Muscoloskeletal Sytems

Lemone and Burke Chapters 38-40

Musculoskeletal System

Objectives:

- Review Anatomy and physiology
- Describe normal MS assessment
- Describe age related changes
- Discuss tests and nursing interventions
- Recognize diversity issues

Musculoskeletal System

Objectives (cont):

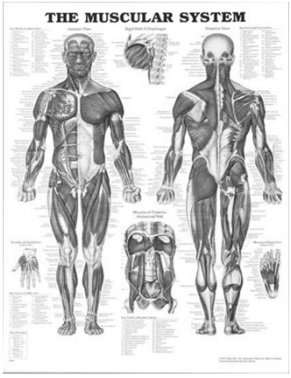
- Discuss etiology, pathophysiology, clinical manifestations, nursing interventions and collaborative management of:
- Strains, sprains, dislocations, bursitis, carpal tunnel, meniscus issues, and muscle spasms
- Fractures

Skeleton

- Supports soft tissue
- Protects vital organs
- Store minerals
- Site of hematopoisis

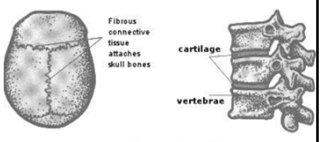
Muscles

- 3 types of muscle
  - Skeletal
  - Smooth
  - Cardiac

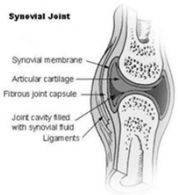


Joints

- Classification by structure:
- Fibrous
- Cartilaginous
- Synovial



- Classification by function:
- Synarthrosis
- Amphiarthosis
- Diarthrosis



Diagnostic tests

- X-ray
- CT scan
- MRI
- Bone scan
- Bone density scan
- Arthroscopy
- Blood tests

Musculoskeletal Assessment

- Health history
- Inspection
- Palpation
- ROM

Soft tissue injuries

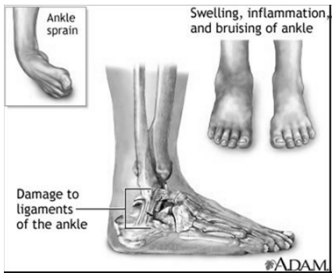
- Contusions
- Strains
- Sprains
- Dislocation
- Bursitis
- Carpal tunnel
- Meniscus
- Muscle spasms

Contusions and Strains

- Contusion:
  - Bleeding into soft tissue
  - Result of blunt force
- Strain: Stretching injury to a muscle or a muscle-tendon unit
  - Caused by mechanical overload
  - Muscle is forced to extend past its elasticity

Sprains

- Stretch or tear of a ligament surrounding a joint
- Sprains of the ankle and knee are most common



Interdisciplinary Care

- Primary goal in soft-tissue trauma is to reduce swelling and pain: R-I-C-E:
  - Rest
  - Ice
  - Compression
  - Elevation
- X-ray to rule out or evaluate damage
- MRI if follow up needed
- May need immobilization, splint/sling
- Medicate with NSAID or other analgesic

Nursing diagnosis for soft tissue injury

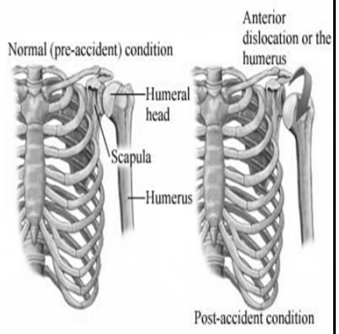
- Acute pain r/t: _____ aeb:_____ (or mb____)
  - Assess
    - pain (location, intensity, precip and relieving factors)
    - Neurovascular
  - Treat with R I C E
  - Collaborate with _____
  - Teach patient
    - RICE
    - Meds
    - Use of adjunctive devices
  - Medicate with ____ per order
    - Evaluate the response to pain med in ___ min
    - Evaluate for side effects of pain meds such as ___

