Musculoskeletal System

Osteoarthritis

- Incidence >90% by age 45
- 50% of those over 65 will have symptomatic arthritis
- Overall women = men
  - Before 45yo men>women
  - After 55 yo women>men

Pathophysiology

- Loss of cartilage
- Loses glistening appearance becomes yellow or gray
- Cartilage thin and absent over some areas leaving underlying bone unprotected
- Unprotected subchondral bone becomes sclerotic
- Joint capsule becomes thickened and adheres to the underlying bone which will have limited movement

Symptoms

- Cardinal sx joint pain on weight bearing
- Stiffness <15 min in the AM
- Swelling less common
- Neuro sxs only secondary to vessel or nerve impingement

Etiology

- Seems to go along with aging and other secondary factors contribute
  - Previous trauma-joint dislocations, FX
  - Infection
  - Obesity
  - Inflammatory arthritis-release enzymes digest cartilage cells
  - Mechanical misalignment
  - Drugs (indomethacin, steroids) stimulate digesting enzymes

Clinical Manifestations

- Articular surface changes common after 40
- Pain one or more joint, usually weight bearing/Relieved by resting joint
- Nocturnal pain not relieved by rest may be accompanied by parasthesia (numbness, tingling, prickling)
X-ray

- Loss of joint space
- Osteophytes at margin
- Normal cartilage

This is typically the first joint affected by osteoarthritis.
Look at the base of your thumb, do you see any bony hypertrop

A normal joint surface

Arthritic cartilage
Osteoarthritis typically affects certain joints:
- Base of thumb
- Spine
- Hips
- Knees
- NOT the mcp's, elbow, wrists, shoulders

Distribution is usually asymmetrical.
- Early on may be swollen, red

Treatment:
- To lessen discomfort and retard progression
- NSAIDs/Rest until inflammation subsides
- Weight reduction
- Exercise/Prevent joint capsule contraction
- Possibly steroid injection
Erosive OA

- An OA that resembles RA, usually in elderly white caucasian women
- Characterized by pain, tenderness, and swelling in hands but not mcps
- Labs wnl, xray typical of OA

This pt. with erosive osteoarthritis has marked bony hypertrophy

Rheumatoid Arthritis

- Most common chronic inflammatory polyarthritis (always multiple joints, usually hands and feet)
- Cause unknown
- Synovial thickening and joint damage
- Extra articular manifestations common

Pathophysiology

- Inflammation of joints known as joint synovitis/Immune response
- Pannus: proliferation of newly formed synovial tissue infiltrated with inflammatory cells, due to altered immune function

Labs

- none are specific but reinforce the clinical impression
- Normochromic, normocytic anemia in 40%, no response to iron
- + RF in 50% at 6 months
- 75% at 10 months
- 20% will have – RF
- Elevated sed rate
- Aspiration of joint fluid will show elevated WBCs
+ RF may show with psoriasis, inflammatory diseases, TB, SLE, SBE, chronic active hepatitis

Younger patients
- More gradual onset
- 67% female
- Less systemic features
- Usually begins in hands or feet
- 75% will have +RF
- Average sed 28 mm
- 17% with fever
- 20% with weight loss

Differential diagnosis in young
- SLE
- Mixed connective tissue disease
- Systemic Sjogrens
- Vasculitis
- Fibromyalgia
- Hypothyroidism
- Spondyloarthropathies
- Bacterial endocarditis

Differential diagnosis in elderly
- Previous diseases +
- PMR
- Erosive OA
- Gout, pseudogout
- Seronegative syndromes

- 2 types of rheumatoid arthritis in elderly
  - Carryover RA
  - Elderly onset
    - Average of onset 55yo
    - Disease behaves differently than in younger groups
    - Those with severe disease tend to die early
Elderly onset RA

- More abrupt onset
- More systemic features
- May present with shoulder involvement
- 57% female
- Fever 8%
- 33% with weight loss
- Average ESR 56m
- +RF 89%
- Diagnosis may be confusing, easy to confuse with other illnesses/conditions

Symptoms

- May have prodrome of months of fatigue, stiffness, weight loss, fever, vague arthralgias before developing the multiple inflamed joints
- AM stiffness usually >30 minutes
- Will have joint pain, swelling, erythema, warmth
- Joint pattern
  - Never dips, sometimes pips, always mcps
  - Swelling of mcps may lead to loss of valleys

