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## Prevention and Treatment of Injuries

The Ankle and Lower Leg

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Houston, Texas

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## Anatomy

- Tibia: the second longest bone in the body
  - Serves as the principle weight-bearing bone of the leg.
  - It is triangularly shaped in its upper two thirds but is rounded and more constricted in the lower third.
  - Lower third of shaft produces an anatomical weakness that establishes this area as the site of most fractures occurring to the leg.

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## Anatomy

- Fibula: the long slender bone located along the lateral aspect of the tibia
  - Connected to the tibia at both proximal and distal ends by strong anterior and posterior ligaments.
  - The main function of the tibia is to provide the attachment of muscles

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## Anatomy



- Tibial and Fibular Malleoli

The thickened distal ends of both the tibia and the fibula. Medial and Lateral malleolus.

They extend distally so that stability is created by the bony arrangement at the ankle joint.

The bone extends further on the lateral side than on the medial side giving more stability on the lateral side.

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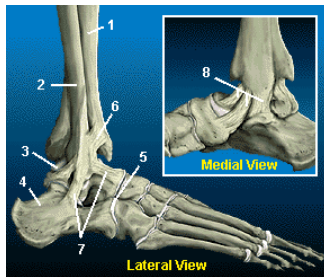
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## Anatomy



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## Anatomy



- Lateral Ligaments: Anterior Talofibular Ligament, Posterior Talofibular Ligament, and Calcaneofibular Ligament
- Medial Ligaments: Deltoid Ligament

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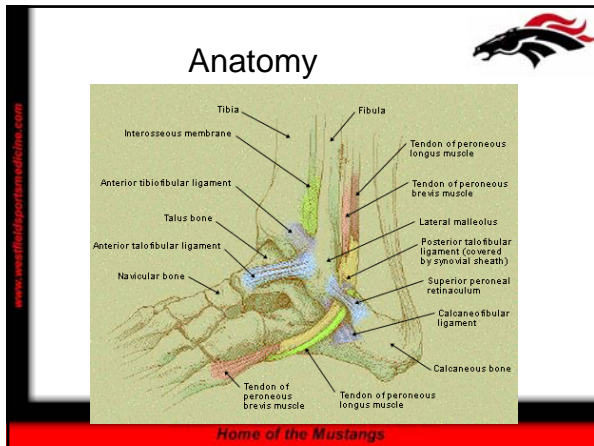
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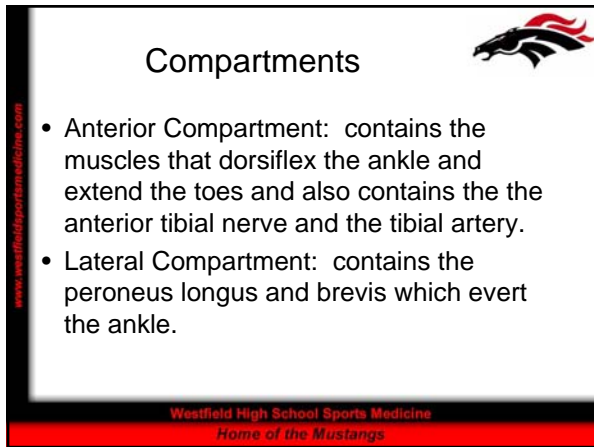
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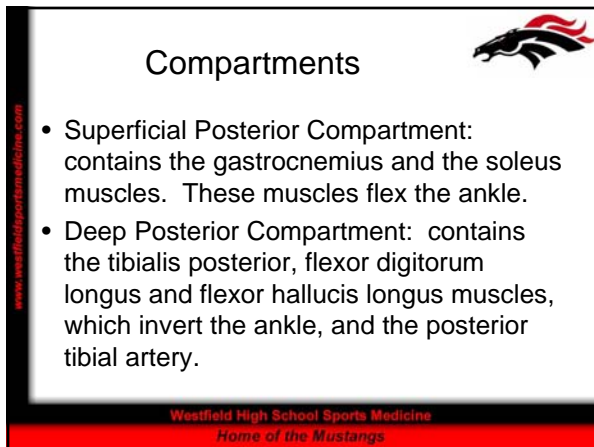
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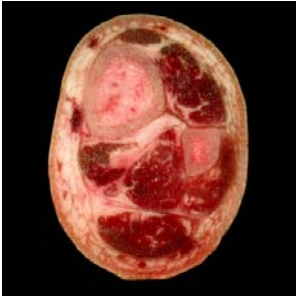
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## Compartments



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## Preventing Injuries To:

- Achilles Tendon Stretching: Performed with knee extended to stretch the upper gastrocs and then bent at 15 to 30 degrees to stretch the lower soleus and heel cord.
- Strength Training: Using toes raises in full range of motion. Also use inversion, eversion, dorsi-flexion, and plantar flexion.

