**Chapter 20: Musculoskeletal Injuries**

**Overview:** This chapter covers the anatomy and physiology on common injuries and assessment of the musculoskeletal system. The *musculoskeletal system* includes the voluntary muscles and other supporting structures that give the body form and enable movement. The primary components are bones and muscles, connected with joints, cartilage, ligaments, and tendons.  
**Anatomy and Physiology**

*Skeleton (axial and appendicular):* rigid framework to protect internal organs, provide internal structure, and produce blood cells; consists of *bones*, connective tissue, and *cartilage*

*Joints:* the site at which two or more bones make contact; enable movement and articulation

*Ligaments:* thick bands of connective tissue holding two bones together; provide structure & stabilization

*Tendons:* non contractile tissue that connects muscle to bone

*Muscle (skeletal, cardiac, smooth):* a type of tissue that has the ability to contract

1. Only skeletal muscle is part of the musculoskeletal system.
2. Skeletal muscles contract to cause flexion and extend to cause extension.

**Common Injuries**

*Sprains:* involve stretching or tearing of a ligament when joint is forced beyond its normal ROM

*Strains:* a stretch or torn muscle

*Ruptured tendons:* sudden and forceful contractions of a muscle can damage a tendon

*Fractures:* break in a bone, often caused by trauma

1. *Closed fractures* occur when the overlying skin has not been disrupted. *Open fractures* cause opening in the overlying skin and are true emergencies, allowing bacteria to enter the body

*Dislocations:* a separation or displacement of the bones of a joint

**General Assessment**

1. Assessing MOI can be crucial for providing clues to a patient’s possible injuries.
2. Deformity is a common finding that often indicates a musculoskeletal injury. Mild deformity is generally caused by swelling or internal bleeding but can also be caused by fractures. Gross deformities are often caused by displaced fractures or dislocations.
3. *Guarding:* the act of holding a painful injury close to the body; may be a sign of a musculoskeletal injury
4. Performing a physical exam using *DCAP-BTLS* is important for finding potential injuries.
5. Avoid focusing on the obvious musculoskeletal injury. Focusing all your attention on the obvious injury may cause you to overlook a serious head or internal abdominal injury.
6. Use best judgment on exposing the injury site to look for bleeding and open skin at the risk of exposing the patient to unnecessary privacy and/or environmental risks.
7. Always assess the distal neurovascular status of a suspected musculoskeletal injury (CSM)

**Upper Extremity Injuries**

Standard Approach–examine each extremity separately. Examine and palpate the scapula, sternoclavicular joint, *A/C joint*, acromion process. Then, using two hands palpate the upper extremity from proximal to distal. Finally, palpate the injury.

Common injuries and characteristics:

1. A/C separation: end of clavicle sticks out
2. Broken collarbone: skin tenting above clavicle
3. Shoulder dislocation: dent under acromion, patient resistant to arm movement.
   1. Use the shelter position to determine the type of dislocation (posterior or anterior)
4. Humerus fracture: point tenderness, swelling, angulation, impingement of radial nerve
5. Elbow dislocation: arm locked with 40-50 degrees of flexion, rapid CSM compromise
6. Forearm fractures: may exhibit false movement if both radius and ulna are compromised
7. Skier’s thumb: excess lateral and dorsal rotation of the thumb

**Lower Extremity Injuries**

Standard Approach–Assess MOI, CSM distal to injury. Assessing proximal to distal, press inwards on the pelvic bones, then downwards on the pelvis. Assessing each leg separately, press inward on the hip, two hands on the femur, palpate all sides of the knee, finally palpating down the lower leg until obstructed by the ski/snowboard boot.

Common injuries and characteristics:

1. Pelvic fracture: high MOI, may result in acute internal bleeding (Call DART)
2. Hip fracture: common among older patients, shortened leg and external rotation; may have referred knee pain
3. Hip dislocations: 90% posterior, significant MOI to sitting position
4. Femur fractures: distal results in swelling above knee, midshaft can result in compromise to femoral artery (Call DART), proximal often referred to as “hip fractures”
5. Knee injuries: swelling, point tenderness, twisting MOI, popping sensation, reduction in motion
6. Tib-fib injuries: characteristic of non-releasable or failed to release bindings; may result in compartment syndrome

**Methods of Care**For all immobilization techniques, check CSM before and after splinting, maintain manual stabilization until splint application, pad the splint for further patient comfort.

1. *Splinting:* immobilization above and below injury to decrease movement, pain, further damage, and easier transport
2. Sling and swathe: used to immobilize upper-extremity injuries
3. Vacuum/air splints: opposite of each other to form a rigid conformable splint.
4. Blanket roll: used to immobilize shoulder dislocations
5. Pelvic binder: binds the pelvis to transport and reduce pain
6. Quick splint: leg injuries
7. SAM splint: lower arm injuries
8. Traction splint: leg injuries requiring traction such as a femur fracture

**Patroller Skills**

1. Splinting for upper and lower extremity injuries
2. Open fracture: sterile dressing, creative splinting, rapid transport
3. Boot removal: Once off the hill–using several patrollers—stabilize, warm up, and remove boot by sliding heel away followed by toe. Assess distal CSM.

**Must study:** To be able to properly package and ship each of these injuries, review each chapter diagram.

**Key Terms:** *A/C joint, angulation, articular cartilage, articulation, bone crepitus, cartilage, cortex, dislocation, dorsal, dorsiflex, false movement, fracture, guardian, immobilization, joints, joint capsule, ligaments, meniscus, musculoskeletal system, periosteum, plantarflex, popliteal fossa, skeletal muscle, sling and swathe, splint, sprain, strain, subluxation, synovium, tendons, traction, traction splint, zone of injury*