PIPs markedly swollen with faint swelling of the MCPs

Rheumatoid nodules and deformity

Bony erosions can be seen at the margins of the joint
Erosions occur rapidly in the first 2 years of the disease

Typical visible changes include ulnar deviation of the fingers at the MCP joints, hyperextension or hyperflexion of the MCP and PIP joints, flexion contractures of the elbows, and subluxation of the carpal bones and toes (cocked —up).
**Extra articular Disease**

- Much more problematic
- Weight loss
- Anemia fever
- Rheumatoid nodules/granulomas
- Sjogrens syndrome
- Episcleritis
- RA lungs – pleurisy, pleural effusions
- Splenomegaly
- Lymphadenopathy

**Cardiopulmonary Disease**

There are several pulmonary manifestations of rheumatoid arthritis, including pleurisy with or without effusion, intrapulmonary nodules, rheumatoid pneumoconiosis (Caplan's syndrome), diffuse interstitial fibrosis, and rarely, bronchiolitis obliterans pneumonitis. On pulmonary function testing, there commonly is a restrictive ventilatory defect with reduced lung volumes and a decreased diffusing capacity for carbon monoxide. Although mostly asymptomatic, of greatest concern is distinguishing these manifestations from infection and tumor. Pericarditis is the most common cardiac manifestation.

**Ocular Disease**

Keratoconjunctivitis of Sjogren's syndrome is the most common ocular manifestation of rheumatoid arthritis. Sicca (dry eyes) is a common complaint. Episcleritis occurs occasionally and is manifested by mild pain and intense redness of the affected eye. Scleritis and corneal ulcerations are rare but more serious problems.

**Neurologic Disease**

The most common neurologic manifestation of rheumatoid arthritis is a mild, primarily sensory peripheral neuropathy, usually more marked in the lower extremities. Entrapment neuropathies (e.g., carpal tunnel syndrome and tarsal tunnel syndrome) sometimes occur in patients with rheumatoid arthritis because of compression of a peripheral nerve by inflamed edematous tissue. Cervical myelopathy secondary to atlantoaxial subluxation is an uncommon but particularly worrisome complication potentially causing permanent, even fatal neurologic damage.

Although the joints are almost always the principal focus of the rheumatoid arthritis, other organ systems may also be involved. Extra-articular manifestations of rheumatoid arthritis occur most often in seropositive patients with more severe joint disease. Interestingly, extra-articular manifestations can occur in later stages of the disease when there is little active synovitis (“burnt-out” disease). In contrast to the predilection of rheumatoid arthritis for women, extra-articular manifestations of the disease are more common in men.

- Xray may show joint destruction, erosions and spurring
- Helpful to monitor disease
Sjogren’s Syndrome

Approximately 10 to 15% of patients with rheumatoid arthritis, mostly women develop Sjogren’s syndrome, a chronic inflammatory disorder characterized by lymphocytic infiltration of lacrimal and salivary glands. This leads to impaired secretion of saliva and tears and results in the sicca complex: dry mouth (xerostomia) and dry eyes (keratoconjunctivitis sicca). Patients with Sjogren’s syndrome have a variable expression of disease in other exocrine glands. This is manifested clinically as dry skin, decreased perspiration, dry vaginal membranes, or a nonproductive cough. Commonly, there is also a polyclonal lymphoproliferative reaction characterized by lymphadenopathy and splenomegaly. This can mimic and rarely transform into a malignant lymphoma.

Rheumatoid Nodules

The subcutaneous nodule is the most characteristic extra-articular lesion of the disease. Nodules occur in 20 to 30% of cases, almost exclusively in seropositive patients. They are located most commonly on the extensor surfaces of the arms and elbows but are also prone to develop at pressure points on the feet and knees. Rarely, nodules may arise in visceral organs, such as the lungs, the heart, or the sclera of the eye. (learn more about rheumatoid nodules in case report #6)

Rheumatoid Vasculitis

The most common clinical manifestations of vasculitis are small digital infarcts along the nailbeds. The abrupt onset of an ischemic mononeuropathy (mononeuritis multiplex) or progressive scleritis is typical of rheumatoid vasculitis. The syndrome ordinarily emerges after years of seropositive, persistently active rheumatoid arthritis; however, vasculitis may occur when joints are inactive.

