

Chapter 20: Musculoskeletal Injuries

Overview: Covers the anatomy and physiology of common injuries of and assessment of the musculoskeletal system. The musculoskeletal system is the voluntary muscles and other supporting structures that give the body form and enable movement. The primary components are bones, muscles, connected with joints, cartilage, ligaments, and tendons.

Anatomy and Physiology

Skeleton

- Rigid framework to protect internal organs, provides internal structure, and produces blood cells.
- Consists of bones, connective tissue, and cartilage.
- Made up of seven areas: head, spine, shoulders, upper extremities, rib cage, pelvis, and lower extremities

Joints

- Defined as the site at which two or more bones make contact. They enable all body movement, including bending and straightening. Surrounding connective tissue stabilizes the joint and is called the joint capsule. This area is filled with a lubricant called synovial fluid allowing better movement of the joints

Ligaments

- Ligaments are thick bands of connective tissue that hold two bones together. Ligaments resist stretching, restricting joint movement to the range of normal motion. Ligaments provide important structure and stabilization of the skeleton.
- When a ligament is pushed beyond its limit, damage occurs. The supporting ligament can overstretch or tear, or the capsule can tear open resulting in an unstable joint with pain and limited function.

Muscle

- The three muscle types are skeletal, smooth, and cardiac. The musculoskeletal system includes only skeletal muscle.
- Skeletal muscles are usually divided into complementary pairings (biceps and triceps). One muscle is responsible for contracting to cause a bending (flexing) while the other's contracting causes straightening (extending).

Tendon

- Strong, strap-like continuation of a muscle that connects a muscle to a bone across a joint.
- Can also be damaged by overstretching and tearing. If damaged the muscle's effectiveness is significantly reduced or the muscle can become nonfunctional.

Common Injuries

Sprains

- Injury involving the stretching or tearing of a ligament. Occurs when a joint is forced beyond its normal range of motion. These injuries may also occur with other musculoskeletal injuries.

Strains

- Stretched or torn muscle, commonly referred to as a "pulled muscle." Strains are often caused by overexertion and poor body mechanics.

Ruptured Tendons

- Sudden and forceful contractions of a muscle can damage a tendon, resulting in a complete loss in the movement of the associated joint upon muscle contraction.

Fractures

- A fracture is a break in a bone usually caused by trauma but may also result from bone disease. A fracture can occur anywhere on a bone and can affect any bone. Fractures are usually grouped into two major categories, closed fractures and open fractures.
- Closed fractures are ones in which the overlying skin surface has not been disrupted
- Open fractures are ones in which the overlying skin has been opened. Open fractures are true emergencies because bacteria and other contaminants can enter the body.
- Fractures are further classified according to whether the broken bone remains in normal anatomic alignment.
 - A nondisplaced fracture is when a bone remains in alignment.
 - A displaced fracture causes the affected extremity to appear bent, crooked, shortened or rotated.
- Fractures can result in significant internal and/or external blood loss. Open fractures generally result in a greater loss of blood because local soft tissues do not restrict the bleeding.

Dislocations

- Separation or displacement of the bones of a joint. When a joint dislocates, the joint capsule and ligaments can stretch or tear. Furthermore, soft tissues, blood vessels, and surrounding nerves can also be damaged.
- If a joint dislocates then returns to its normal anatomic position this is known as a subluxation.

General Assessment

- Assessing mechanism of injury can be crucial for providing clues as to a patient's possible injuries.

- Deformity is a common finding that generally 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.
- Guarding is the act of holding a painful injury close to the body and may be a sign of a musculoskeletal injury.
- Performing a physical exam using DCAP-BTLS is important for finding potential injuries.
- Avoid focusing on the obvious musculoskeletal injury
 - Focusing all your attention on the obvious unnatural angle of a broken leg may cause you to overlook a serious head or internal abdominal injury.
- Use best judgment on exposing the injury site to look for loose bleeding and open skin at the risk of exposing the patient to unnecessary privacy or environmental risks
- Always assess the distal neurovascular status of a suspected musculoskeletal injury (CSMs)

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:

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

Lower Extremity Injuries

Standard Approach—Assess MOI, CMS 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:

- Pelvic Fracture: High MOI, may result in acute internal bleeding (Call DART)
- Hip Fracture: Common among older patients, shortened leg and external rotation. May have referred knee pain
- Hip dislocations: 90% posterior, significant MOI to sitting position.
- Femur fractures: Distal result in swelling above knee, midshaft can result in compromise to femoral artery (Call DART)
- Knee injuries: swelling, point tenderness, twisting MOI, popping sensation, reduction in motion
- 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 CMS before and after splinting, maintain manual stabilization until splint application, pad the splint for further patient comfort.,

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

Skills

- Open fracture: sterile dressing, creative splinting, rapid transport
- Boot removal: once off the hill, using several patrollers, stabilize, warm up, and remove boot by sliding heel away followed by toe. Assess distal CMS.

Must study

- There's no easy way to go about it. To properly package and ship each of these injuries, make sure to review each diagram in this chapter.

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.