Nursing diagnosis for soft tissue injury – cont:

- Impaired physical mobility r/t:___ aeb: ____
- Risk for fall r/t: ___
- Activity intolerance r/t: ___ aeb: ___
- Knowledge deficit r/t:_____ mb:_____

Dislocations

- Ends of two connected bones separate
  - Results from extreme force put on a ligament
  - congenital
- Most common sites for dislocation include:
  - Shoulder
- Subluxation: partial dislocation

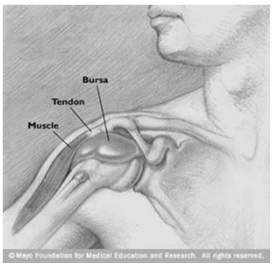


Dislocation

- Interdisciplinary Care:
  - Diagnosis – H&P, X-ray, MRI
  - Correction of dislocation – reduction
  - Pain management
- Nursing diagnosis:
  - Acute pain
  - Risk for injury
  - Others????

Bursitis

- Inflammatory condition of the bursa
  - Bursa - fluid-filled sac located adjacent to tendons near large joints
  - Functions: gliding surface to reduce friction between tissues of the body



Bursitis

- Causes:
  - Injury
  - Infection
  - Underlying rheumatic condition (RA)
  - Inflammation of elbow bursa from gout crystals
- Diagnosis:
  - Clinical symptoms
  - X-ray

Bursitis

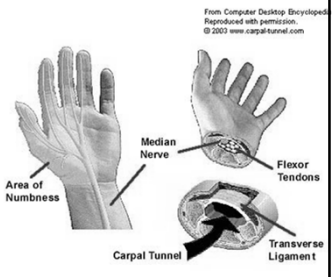
- Collaborative management:
  - Ice
  - Rest
  - Meds: Anti-inflammatory, pain-med, cortisone
  - Aspiration of fluid

Septic Bursitis

- Aspiration
- Culture of fluid to identify organism
- Antibiotic therapy, sometimes IV
- May need repeated aspiration of fluid
- Surgical drainage and removal of infected bursa sac
- Urgent medical interventions

Carpal Tunnel Syndrome

- The median nerve in the wrist becomes compressed causing pain and numbness
- Repetitive injury - Most common cause
  - Occupational
  - Recreational
  - Other causes:

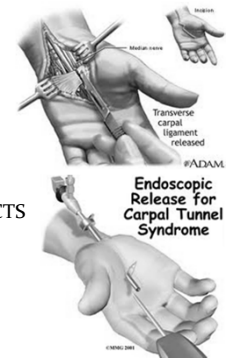


Carpal tunnel syndrome

- Diagnosis:
  - H&P
  - Phalen test
  - X-ray
  - MRI

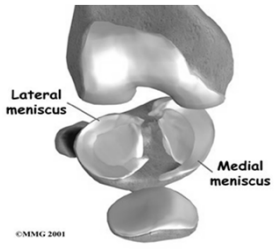
CTS: Interventions

- Non-surgical
  - Drug therapy: NSAIDs, steroid injections
  - Immobilization of wrist (splint)
- Surgical
  - Required in half of clients with CTS
  - Involves nerve decompression
    - OCTR (open carpal tunnel release)
    - ECTR (endoscopic carpal tunnel release)



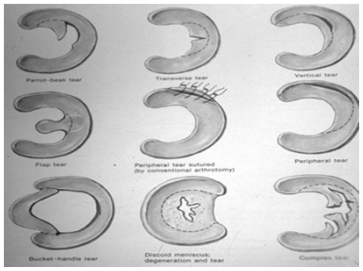
Knee Injuries: Meniscus

- Pathophysiology
  - Tearing of either the medial meniscus or the lateral meniscus
  - Usually a result of twisting the leg when the knee is flexed and foot is on ground



Torn Meniscus: Symptoms

- Pain, swelling and tenderness in the knee
- Clicking or snapping sound when the knee is moved