A rheumatoid vasculitis resulting in gangrene

The course of rheumatoid arthritis cannot be predicted in a given patient. Several patterns of activity have been described:
• spontaneous remission particularly in the seronegative patient within the first 5 months of symptoms (less than 10%)
• recurrent explosive attacks followed by periods of quiescence most commonly in the early phases
• the usual pattern of persistent and progressive disease activity that waxes and wanes in intensity.

Disability is higher among patients with rheumatoid arthritis with 60% being unable to work 10 years after the onset of their disease. Recent studies have demonstrated an increased mortality in rheumatoid patients. Median life expectancy was shortened an average of 7 years for men and 3 years for women compared to control populations. In more than 5000 patients with rheumatoid arthritis from four centers, the mortality rate was two times greater than in the control population. Patients at higher risk for shortened survival are those with systemic extra-articular involvement, low functional capacity, low socioeconomic status, low education, and prednisone use.
Treatment

- Important to treat aggressively and in early stages to minimize joint destruction
- Therefore important to diagnose early
- In past used to “step up” only when sx’s uncontrolled sometimes missing window of opportunity

Analysis Drugs

Pain caused by inflammation is best treated with an anti-inflammatory drug, although occasionally the addition of acetaminophen can be helpful. Chronic narcotic therapy is not used routinely due to side effects such as diminished mental status, hyper somnolence, constipation, and dependency. Furthermore, they have no anti-inflammatory activity. They may be needed for patients with severe joint destruction who are not surgical candidates.

Analgesic Drugs

NSAIDS still basic therapy for RA
- All are essentially the same
- Problems with NSAID therapy in the elderly
  - Gastropathy
  - Complicated diverticular disease
  - Renal insufficiency
  - Drug interactions

- Cox-2 inhibitors
- Corticosteroids
- Anti-malarials
- Gold therapy
- Penicillamine
- Sulfasalazine
- Methotrexate
- Arava, Remicade (disease modifying agents)

- Rest
- PT
- Exercise
Which joints are affected in RA?

Look at the articular spaces – Can you see the margins clearly?

Typical deformity of RA

SLE
Systemic Lupus Erythematosus

- Chronic inflammatory disease of multiple organs
- Primarily a disease of younger people
  - Women age 20-40
- 15% will have onset later in life
- Older persons will have a milder disease
Symptoms

- Range from fulminant febrile illness to ax with only abnormal labs
- Most common presentation is that of multiple constitutional sx-- fever and malaise, fatigue and weight loss

- Systemic: fever, chills, fatigue, anorexia, weight loss
- Skin: butterfly rash on face but may be anywhere, photosensitivity, frontal alopecia, palmar rash
- MS: polyarthritis
- Eyes: conjunctivitis, retinal lesions
- Lung: pleurisy, rubs, effusions
- CV: pericarditis, endocarditis, cardiomyopathy
- GI: abd. pain secondary to vasculitis, dysphagia, Hepatosplenomegaly

Butterfly rash

- Neuro: anxiety, memory loss, minor psychoses, depression, seizures
- Raynauds: 25%
- Renal: present in most,
  - Protenuria, hematuria
  - Nephritis develops early, may lead to HTN
Lab

- ANA – sensitive and + in most with disease but not diagnostic
- Dec. WBCs, anemia
- Elevated SGOT

- double-stranded DNA antigen (anti-dsDNA) and antibody to Sm nuclear antigen (anti-Sm) may be helpful in patients who do not meet the diagnostic criteria for lupus

The ACR recommends that primary care physicians consider a rheumatology referral for patients with characteristic signs and symptoms of systemic lupus erythematosus and a positive ANA test, particularly if these patients have more than mild or stable disease.²

Diagnostic Criteria for Lupus

No one diagnosis or PE finding will tell you the Person has lupus. Instead meeting a certain # of diagnostic criteria is involved.

Pharmacological Management

- ASA or NSAIDS
  - Treat arthritis, fever, fatigue
  - ASA also has antiplatelet effect
- Antimalarial drugs
  - Hydroxychloroquine (Plaquenil)
  - Treat skin and arthritic symptoms

Pharmacological Management (Cont.)

