Function of the Skeletal System:

* Support
* Protection
* Movement
* Mineral Storage
* Hematopoiesis (Blood Cell Formation)

Functions of Muscles:

* Maintenance of Posture
* Motion
* Production of Heat

Axial Skeleton:

* Skull
* Spine
* Thorax

Appendicular Skeleton:

* Extremities

Diagnostic Testing:

* Myelogram: contrast is injected into the spinal column to visualize vertebrae etc. Most common side effect is headache. Keep patient is semi fowlers to prevent this.
* Bone Scan: nuclear material is injected into the bloodstream and the pictures are taken to show ‘Hot Spots” very useful in diagnosing osteomyelitis and metastatic disease.
* CT Scan: produces 3 dimensional images, REMEMBER check for allergy to iodine/shellfish prior to study
* MRI: produces cross section images of the body and can visualize not only bone but soft tissue, tendons, cartilage, etc. Remove ALL metal such as jewelry, glasses, hair clips, check if they have pacemaker or implanted metal devices
* Arthrocentesis: Removal of fluid from the joint space to check for infection or relieve pain
* Arthroscopy: entering the joint space with a camera to visualize the joint, Often used in conjunction with fluid or material removal from the joint.
* Electromyelogram: needles inserted into muscles and a graph of the electrical activity in the muscles

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| Rheumatoid Arthritis | Ankylosing Spondylitis | Osteoarthritis | Gouty Arthritis |
| Autoimmune Disease(Systemic) Inflammation of ALL jointsNO CURE | Genetic Autoimmune | Wear and Tear on Joints (Degenerative Joint Disease)Non-Systemic (may affect one joint or one side of body), Noninflammatory | Metabolic DiseasePrimary 85% (hereditary)Secondary (from medications or other diseases) |
| Immune system decides to attack one of its own proteinsAlso affects other organ systems | Bones of the Spine Fuse Together | Degeneration of the joints which eventually leads to damage to bones | Buildup of Uric acid in the blood from ineffective metabolism of purines. Tophi (uric acid crystals) develop in the joints (most commonly Great Toe) |
| Prognosis varies but it is usually progressive (Stage 1-4) Stage 4 is joint deformity, muscle atrophy, bone and cartilage destruction | Eventually causes Kyphosis which affects the ability for respiration, blindness, common with IBSHas ‘flares’ & ‘remissions’ | Heberden nodes: nodes on DISTAL joint of fingersBouchard’s Nodes on PROXIMAL joints of fingers | Has ‘flares’ and remissions dependent on diet and other factors. Very painful red, hot swollen joint. |
| Most Common:Women age 30-60 | Most Common: Young Men | Most Common: advanced age or occupational/recreational | Most Common:Middle Aged Men |
| Diagnostic Testing:ESR ↑ meaning increased inflammatory reaction in the bodyANA, CRP, Rheumatoid Factor | Diagnostic Testing:↓H&H, ↑ESR & CRP and + HLA-B27 antigenXrays will show fusion | Diagnostic Testing:Xray, MRI, CT | Diagnostic Testing:↑Uric Acid Levels (hyperuricemia) |
| Drugs: NSAIDS, Salicylates, Cox-2 Inhibitors, Steroids, DMARDs, Immunosuppressants, topical analgesics | Drugs: TNF Inhibitors (biologics), steroids, oral analgesicsSurgery to replace fused joints | Drugs: Tylenol, NSAIDS, GlucosamineSurgical joint replacement or arthroplasty | ***Colchicine*** for acute attacks 5mg/hr for 12 hours IV (can also be given orally)***Allopurinol*** for chronic maintenance.Steroids may also be used for acute inflammation. |
| Diet: Give NSAIDS with Milk or Food | Diet: None Specific | Diet: Low Calorie if Obese | Diet: Avoid high purine foods (brain, liver, kidney, alcohol, sardines, herring, beer etc.) |
| Interventions:↑Exercise to keep joints from “freezing”, heat treatmentsNo Aspirin with other NSAIDS | Interventions:Exercise to ↑ Flexibility and improve postureSwimming and Walking (anything LOW impact) | Interventions:↑Exercise (swimming)↑Exercises that strengthen the affected joint (ie: knee would be bicycling) | Interventions:Bed cradles prevent pressure from bed linens on affected jointsAvoid excessive alcoholCheck flank pain/urine for possible kidney stonesMaintain rest and immobility when flared up |

Osteoporosis: Loss in Bone Density

Increase calcium and exercise especially weight bearing

Most common post-menopausal women due to loss of estrogen, small framed Caucasian or Asian women

Caused by ↓ Ca+ or prolonged bedrest/lack of weight bearing

Diseases that contribute to osteoporosis: COPD, Hyperthyroidism, Alcoholism, Vitamin D deficiency

Medications linked to osteoporosis STEROIDS, Anticonvulsants, Immunosuppressants & heparin.