McMurray Test

Treatment for Torn Meniscus

- **Locked knee:**
  - Manipulation and casting for 3-6 weeks
  - Partial or total meniscectomy
- **Post – op care:**
  - Neurovascular check
  - Check for bleeding
  - Leg exercises

Muscle spasms

- **Causes:**
  - Muscle fatigue
  - Heavy exercise
  - Dehydration
  - Hypothyroidism
  - Low levels of magnesium or calcium
  - Alcoholism
  - Kidney failure
- **Location:**
  - Calves
  - Neck or lower back

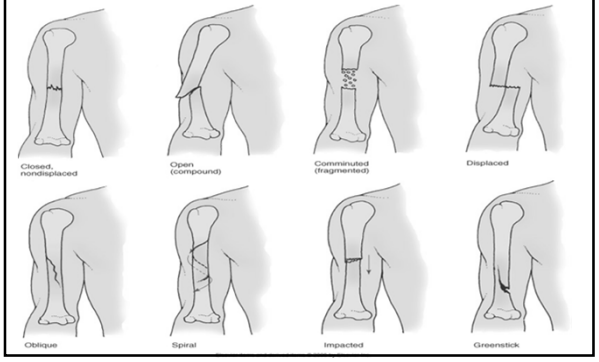
Muscle Spasms

- **Duration:**
  - Generally of short duration
  - Acute low back pain
  - 90% recover within 3 months
- **Treatment:**
  - Hydration
  - Non-medical
  - Medication

Classification of fractures

- **Complete fracture**
  - bone is divided into two distinct sections
- **Incomplete fracture**
  - break is through only part of the bone
- **Open or compound fracture**
  - Wound visible externally
- **Closed or simple fracture**
  - does not extend through the skin - no visible wound

Common types of fractures



Causes

- **Pathologic or spontaneous fracture**
  - Minimal trauma
  - Weakened bone
- **Fatigue or stress fracture**
  - Excessive stress to bone
- **Compression fracture**
  - Most common site - vertebra

Signs and symptoms of fractures

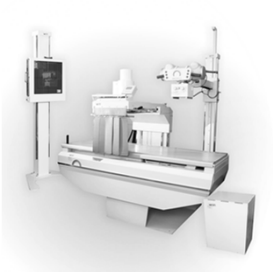
- Pain
- Diminished mobility/movement
- Change in bone alignment
- Alteration in length of extremity
- decreased ROM
- Swelling
- Discoloration
- Crepitation
- Subcutaneous emphysema

Emergency treatment

- Cover wound with sterile dressing
- Immobilize
- Do not attempt to clean out
- Do not reduce
- Transport
  - Needs xray for location and extent of damage

Diagnostic tests

- Standard Xrays
- CT scans
- Bone scan (not commonly done)
- MRI



Neurovascular Assessment

- Compare the injured area with its symmetric counterpart
- Color
- Temperature
- Movement
- Sensation
- Pulses
- Capillary refill
- Pain
- Edema

Lower Extremity Fractures

- **Fractures include those of the:**
  - **Femur**
  - **Tibia and fibula**
  - **Ankle and foot**

Non-surgical Management Fracture

- Cast
- Skin (Buck's) traction
- Skeletal traction

- Traction is temporary followed by the use of a cast brace or surgery

Examples for different casts

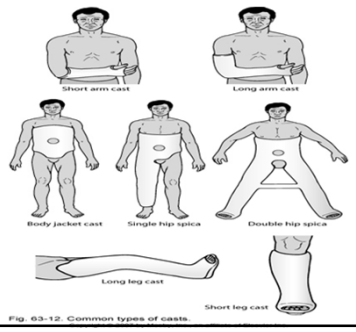


Fig. 63-12. Common types of casts.