- Corticosteroids
  - For severe and life threatening manifestations
Pharmacological Management (Cont.)
- Cytotoxic agents
  - If other drugs fail
  - Imuran, Cytosar
  - Work by decreasing proliferation of cells within the immune system
  - Usually given with steroids ~ allows lower doses of both

Treatment
- Will need chronic care
- NSAIDs, rest
- Antimalarials – plaquenil (need regular ophth. Exams)
- Immunosuppressives
- Sun avoidance

http://www.aafp.org/afp/20031201/2179.html

Excellent article

Ankylosing Spondylitis
- Inflammatory arthritis affecting the axial skeleton (spine, sacroiliac joints)
- Predominantly male 3:1
- Incidence increases after age 40
- Will “burn out” in the elderly but are then left with spine abnormalities

Symptoms
- Posture – flattened lumbar lordosis
- Curving thoacic kyphosis
- Rigid spine, unable to turn neck
- Walk with knees bent to see ahead
- Associated with iritis, aortic enlargement
- Pain lessens with activity
- Sxs persist > 3 months
- Pain worse with rest
- Onset insidious
**Pathophysiology:** AS most commonly affects the SI joints and the axial skeleton. Involvement of the SI joints is required to establish the diagnosis. Hip and shoulder joints are affected less frequently. Peripheral joint involvement is least common.

The initial presentation generally occurs in the SI joints and is followed by involvement of the discovertebral, apophyseal, costovertebral, and costotransverse joints and the paravertebral ligaments.

**Chronic involvement of the spine eventually can lead to decreases in ROM and fusion of the vertebral bodies.** Involvement of the cervical and upper thoracic spine can lead to fusion of the neck in a stooped forward-flexed position (see *Images 1-2*). This position can significantly limit the patient's ability to ambulate and look straight ahead.

**Focus the physical examination on active ROM and passive ROM of the axial and peripheral joints.** Tenderness in the SI joints is common.

Screen for extra-articular manifestations by performing specific examinations (e.g., ophthalmologic, cardiac, and gastrointestinal examinations).

**X-rays:**

- Classic “bamboo spine” secondary to fusion

**Labs:**

- Genetic component
  - + HLA B27 in 90%
  - - rheumatoid factor

**Treatment:**

- PT exercise
- In advanced disease no NSAIDs
- Treat early pain symptomatically
Complications

• Patients with a history of AS who report any recent trauma or an increased level of back or neck pain should be fully evaluated for the possibility of a vertebral fracture and subsequent spinal instability.

• Many patients with advanced disease have fusion of the spine. As discussed above, if these patients report any change in position or movement of the spine, they should be assumed to have a spinal fracture since this is the only method for the spine to move. Patients should be treated cautiously until fracture has been ruled out. If spinal fracture is present, surgical stabilization may be necessary. Symptoms generally
Gout

- Most common form of acute arthritis in elderly
- Occurs secondary to crystal deposition in the joint
- May be acute or chronic and may have extra articular manifestations

The peak incidence of acute gout occurs between 30 and 50 years of age. Approximately 90 percent of first attacks are monoarticular. In more than one half of patients with acute gout, the first metatarsophalangeal joint is the initial joint involved, a condition known as podagra. Joint involvement (in order of decreasing frequency) includes the metatarsophalangeal joint, the instep/forefoot, the ankle, the knee, the wrist and the fingers.

Gout in women occurs exclusively after menopause. Women develop gout at an older age than men and have twice the prevalence of hypertension, renal insufficiency and exposure to diuretics. The onset of gout before age 50 in men or before menopause in women is atypical and raises concern about an associated inherited enzyme defect or renal disease.

As you can imagine this is very painful!!

Signs and symptoms

- Acute – warm, red, very painful swollen joint usually in lower extremities
- Chronic – aching in various joints and AM stiffness
- Extra articular manifestations
  - Tophi
  - Renal calculi
• Serum uric acid >9 does not diagnose but correlates with high risk
• Poss elevated ESR
• Definitive dx only with joint aspiration

• Acute Gout
The four treatment options available for the acute gouty attack are NSAIDs, colchicine, corticosteroids and analgesics

NSAIDs are the preferred therapy for the treatment of patients without complications. Indomethacin (Indocin) was the first NSAID used for gout, but other NSAIDs, including ibuprofen (Motrin), naproxen (Naprosyn), sulindac (Clinoril), piroxicam (Feldene) and ketoprofen (Orudis) are also effective in the treatment of acute gout. Maximum dosages should be given immediately after the onset of symptoms or at the time of diagnosis and continued for 24 hours after complete resolution of the acute attack, then tapered quickly over two to three days.

