CHAPTER 6 THE FOOT, ANKLE, & LOWER LEG

- I. Anatomy
 - A. The foot stabilizes and supports the rest of the body.

B. The foot absorbs several HUNDRED pounds of force up to 3x the body weight.

C. The foot has 4 arches that absorb the impact of walking, running, and jumping.

- 1. Transverse arch
- 2. Metatarsal arch
- 3. Inner longitudinal arch {medial}
- 4. Outer longitudinal arch {lateral}
- D. Each foot contains 26 bones and 38 joints.
 - 1. 7 tarsal bones
 - a. Talus
 - b. Calcaneus
 - c. Navicular
 - d. Cuboid
 - e. Medial cuneiform
 - f. Intermediate cuneiform
 - g. Lateral cuneiform
 - 2. 5 Metatarsals (mid-foot)
 - 3. 14 Phalanges (toes)
 - a. 1st phalange is medial (big toe)
 - b. 5th phalange is lateral (little toe)
- E. ANKLE: Most commonly injured major joint in athletics.
 - 1. Most injuries are minor sprains.
- F. Ankle joint (talocrural joint) is made up of 4 bones:
 - 1. Tibia-
 - 2. Fibula- 2 bones of the lower leg
 - 3. Talus-
 - 4. Calcaneus- 2 largest bones of the foot
 - a. Malleoli: 2 large bony prominences on either side of the ankle.

b. They are the distal heads of the tibia (medially) and Fibula (laterally)

- 5. Tibia:
 - a. Transmits weight placed on the lower leg to the talus.
 - b. Is mounted almost directly on top of the talus and extends over its medial side.

6. Fibula:

a. on lateral side of the talus

7. Ankle is a HINGE joint, which moves in one plane:

Flexion and Extension (dorsi-flexion and plantar flexion).

8. Ankle is more stable in dorsi-flexion. (important to remember when taping)

9. Ankle joint is very strong, but due to stresses of athletics, is often injured.

10. After the bones, the 1st line of defense against ankle sprains is the joint's ligaments.

a. Most of ankle's ligaments are attached to the rough edges of the malleoli.

b. Ligaments are named for the bones they connect.

c. Ligaments most commonly injured:

1. Anterior and Posterior Talofibular, anterior tibiofibular, and calcaneofibular (lateral side)

2. Deltoid Ligament (medial side), a group of 4 ligaments.

11. The muscle-tendon groups most important in preventing ankle injuries:

a. Achilles Tendon

1. The attachment site of the Gastrocnemius and Soleus muscles (calf muscles).

2. If tendon is tight, it is often the cause of ankle sprains.b. Peroneal muscle group

1. Runs along lateral side of the leg and foot, attaches under the foot.

2. When contracted, these muscles cause the foot to evert, which helps prevent an inversion sprain.

12. Lower Leg:

a. 2 bones: Tibia and Fibula

b. Area on front of lower leg called shin.

c. Interosseous membrane connects Tibia and Fibula.

d. No large muscle mass and poor blood supply to shin area.

e. Back of lower leg – calf muscles:

1. Gastrocnemius-

2. Soleus- Join to form Achilles tendon

3. Achilles tendon, also called heel cord, attaches to calcaneus (heel bone).

- G. Evaluation Format
 - 1. Purpose of evaluation is to determine if there is a serious injury.
 - 2. At first, always suspect a fracture.
 - 3. Signs of fracture:
 - a. Direct or indirect pain
 - b. Deformity
 - c. Grating sound at injury site
 - d. Sometimes NO PAIN or swelling!!!

4. If fracture is suspected, stop evaluation, splint, and transport athlete to Dr.

5. Avulsion Fracture

a. is more common in young athletes because ligaments are stronger than bones.

b. A force that would tear a ligament in an adult will pull away a chunk of bone in a younger athlete.

6. 4 steps in evaluation process: H.O.P.S.

a. HISTORY- Ask questions to determine mechanism of injury.

- 1. How did it happen?
- 2. Where does it hurt?
- 3. Did you hear a pop or snap?
- 4. Have you injured this anatomical structure before?
- b. OBSERVATION- Look for:
 - 1. bleeding
 - 2. deformity
 - 3. swelling
 - 4. discoloration
 - 5. scars
 - 6. other signs of trauma
- c. Palpation: Physical inspection

1. Palpate away from injury site 1st, then work toward injury.

2. Find point tenderness – the site of the most pain is site of most damage.

- 3. Use bilateral comparison.
- d. Special tests
 - 1. Looks for pain, disability, and instability
 - 2. Years of training are necessary to be competent

enough to test an athlete without doing further damage.

3. NEVER DONE BY STUDENT TRAINER!!!

4. Special tests and functional tests are done to assess disabilities.

- a. joint stability
- b. muscle/tendon
- c. accessory anatomical structures
- d. inflammatory conditions
- e. range of motion
- f. pain or weakness in affected area
- H. Assessment Tests
 - 1. Purpose-

a. to enable allied health professionals to properly assess the severity of the injury.

b. to make recommendations regarding treatment and possible return to participation.

Example: "Thompson Test" – used to detect Achilles tendon rupture; checks the reaction of calf muscles when squeezed. Lack of Plantar Flexion is a sign of ruptured tendon.

- I. Rehabilitation
 - 1. Sending an athlete back to competition before healing is complete leaves the player susceptible to further injury.
 - 2. How to determine when healing is complete:
 - a. By the absence of pain during stressful activity
 - b. By the return of full range of motion
 - c. By the return of strength, power, and endurance to the affected muscle group.
 - 3. Before beginning rehab, the trainer should consult with the sports med. team to establish an individual program tailored for that individual athlete and their specific injury.
 - 4. Included in any rehab protocol is the following:
 - a. Range of motion exercises
 - b. Resistive exercises
 - c. Cardiovascular/fitness activities
 - 1. walking
 - 2. running
 - 3. stair climbing
 - 4. progressive running
 - 5. cycling

- d. sports specific activities
 - 1. jumping
 - 2. figure of eights
 - 3. jumping rope
- 5. Return to Competition Guidelines
 - a. These guidelines must be met before returning to competition:
 - 1. full range of motion
 - 2. strength, power, and endurance are proportional to athlete's size and sport
 - 3. no pain during running, jumping, or cutting
- J. Preventive/Supportive Techniques
 - 1. The application of preventive and supportive techniques is a timehonored and time-consuming tradition.
 - 2. It is also very expensive.
 - 3. All injured joints should be supported initially.
 - 4. Whether to continue taping a healthy joint is a decision the trainer will have to make.
- K. Protective Devices
 - 1. Their use is beneficial if:
 - a. they are properly selected
 - b. used in the appropriate setting
 - c. correctly fitted
 - d. properly applied
 - e. used within the rules and guidelines of the specific sport.
 - 2. Consultation with an equipment specialist is encouraged.
 - 3. Listed are various protective devices that are commercially available:
 - a. Achilles Brace
 - b. Ankle braces
 - 1. lace-up
 - 2. air
 - 3. prophylactic
 - c. arch supports
 - d. boots
 - 1. hockey
 - 2. skiing
 - 3. wrestling

- e. bunion pads
- f. corn and callous pads
- g. heel cups
- h. heel lifts
- i. orthosis
 - 1. soft
 - 2. semi rigid
 - 3. rigid
- j. shin guards
- k. shoes
- 1. steel insoles
- m. toe guards
- n. turf toe strips