Cast Materials

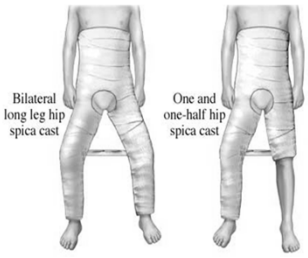
- **Plaster of Paris**
  - 24 +hours to dry
  - Perform petaling for sharp edges
  - Window the cast if skin is disrupted
  - Handle wet cast with palms of hands

Cast Materials (continued)

Fiberglass
Lighter
Dry in 10-15 minutes – weight bearing in 30 minutes

Polyester-cotton knit
Dry in 7 minutes
May bear weight in 20 minutes

Casts – Practice Assessment



Cast Care

- Handle with care while drying
- Elevate on pillows
- Monitor Neurovascular status
  - Make sure cast is not too tight
  - Check for drainage
- Teaching
  - Report: numbness, coolness, swelling, increased pain, change in color
  - No objects inside cast!! No hair dryer to dry cast
  - Crutches

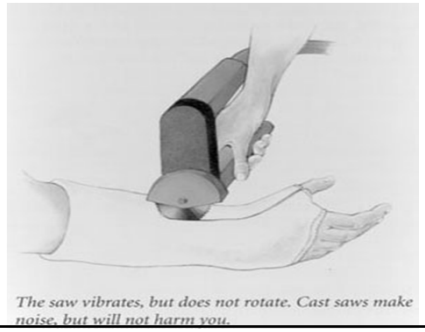
Cast Complications

- Infection
- Circulation impairment – compartment syndrome
- Peripheral nerve damage
- Complications of immobility
  - Skin breakdown
  - Pneumonia/Atelectasis
  - Thromboembolism
  - Constipation

Nursing diagnosis

- Acute pain r/t
- Risk for neurovascular dysfunction
- Risk for infection
- Impaired physical mobility

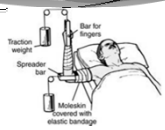
Cast Removal

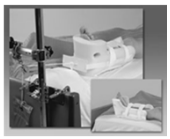


The saw vibrates, but does not rotate. Cast saws make noise, but will not harm you.

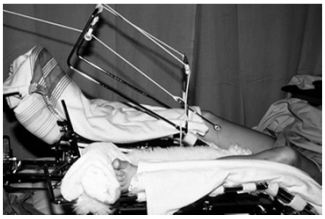
Skin Traction

- Weights need to stay in place!
- Center client on bed
- Weights need to hang freely
- Assess skin,
- Assess neurovascular



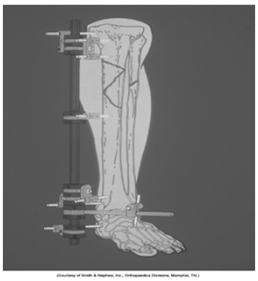


Skeletal Traction



- Center client
- Assess skin
- Assess neurovascular
- Pin care

External Fixation



- Pins implanted into the bone
- External metal frame to prevent bone movement
  - Check N/V status every 4 hours
  - Elevate extremity

Routine Pin Care

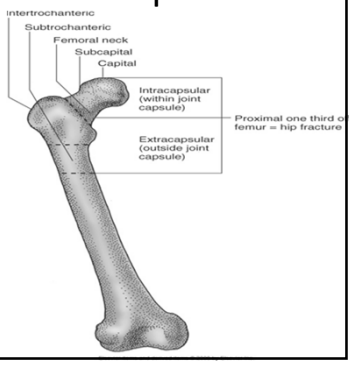
- **Primary Purpose**
  - Keep site free of infection
    - Done q shift
  - Assess for signs of infection
    - Erythema, purulent drainage, edema, warmth

Open Reduction with Internal Fixation (ORIF)

- Allows surgeon direct visualization of the fracture site
- Uses metal pins, screws, rods, plates, or prosthetic devices to immobilize the fracture during healing