Colchicine, an antimitotic drug derived from the roots of the herb Colchicum autumnale, is one of the oldest treatments for gout. Although colchicine is effective in treating acute gout, 80 percent of patients experience gastrointestinal side effects, including nausea, vomiting and diarrhea, at therapeutic dosages. Furthermore, colchicine is less effective once an acute attack has persisted for a few days.

Meds
• Indocin 50 mg tid X 1 week doc
• Colchicine >5 mg q 2 hrs until effective may lead to severe diarrhea
• If attacks recur, tophi are present, or serum UA >9 use allopurinol 100-200 mg qd to prophylax
Osteoporosis

Definition: systemic skeletal disease characterized by decreased bone mass and deterioration of bone tissue leading to increased bone fragility and susceptibility to fracture

Osteoporosis lead to...

- 250,000 hip fractures per year
- 240,000 wrist fractures per year
- 500,000 vertebral fractures per year
- Government expense of 10 billion dollars per year
- Decreased mobility, decreased independence, pain syndromes and disfigurement

Risk Factors for Osteoporosis

- 20% of Caucasian women >70 have it
- 40% of Caucasian women >80 have it
- Thin
- Positive family History
- Increased ETOH and caffeine
- Smoking
- Steroids, thyroid replacement, anticonvulsants
- Positive family history of kidney stones (Ca++ wasting)
Indications for Bone Densitrometry

- Women at menopause
- Persons with major risk factors
- Osteopenia by plain X-ray
- Persons with fractures
- Major risk factors
- Secondary causes

WHO Criteria

- Osteopnea – 1-2.5 SD below mean
- Osteoporosis - >2.3 SD below mean
- Severe osteoporosis – non violent fracture

Treatment

- Calcium – need lifelong supplementation
  - 1000mg qd if post menopausal on ERT
  - 1500 mg qd if has osteoporosis or not on ERT
- Need dietary Ca++ too
- Vit D Adults 400u qd/ Seniors 800u qd
- Exercise!!!

Osteoclastic Inhibition

- ERT – reduces the increased osteoblastic and osteoclastic activity present in older women
- Decreases risk of fracture by 25%
- The dose may have an effect on therapeutic response
- Duration required to show benefit is 7 or more years
- Timing of therapy has only a moderate influence on outcome
- Tamoxifen and Raloxifen also improve bone density
- Alendronate (Fosomax)10 mg qd or 70mg/week
- Calcitonin (Miacalcin)nasal spray use 200 IU qd or subq 50IU qd
- Some pain relief with calcitonin
Low Back Pain

- Incidence
  - Lifetime probability of 70-80%
  - Most people will improve without treatment
  - Most people will have multiple recurrences
  - Referral is not usually warranted

- Etiology
  - Soft tissue injury, overuse, deconditioning
  - Herniated intervertebral disc
  - Impingement of nerve
  - Compression fractures
  - Rheumatic diseases
  - OA
  - Metastatic disease, spinal tumor, infection
  - spondylolisthesis

This disc is protruding into the nerve
Other causes of back pain

- Spinal stenosis – typically in the elderly
- Ureteral colic
- Pyelonephritis
- Pancreatitis
- Peptic ulcer

Differential Diagnoses

- Acute MS pain
- Recurrent chronic MS pain
- Pain from other organ systems

3 main questions to address…

- Is there a serious systemic illness causing the back pain?
- Is there any neurologic compromise?
- Are there any psychosocial issues complicating the pain?

- And how will you know if these problems exist?

