ Less common
 - ▣ Proximal joint

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

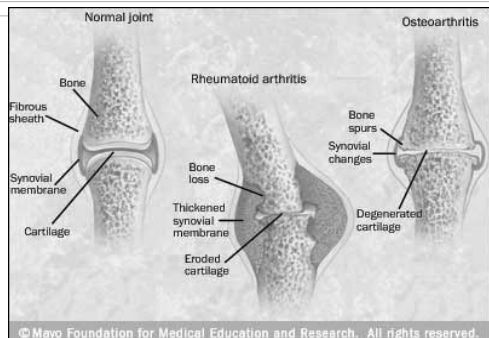
- Rheumatoid Arthritis
- Systemic disease
- Causes inflammation of the connective tissue
- 3 times as likely in women
- Onset between age 20-40
- Cause unknown
- Possibly genetic link
- Possibly infectious link – Epstein - Barr



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**
- Vasculitis

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


- Osteomyelitis

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

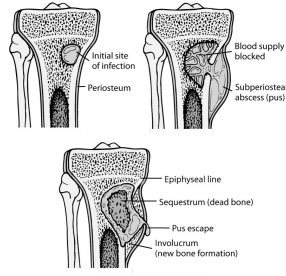
Osteomyelitis - Patho

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



Osteomyelitis - Patho

- 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
- Actual 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

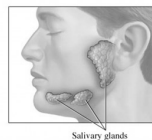
Scleroderma - diagnosis

- 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

Sjorgen's

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