Fractures of the Hip

- **Intracapsular**
- **Extracapsular**



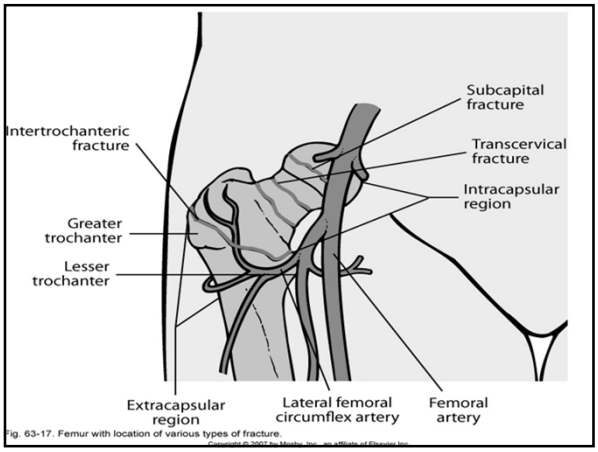


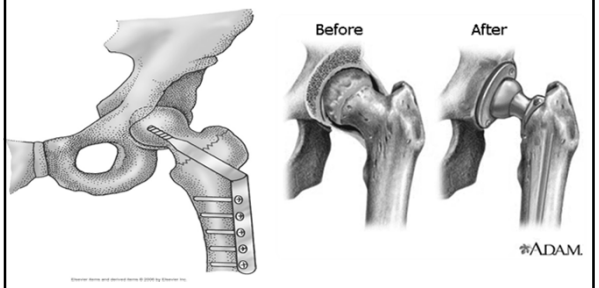
Fig. 63-17. Femur with location of various types of fracture.

Signs and Symptoms of a Hip Fracture

- Pain in hip or groin
- Edema, stiffness and bruising
- Inability to bear weight on affected extremity
- Muscle spasm

Examples ORIF

intramedullary rod; prosthesis of head



Postoperative Care for Hip Fracture

- Neurovascular check
- Maintain skin intergity
- Monitor VS
- I+O
- Respiratory exercises
- Maintain proper alignment by using hip precautions
- Avoid flexion > 90 degrees
- Early ambulation

Figure 52-20 Pillows are staggered in a wedge-shaped arrangement to maintain abduction of hip.

Post-operative Care (continued)

- Case study
  - 78 y/o female admitted to med/surg s/p ORIF L hip 12 hours ago. Dressing to L hip, JP in place.

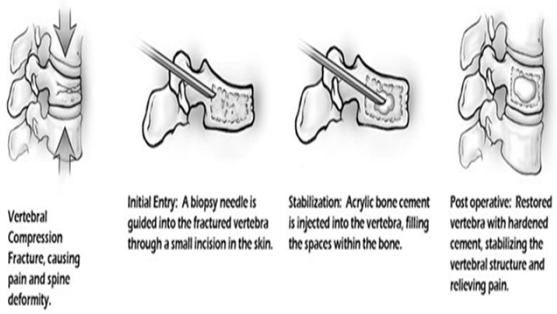
Fractures of the Pelvis

- **Most common cause - trauma**
- **Internal damage the chief concern in pelvic fracture**
  - Hemorrhage and shock
- **Management of pelvic fractures**
  - Single fx site – bedrest,
  - 2 or more fx sites - surgery

Compression Fractures of the Spine

- **Most associated with osteoporosis**
- **Nonsurgical management**
  - bedrest, analgesics, and physical therapy.
- **Minimally invasive surgeries**
  - vertebroplasty and kyphoplasty
  - Halo immobilizer

Vertebroplasty



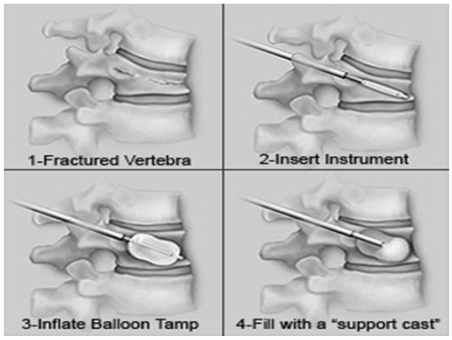
Vertebral Compression Fracture, causing pain and spine deformity.

