Superficial Skeletal Muscles - Posterior

temporalis
occipitalis
sternocleidomastoid
trapezius
deltoid
infraspinatus
teres major
triceps brachii
latissimus dorsi
external oblique
gluteus medius
gluteus maximus
adductor magnus
glutens
hamstring group
biceps femoris
semi-tendinosus
semi-membranosus
gracilis
gastrocnemius
calcaneal (Achilles) tendon
fibularis longus
Anatomy and Physiology

• Bones and joints
• Bones provide framework and support
  – Classified by shape and composition
• Joints
  – Where two or more bones meet
• Muscle structure, movement, and heat
Bone can be damaged and repair itself. The steps of bone repair include (1) bleeding at the site of injury with clot and granulation tissue formation (2) proliferation of cells at the site, forming a callus (soft bony deposit) over the injury or fracture; (3) cells becoming bone (osteoblasts) or cartilage at the site; (4) the bone calcifying (hardened) by the deposit of inorganic salts at the site; and (5) the remodeling of the bone to the shape necessary to complete its designated function.
Joints

Synarthrosis—no movement  ex: suture of skull

Amphiarthrosis—some movement but limited  ex: pelvis

Diarthrosis—complete movement  ex: knee, hip, elbow
The muscles of the body give off enough heat in 30 minutes to bring about a half of a gallon of water to a boil.

By weight, bone is five times stronger than steel.
Common Signs and Symptoms

• Bone and joint diseases:
  – Pain, swelling, decreased mobility, and deformity

• Muscle disorders:
  – Weakness
Diagnostic Tests

• X-rays
• Computed axial tomography (CAT) scans
• Magnetic resonance imaging (MRIs)
• BMD – DEXA
• Blood studies
  – Including calcium and phosphorus
• Electromyography
Diseases of the Bone

• Vary from mild to severe

• More common as adults age
Diseases of the Bone

• Spinal deformities:
  – Kyphosis
    • Curvature of thoracic spine
  – Lordosis
    • Exaggerated anterior or inward curve of lumbar spine
  – Scoliosis
    • Lateral curvature of spine
Spinal Deformities
Diseases of the Bone

- **Osteoporosis**
  - Metabolic bone disease causing porosity and leading to decrease in bone mass

- **Osteomyelitis**
  - Inflammation of bone caused by staphylococcal infection

- **Osteomalacia**
  - Softening of the bones
Diseases of the Joints

• Most occur as slow process

• Arthritis
  – Any Inflammation of a joint—can be divided into two main groups: osteo and rheumatoid arthritis

• Osteoarthritis
  – Degenerative process – “wearing out of joint”—the leading cause of disability in the US.
Diseases of the Joints

• Rheumatoid arthritis  page 109-112
  – Autoimmune disorder affecting joints and connective tissue of entire body—can even affect the lungs, heart, and blood vessels.

• Rheumatoid vs Osteoarthritis page 110
  – Osteoarthritis affects working joints
  – Rheumatoid can affect all joints

• Gout—pictures on page 111
  – Metabolic error in breakdown of certain protein foods—sharp uric acid crystals are found in the joint.
Diseases of the Joints

• Hallux valgus—picture page 112
  – Deformity affecting metatarsophalangeal joint of big toe
  – Also known as bunion

• Temporomandibular (TMJ) joint syndrome
  – Severe headaches and pain in jaw
Diseases of Muscle and Connective Tissue

• Muscular dystrophy (MD)
  – Inherited, genetic disorder affecting skeletal muscles

• Ganglion cyst—picture page 113
  – Fluid-filled benign tumor on tendon sheath near wrist
  (can occur near other tendons in the body)

• Tetanus—a toxin produced by the bacillus bacterium, clostridium tetani causes tetanus.
  – Also known as lockjaw
Neoplasms

- Primary neoplasms of musculoskeletal system uncommon
  - Typically secondary, metastasizing from lungs, breast, and prostate
  -- the most common primary tumor of bone is **osteosarcoma**. **Ewing’s sarcoma** is also primarily a bone tumor, affecting long bones in children and teens—highly malignant and quickly metastasizes to nearly every organ. **Myeloma** is the most common bone marrow tumor. **Kaposi’s sarcoma** affects soft tissue.
Neoplasms

- **Osteosarcoma**
  - Most common primary tumor of bone affects the tibia, humerus or femur.