History

- Oldcart
- Pertinent ROS
- Onset, hx of pain
- Occupation, activity
- Treatment to date
- Previous workup, dx
- Other health problems

PE

- Affect, Gait, general appearance
- Palpate back
- Observe back flexion
- Knee, ankle reflexes
- Strength: HT walking, big toe dorsiflexion
- Straight leg raising (SLR)
- Abd, chest, possibly pelvic and rectal

Labs

- Chem panel
- ESR
- Rheumatologic testing
- PSA
Osteomyelitis

- **Imaging**
  - Xrays
  - MRI
  - Bone scan

- **Causes**
  - Incisional infection
  - Direct contamination open fracture, surgery
  - Bloodborne, spread by other sites of infection (Pulmonary)

- **Those at risk include**
  - Elderly
  - Malnurished
  - Impaired immune system
  - Chronic illness
  - Long term use of corticoidsteroids

- **Pathophysiology**
  - Staph Aureus 70-80% infections
  - Increased vascularity and edema
  - Thrombosis of blood vessels occurs in the area causing result ischemia and bone necrosis
  - Infection extends to medullary cavity, soft tissue and joints

- **Clinical Manifestations**
  - Septicemia
  - Pain, Swelling,Tenderness
  - Constant pain intensifies with movement due to pressure of collecting pus

- **Diagnostic Findings**
  - Xrays
  - Bone Scan
  - MRI
  - Elevated Leukocytes
  - Sed Rate
  - Wound and blood culture
Medical Management
- Control infection
- Hydration
- Diet high in vitamins and protein
- Correction of anemia
- Area immobilized to decrease discomfort
- Prevent pathologic fx.
- IV antibiotics 3 to 6 weeks

Osteomalacia
- Metabolic bone disease due to inadequate mineralization of bone, calcium deficiency. Softening and weakening of the skeleton, causing pain, tenderness to touch, pathologic fx.

Pathophysiology
- Deficiency of activated vitamin D
- Low calcium and phosphate in the extracellular fluid
- Malabsorption Syndrome
- Excess loss of calcium
- GI disorders/Chronic Pancreatitis, Celiac Disease
- Renal insufficiency/Acidosis

Diagnostic Findings
- Xray/Demineralization is evident
- Low serum calcium
- Urine excretion of calcium and creatinine are low
- Bone Biopsy

Medical Management
- Increase Vit D along with calcium
- Diet/Fortified milk, eggs
- Exposure to sunlight
- Deformities treated with braces or surgery

Osteosarcoma
- Most common malignant bone forming tumor
- Accounts for 38% of bone tumors
- Male/Female 3:2
- Adolescents, young adults
- Occurs at ages 50-60
- History of radiation
Located in the metaphyses of long bones
- Distal femoral metaphysis, 50% around the knee
- Tumor breaks through cortex, lifts periosteum and stimulates bizarre patterns of new bone formation

**Symptoms**
- Pain
- Swelling
- Pathologic Fx

**Treatment**
- Surgery is the major treatment of choice
- Location of tumor, size, malignancy grade, evidence of metastasis
- Preoperative chemotherapy has greatly increased the number of individuals qualifying for limb salvage surgery

**Amputations**
- Removal of body part, usually extremity
- Progressive peripheral vascular disease
- Trauma/Crushing injuries
- Congenital Deformities
- Malignant Tumor/Osteomyelitis

**Levels of Amputation**
- Performed at the most distal point
- Circulation in the part/functional usefulness
- Angiography
- Prosthesis
- Surgery/conservation of extremity

**Complications**
- Hemorrhage
- Infection
- Skin breakdown
- Phantom Limb pain/Caused by the severing of peripheral nerves
- Joint contracture
Medical Management

- Healing amputation
- Nontender residual limb for prosthesis
- Control of limb edema with soft compression dressing
- Dressings/ care not to constrict circulation
- Removable rigid dressing

Rehabilitation/Nursing Interventions

- Psychological support/Sudden change in body image
- Relieving Pain
- Minimize Altered Sensory Perceptions
- Promote wound healing
- Enhancing body image
- Promote independent self care
- Help patient achieve physical mobility

Reynaud’s Phenomenon

- Localized, intermittent episodes of vasoconstriction of small arteries of the feet and hands that cause color and temp changes
- Generally unilateral, affecting only one or two digits. Usually underlying systemic disease present.

Clinical Manifestations

- Pallor brought on by sudden vasoconstriction
- Fingers, toes, and ears may turn white due decreased blood flow, then turn blue due to little oxygen.
- Once spasm occurs, the patient may have tingling and swelling of the extremities.
- After the attack is over, area turns red and pink, indicating blood flow now back to normal

Treatment

- Meds to dilate blood vessels
  - Calcium channel blockers/Adalat, Procardia
  - Alpha blockers
  - Avoid stimuli/smoking, cold