Initial Entry: A biopsy needle is guided into the fractured vertebra through a small incision in the skin.

Stabilization: Acrylic bone cement is injected into the vertebra, filling the spaces within the bone.

Post operative: Restored vertebra with hardened cement, stabilizing the vertebral structure and relieving pain.

Balloon Kyphoplasty



Cervical spine injury

- Traction
- Halo placement
- Used in non- displaced cervical fracture

Complications of fractures

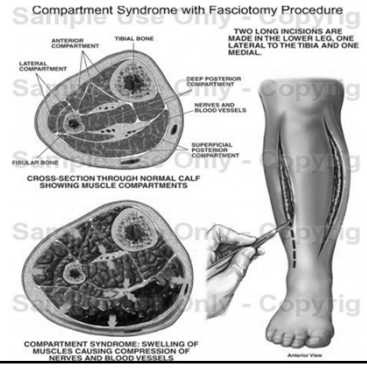
- Acute compartment syndrome
- Shock
- Fat Embolism syndrome
- Infection (osteomyelitis)
- Ischemic necrosis
- Fracture blisters
- Delayed union, nonunion and malunion
- DEEP VEIN THROMBOSIS

Acute Compartment Syndrome

- Acute compartment syndrome
  - Ischemia – edema cycle
  - Most common site is lower leg and forearm
  - Internal and external causes
    - Internal = hemorrhage
    - External = casts and constricting dressings
  - Edema causes pressure on nerve endings and subsequent pain

Acute compartment syndrome

- **Signs and symptoms**
  - Numbness and tingling (paresthesia)
  - Pallor of tissue
  - Weak pulses
  - Pain with passive movement of extremity
  - Pain that is unrelieved by pain medication



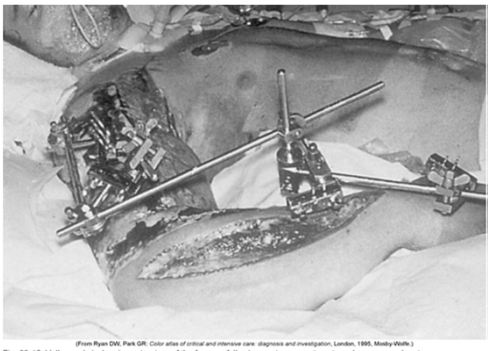

(From Ryan DW, Park GR: *Color atlas of critical and intensive care: diagnosis and investigation*, London, 1995, Mosby-Wolfe.)

Fig. 63-15. Volkmann's ischemic contracture of the forearm following acute compartment syndrome secondary to a supracondylar fracture of the humerus. Note the incision line of an unsuccessful fasciotomy.

Fracture Blisters

NCLEX

- A client has a total knee replacement, and a CMP device is being used. The nurse understands that teaching was effective when the client ID the goal of Tx as:
  - A. maintain muscle tone
  - B. Improve flexion of joint
  - C. Prevent tissue breakdown
  - D. Avoid formation of thrombus

NCLEX

- A client is in skeletal traction while awaiting surgery for repair of a fractured femur. The client c/o of leg discomfort and asks the nurse to release the traction. Which is the nurse's best initial response:
  - A. I will remove half the weights and notify your physician
  - B. I 'll get your pain med to help relieve your discomfort
  - C. I can't do that because the weights are needed to keep your bones in alignment.
  - D. I have to follow the physician's directions, and releasing the weights is not ordered

NCLEX

- A client's leg is set in a long leg cast. Because of the long leg cast, the nurse should monitor for a clinical indicator of compromised circulation such as:
  - A. Foul odor
  - B. Swelling of the toes
  - Drainage on the cast
  - Increased temperature

Questions?

"Have you got any Hip - op?"