Symptoms are rare but loss of height can be noted.

Diagnostic Testing:

Bone Density (densitometry)

Risk for pathologic Fx and Fx in general (Hip is most common)

Drugs: Fosamax (take first thing in the morning on empty stomach and sit upright for 1 hour)



Osteomyelitis: Infection of the bone and bone marrow

Risk for fractures if not treated promptly as infected bone weakens over time

If there is a wound associated with the area a sample should be collected and sent for culture and sensitivity and placed on contact precautions.

Treatment is long term IV antibiotics (at least 6 weeks)

Even once ‘treated’ recurrence often happens.

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| Partial Knee Replacement (Unicompartmental) | Total Knee Replacement  | Total Hip Replacement (bipolar) |
| Only one of the knee compartments require replacement | All parts of the knee are replaced | Different variations but all parts replaced (prosthesis) |
| Small incision is made to expose damaged cartilage | Longer incision possible with drains | Longer incision possibly with drains |
| Patient will be up and walking 2-3 hours after the surgery | Bedrest for 24 hours.Patient will have intensive physical therapy for weeks after procedure.Partial weight bearing with walker for weeks. | Keep the legs ***abducted*** so the prosthesis does not become dislocated and do NOT cross the legs for weeks after! Will be partial weight bearing and need a walker as well.No flexion of the hip >90 degrees. |
|  | CPM machines may be used for passive motion | Will perform “Quadricep Setting” exercises where they push the knee down to the mattress and raise the heel off the bedAlso pushing foot down against the footboard of the bed and counting to 5 for strengthening. |
| May need to be on blood thinners after surgery to prevent formation of a clot (embolism) | May need to be on blood thinners after surgery to prevent formation of a clot (embolism) | May need to be on blood thinners after surgery to prevent formation of a clot (embolism) |
| Neurovascular checks every hour x 24 hours, every 2 hours x 24 hours, every 4 hours after that (are toes pink, warm mobile and with capillary refill <3 seconds?) | Neurovascular checks every hour x 24 hours, every 2 hours x 24 hours, every 4 hours after that (are toes pink, warm mobile and with capillary refill <3 seconds?) | Neurovascular checks every hour x 24 hours, every 2 hours x 24 hours, every 4 hours after that (are toes pink, warm mobile and with capillary refill <3 seconds?) |

Fractures- injury to the bone where the continuity of the bone tissue is broken.

Can be Traumatic or Pathologic

Closed- bone is NOT protruding through the skin

Open-bone has broken through the skin (more serious and a risk for infection) give tetanus

Traction is used to align and stabilize a fracture, prevent deformities, and relieve muscle spasms.

Bucks traction is used for hip and femur fractures.

Healing Process:

* Blood leaks out and forms a clot around the break
* Hematoma is formed
* **Fibrin meshwork is formed**
* WBCs wall off the area
* Osteoblast enter the area to firm it up
* New blood vessels develop and collagen strands start to incorporate calcium deposits
* Callus (new bone) is formed
* Remodeling-the callus is reabsorbed and new bone is laid down along stressed areas

FEMUR FRACTURES:

Femur is the largest and strongest bone in the body

Fractures are very painful place in traction and do not release until repaired (PAIN!!!)

Safety risk is a **fat** **embolism** where globules of fat are released into the bloodstream

Symptoms are tachycardia, shortness of breath and tachypnea, crackles.

Priority is to give the patient OXYGEN!

Young person who presents with femur fracture without trauma may have osteogenic sarcoma!

HIP FRACTURES

S/S of fx is shortening and external rotation of the leg

Repair is ORIF (Open **Reduction** Internal Fixation) or Total Hip Replacement

CASTS:

Check those neurovascular signs-if impaired raise to the level of the heart to maintain arterial pressure