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## Lower Leg Tests

- Percussion and compression test: a gentle percussive blow can be given to the the tibia or fibula above or below the suspected site of a fracture. It may also be applied to the bottom of the heel. Such blows set up a vibratory force that resonates at the fracture, causing pain .

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## Lower Leg Tests



- **Thompson Test:** is performed by squeezing the calf muscle while the leg is extended and the foot is hanging over the edge of the table. A positive Thompson test is one in which squeezing the calf muscle does not cause the heel to move or pull upward or causes the heel to move less when compared with the uninjured leg.

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## Thompson Test



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## Lower Leg Tests



- **Compression Test:** compress the tibia and the fibula together to check for fractures on the tibia or fibula

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## Ankle Stability Tests



- **Anterior Drawer Test:** used to determine the extent of injury to the anterior talofibular ligament primarily and to the other lateral ligaments secondarily.
  - The athlete sits on the edge of the table and the trainer grasps the lower tibia in one hand and the calcaneus in the palm of the other. The tibia is pushed back and the calcaneus is pulled forward. Positive is a CLUNKING sound or feel.

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## Ankle Stability Tests



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## Ankle Stability Tests



- **Talar Tilt Test:** Used to determine the extent of inversion or eversion injuries. With the foot positioned at 90 degrees to the lower leg and stabilized, the calcaneus is inverted. Excessive motion of the talus indicates injury to the calcaneofibular and possibly the anterior and posterior talofibular ligaments as well. The deltoid ligament can be tested when the ankle is everted.

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## Inversion Ankle Sprain

- Grade I :
  - Mild pain and disability occurs, weight bearing minimally impaired. Point tenderness and swelling over the ligament with no joint laxity.
  - RICE – Horseshoe to control hemorrhage – limit weight bearing for a day or two – tape and brace when return to play.

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## Inversion Ankle Sprain

- Grade II
  - Usually complains of a pop or a snap – moderate pain and disability, and weight bearing is difficult – there is tenderness and edema with blood in the joint – may have positive talar tilt – positive anterior drawer, although not like a Grade III –
  - RICE – crutches 5 to 10 days – progress to FWB – Protection device – increase ROM – Increase proprioception – Increase strength – decrease swelling

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## Inversion Ankle Sprain

- Grade III
  - Severe pain in the region of the lateral malleolus – Weight bearing not possible – discoloration – positive talar tilt – positive anterior drawer
  - RICE, protection – NWB, crutches – Isometric exercises – Increase ROM – Balance Exercises – prone to reinjury

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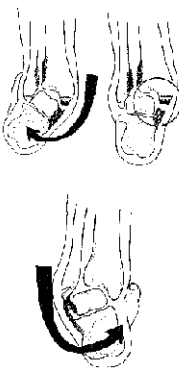
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Inversion Ankle Sprain



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Inversion Ankle Sprain



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Ankle Fracture

- In most cases of a fracture, SWELLING and pain may be extreme. There may be no deformity, but if a fracture is suspected, splinting is essential!
- RICE to control hemorrhage and swelling as soon as possible. To physician for x-rays!

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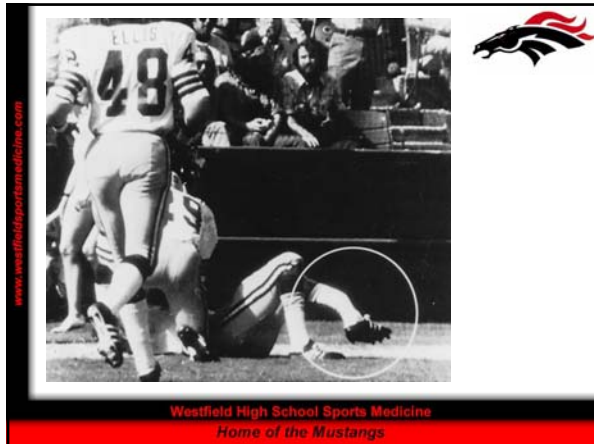
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### Achilles Tendon Strain

