

METABOLIC BONE DISEASE
DEGENERATIVE BONE DISEASE
AUTOIMMUNE AND INFLAMMATORY DISORDERS
INFECTIOUS DISORDERS
CONNECTIVE TISSUE DISORDER
Lemone and Burke Chap 42


Objectives
<ul style="list-style-type: none">□ Discuss etiology, pathophysiology, clinical manifestations, and collaborative management of:□ Osteoporosis, gout, osteopenia, Paget's disease, osteomalacia and osteomyelitis□ Osteoarthritis, rheumatoid arthritis, septic arthritis, Sjogren's syndrome, and scleroderma

Metabolic Bone Disease
<ul style="list-style-type: none">□ 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

Normal

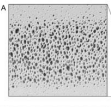


Osteoporosis

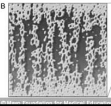


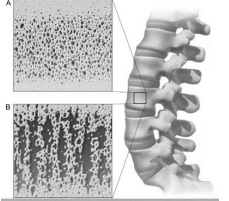


A




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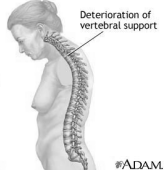




Osteoporosis

- Risk factors
 - Family history
 - Female
 - Low bone mass at age 25-35
 - 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 first (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
 - Corticosteroids
- Diet
 - Vit E
 - Amino Acids
 - Dark berries
 - Low purine diet
- Weight loss for obese patients
- Liberal fluid intake
- Rest

Gout - Nursing Diagnosis

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

Paget’s Disease (Osteitis Deformata)

- 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

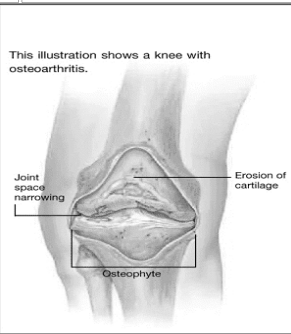
Osteomalacia -Collaborative management

- 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

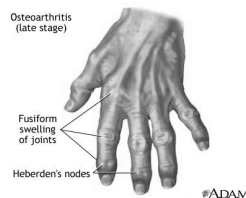
OA - pathophysiology



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

OA- risk factors

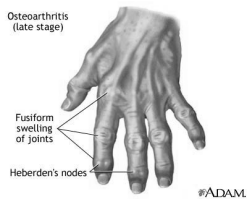
- Increasing age
- Genetic
- Trauma
- Overweight
- Inactivity
- Hormonal



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)



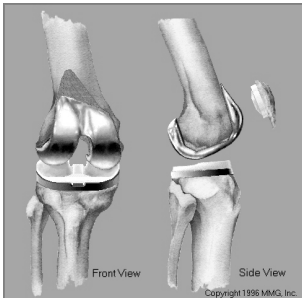
- Heberden's nodes
 - Most common
 - Distal joint
- Bouchard's nodes
 - Less common
 - Proximal joint

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 age 20-40
- Cause unknown
 - ▣ Genetic link?
 - ▣ Infectious link?
 - ▣ Environmental link?
 - ▣ Hormonal link?



Rheumatoid Arthritis (RA) Patho

- Auto-antibodies form - attack healthy tissue,
- Inflammation first in synovial membrane
- Inflammation spreads:
 - articular cartilage,
 - joint capsule,
 - ligaments and tendons
- Synovium thickens creating pannus:

RA (Pathophysiology)

The diagram illustrates three stages of joint pathology. On the left, a 'Normal joint' shows a healthy structure with labels for 'Fibrous sheath', 'Bone', 'Synovial membrane', and 'Cartilage'. In the center, 'Rheumatoid arthritis' is shown with 'Bone loss', 'Thickened synovial membrane', and 'Eroded cartilage'. On the right, 'Osteoarthritis' is depicted with 'Bone spurs', 'Synovial changes', and 'Degenerated cartilage'. A copyright notice at the bottom reads: '© Mayo Foundation for Medical Education and Research. All rights reserved.'

RA - Manifestation

- Fatigue
- Loss of appetite
- Low grade fever
- Muscle and joint aches
- Stiffness
 - Most notable in the morning
- Multiple joints inflamed in symmetrical pattern
- Joints - red, swollen, painful, and tender

Systemic Symptoms of RA

- Sjogren's syndrome
- Pleuritis
- Pericarditis
- Anemia
- Vasculitis

Diagnosis of RA

- History and physical examination
- Abnormal blood antibodies called:
 - Rheumatoid factor (RF) found in 80% of patients
 - Antinuclear antibody (ANA)
- Erythrocyte Sedimentation Rate (ESR)
- CBC
- Joint X-rays: swelling of the soft tissue
- Bone scanning: can show inflamed joints
- CCP
- 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

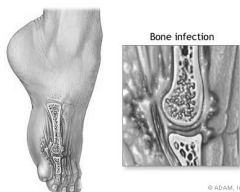
- Chronic pain
- Fatigue
- Ineffective role performance
- Disturbed body image

Infectious Disorder: Osteomyelitis

- Bacterial infection of bone
 - Cause - fungus, parasites, virus, and bacteria (Staphylococcus Aureus most common)
- Acute: new bone infection lasting < 6 weeks
- Chronic: bone infection present > 6 weeks or recurring bone infection

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
 - Sources of pathogens: UTI, soft tissue infections, endocarditis, and infected IV sites
 - Spine is common site of infection in adults
 - Affects older adults, IV drug abusers, sickle cell anemia
- Surgical prosthesis
 - Hip and knee replacements

Etiology (continued)

- **Osteomyelitis from a contiguous infection**
 - Infection from adjacent soft tissues
 - Most common cause of osteomyelitis in adults
 - Often 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

Manifestations of Osteomyelitis

- Low grade fever, malaise
- Cardiovascular effects -
 - Tachycardia
- GI effects
 - Nausea and vomiting, Anorexia
- MS effects
 - Limp , Localized tenderness
- Integumentary effects
 - Drainage and ulceration
 - Swelling, erythema, and warmth
 - Lymph node involvement

Osteomyelitis

- Diagnosis
 - 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

Septic Arthritis

- Joint space invaded by pathogen
- Risk factors include bacteremia, RA
- Manifestation
 - Abrupt onset
 - Joint hot, swollen, painful, fluid filled
 - Fever chills
- Medical emergency
 - Aspirate fluids
 - Abx
 - Immobilize

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 | □ SYSTEMIC |
| □ Thickened, hardened skin and scarring | □ All skin symptoms |
| □ Skin appears tight, reddish, or scaly. | □ CREST |
| □ Extreme itching | □ Complications <ul style="list-style-type: none">■ Musculoskeletal■ Lungs■ Heart■ Digestive tract■ Kidneys |
| □ Can be limited around fingers or in large areas such as limbs. | |
| □ Disabling but not fatal | |

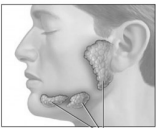
Scleroderma - diagnosis

- 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)