- **Rhabdomyosarcoma**
  - Very rare, highly malignant tumor of skeletal muscle
Trauma

• Main cause of problems in musculoskeletal system
• Fractures  Break in bone  images of fractures p. 116
  – Types:
    • Stress – Pathologic (caused by weakness or disease), or too much weight or pressure.
    • Open (compound) – if the bone has protruded through the skin or an object has punctured through skin making an opening to the fracture site.
    • Closed (simple) — there is no opening in the skin
    • Complete – break goes completely through bone.
    • Incomplete – the bone is not in two
Trauma (continued)

- **greenstick** – partial break like a “green stick”
- **Displaced** – fragments out of position
- **comminuted** – if there are more than two ends or fragments
- **Compression**—bone appears mashed down
- **Impacted** – one bone end forced over the other end
- **avulsion**—a separation of a small bone fragment where a tendon or ligament is attached
Trauma (continued)

Fractures

• **Longitudinal**—runs the length of the bone
• **Transverse**—runs across or at a 90 degree angle
• **oblique**—run in a transverse pattern
• **spiral**—twists around the bone
• **stellate**—form a star-like pattern
Trauma (continued)

- Fractures
  - Intracapsular – inside the joint capsule
  - Extracapsular – outside the joint capsule
  - Intertrochanteric – fractures in the trochanter of the femur
  - Femoral neck – located on the femur
  - Subcapital—located on the femur
  - Colles’ – the wrist
  - Pott’s – the ankle
Treatment of Fractures

• Immobilization—may require splinting initially and splinting or cast after reduction
• Closed reduction—without surgical incision
• Open reduction—require surgical intervention to clean and debride involved tissue and require some type of internal fixation
• Traction—involves the application of a device to maintain alignment and apply a pulling force.
Strains and Sprains

- **Strain**--------- *(a strain is less serious than a Sprain)*
- Symptoms include soreness, pain, and tenderness
  - Overstretching injury of muscle
  - Treatment:
    - Rest
    - Moist heat
    - Analgesics
    - Anti-inflammatories

As pain subsides, physical therapy might be initiated to restore strength and flexibility.
Strains and Sprains

- **Sprain**
  - Traumatic injury to joint with partial or complete tearing of ligaments.
  - Symptoms include varying degrees of swelling, pain, heat, and redness to purple or dark blue discoloration.

- Treatment (RICE):
  - Rest
  - Ice
  - Compression
  - Elevation
Dislocations and Subluxations

• Dislocation
  – Complete separation of bone from normal position
  – Causes pain and joint deformity

• Subluxation
  – Partial separation of bone from normal position
Symptoms are acute pain and obvious joint deformity. In ball-and-socket joints, the ball can be totally anterior or posterior to the socket. The joint tissue rapidly swells, making reduction difficult. (next slide)
Dislocation and Subluxation
Low Back Pain

- Very common disorder, if simple LBP
- May be acute or chronic
- Treatment:
  - Moist heat
  - Analgesics
  - Anti-inflammatories
  - Muscle relaxants
Herniated Nucleus Pulposus

• Herniated disk, ruptured disk, slipped disk, or bulging disk—protrusion of the soft center (nucleus pulposus) of a disk in the spinal cord or spinal nerve.
• Pressure on spinal nerve may cause pain in sciatic nerve (sciatica) or if in the cervical spine pain in the arms.
• Treatment same as low back pain
Bursitis

• Inflammation of bursae or small fluid-filled sac near joints—any joint can be affected, but bursitis of the shoulder is the most common type. Bursitis that occurs in the elbow is commonly called tennis elbow. (Bursae help reduce friction during movement)

• Symptoms:
  – Severe pain
    • Limits motion
Bursitis

• Treatment:
  -- rest
  – Moist heat
  – Analgesics
  – Anti-inflammatory agents

If bursitis persists, further treatment of the bursa includes injection with corticosteroids, draining, and surgical excision. Active range-of-motion exercises are needed after pain subsides to regain and maintain joint motion.
Tendonitis

• Inflammation of tendon or connective tissue that attaches muscle to bone

• May occur in any tendon, but most often it affects the shoulder.
Tendonitis

Treatment:
– Ice
– Analgesics
– Anti-inflammatory
– Exercises
– Surgery

Symptoms are pain, gradual or sudden and severe. Active range of motion can be initiated after the pain subsides. If joint adhesions have developed, surgical intervention might be necessary to free the joint and restore mobility.
Carpal Tunnel Syndrome