- May vary from mild to severe with the most severe being a partial or complete avulsion or rupturing of the Achilles tendon. The athlete feels acute pain and extreme weakness on plantar flexion.
- RICE, Lift in heel of shoe, begin strengthening and stretching

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### Achilles Tendinitis

- Inflammatory condition that involves the Achilles tendon or the sheath around the tendon. Uphill running or hill workouts can cause it to begin.
- Heel lift, ultrasound, Ice, Treat symptomatically

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## Achilles Tendinitis

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## Achilles Tendon Rupture



- Complaints of a sudden snap that felt like something kicked him or her in the lower leg. Pain is immediate but rapidly subsides. TOE RAISIGN is impossible with a rupture. Obvious indentation at the tendon site and positive Thompson test.
- RICE, NSAIDs, non weight bearing, (Non-operative)
- MUST SEE PHYSICAIN

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## Peroneal Tendon Subluxation / Dislocation



- Wrestling, football, ice skating, skiing, basketball, soccer
- Can have tear of the peroneal retinaculum allowing the peroneal tendon to dislocate out of its groove.
- Complaints that in running or jumping, the tendon snaps out of the groove and then back in when stress is released.

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## Peroneal Tendon Subluxation / Dislocation



- Compression with a felt pad or horseshoe.
- RICE, NSAIDs
- Surgery may be required

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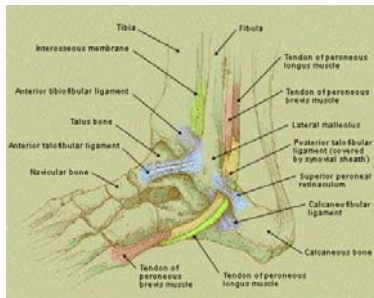
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## Peroneal Tendon Subluxation / Dislocation



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## Anterior Tibialis Tendinitis



- Point tenderness over the anterior tibialis tendon.
- Decrease activity and avoid hill work. Ice packs coupled with stretching before and after running should reduce symptoms
- Strengthening and NSAIDs
- Ask about a new car too!

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**Peroneal Tendinitis** 

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- Complains of pain behind the lateral malleolus when rising on the ball of the foot during jogging, running, cutting, or turning activities. Tenderness is noted over the tendon located at the lateral aspect of the calcaneus distally to beneath the cuboid bone.
- RICE, NSAIDs, strengthen peroneals

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**Gastrocnemius Strain** 

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- Variable amount of pain, swelling and disability. May complain as if being hit in the calf with a stick. Point tenderness and functional strength loss.
- RICE, NSAIDs, heel lift, elastic wrapping, gradual ROM exercises

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**MTSS – Medial Tibial Stress Syndrome** 

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- Referred to as shin splints which is a catch all term
- Caused by a repetitive microtrauma, most commonly seen in basketball, running and gymnastics
- Include weakness of leg muscles, shoes that provide little support, and training errors such as training on hard surfaces and **OVERTRAINING**

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## MTSS – Medial Tibial Stress Syndrome



- May involve one of two syndromes: a tibial stress fracture or an overuse syndrome that can progress to an irreversible, external compartment syndrome.
- Four grades of injury:
  - 1, pain occurring after athletic activity
  - 2, before and after activity, not affecting performance
  - 3, before, during, and after, affecting performance
  - 4, Pain so severe performance is impossible

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## MTSS – Medial Tibial Stress Syndrome



- Physician referral to rule out stress fracture by bone scans and x-rays
- Activity modification
- Correction of pronation during walking and running with custom foot orthotics
- Do not blow off MTSS

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## Anterior Tibial Compartment Syndrome



- Serious condition that can have serious consequences
- Trauma to the anterior lateral aspect of the lower leg
- Positive signs include: Tightness of skin to the anterior lateral aspect of the lower leg, drop foot, numbness of foot or lower leg, cold foot or lower leg, loss of feeling to foot or lower leg.

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## Anterior Tibial Compartment Syndrome



- DO NOT place a compression wrap on the injury
- Get physician attention ASAP
- Athlete may lose lower leg if treatment is denied or delayed

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## Rehabilitation



- BAPS board
- Tubing for inversion, eversion, dorsi flexion plantar flexion
- Stretching
- Strengthening
- Toe raises
- Functional Progression

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