- Repetitive motion injury affecting hands
- Affects individuals working at repetitive tasks requiring finger and wrist motions
(cont) Carpal Tunnel Syndrom

The blood vessels, tendons, and nerves that feed or innervate the hands pass through a tunnel in the wrist area formed by the carpal tunnel ligament. The repetitive motion causes inflammation of the tendons, resulting in pressure on the medial nerve.
Carpal Tunnel Syndrome

- **Treatment:**
  - Rest—stop repetitive motion
  - Splint--
  - Anti-inflammatories
  - Physical therapy

If not relieved by these measures........

- Surgery to split the carpal ligament, enlarging the tunnel and relieving pressure on the median nerve.
Plantar Fasciitis

The plantar fascia attaches to the heel, or calcaneal area of the foot and helps develop the arch of the foot. Heel spurs do not cause the problem; they are the result of the problem.

• Treatment:
  – Rest
  – Ice
  – Analgesics
  – Anti-inflammatories
Plantar Fasciitis

Treatment:
Rest
Ice
Analgesics
Anti-inflammatory
Use of heel pad that relieves pressure on the heel.

Surgery to remove the heel spur and release the plantar fascia has proven ineffective in most cases.
Shoulder and Knee Disorders

• Torn rotator cuff
  – Muscles that hold head of humerus in shoulder socket area. Tears commonly caused by traumatic injuries involving sports.
  – Tears in the tendons that hold these muscles to the bone produce a snapping sound, followed by acute pain and the inability of the individual to abduct or raise the arm.
  – Acute rotator cuff tears are surgically repaired to restore motion of the shoulder. Analgesics and anti-inflammatory medications can be administered for acute pain. Active rehab exercise is needed postoperatively (con next slide)
Torn meniscus:
Attached to top of tibia and provides cushion for distal femur
The tear usually results from a sudden twisting of the leg while the knee is flexed.
Acute pain with weight bearing on the affected knee is the main symptom.
Treatment is immobilization, elevation and application of ice. Analgesics and anti-inflammatory. If surgery is needed it is commonly done arthroscopically. An extensive exercise rehab program is begun postoperatively.
Shoulder and knee disorders

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Cruciate ligament tears:
  Located inside knee joint
  Two ligaments cross to stabilize knee

Often injured when the leg is twisted or hit from the front or back while in a planted or weight-bearing position.

A popping sound is commonly heard at the time of injury, followed by pain and swelling of the knee.

Treatment depends on injury. Can vary from immobilization to surgery.
Shin Splints

- Overuse injury to periosteum and extensor muscles of lower leg
- Occur routinely with sudden increase in activity or new exercise routine
- Pain and tenderness along the inner aspect of the tibia, worsening with exercise and disappearing with rest are common symptoms. Rest, analgesics, anti-inflammatory meds and alternating ice and heat are usually beneficial.
Shin Splints

• Treatment:
  – Rest
  – Analgesics
  – Anti-inflammatory
  – Heat
  – Ice
Rare Diseases

• de Quervain’s
  – Tendonitis affecting thumb—repetitive-use tendonitis. Pain can radiate up the forearm several inches and down into the thumb.

• Tuberculosis of bone (mycobacterium tuberculosis)
  – Develops in tissue cavities; causes bone weakness and pain—generally affects the arms and legs and the knee is a common site. Antibiotic treatment is generally effective. A special form of TB of the vertebra of back of children is called Pott’s disease
Rare Diseases

• Paget’s disease
  Chronic metabolic bone disease affecting bone formation. Paget’s is characterized by an overgrowth of new bone that outpaces the breakdown of old bone. The new bone is thicker but weaker increasing the possibility of fracture. It often affects the pelvis and long bones of the legs in ages > 40. If it affects the bones of the ear, hearing might become impaired. A secondary problem or complication of Paget’s is the development of osteosarcoma, or bone cancer. The cause is idiopathic.
Rare Diseases

- **Myasthenia gravis**
  Autoimmune disorder characterized by muscle weakness and fatigue.

  The problem is related to blocking of the acetylcholine neurotransmitter by antibodies in the neuromuscular junction.
Effects of Aging

• Decreased bone density

• Decreased muscle strength and mass

• Changed vertebral disks and compression of vertebrae
  – Results in changes in height and spine curvature