



THE UNIVERSITY OF TOLEDO MEDICAL CENTER

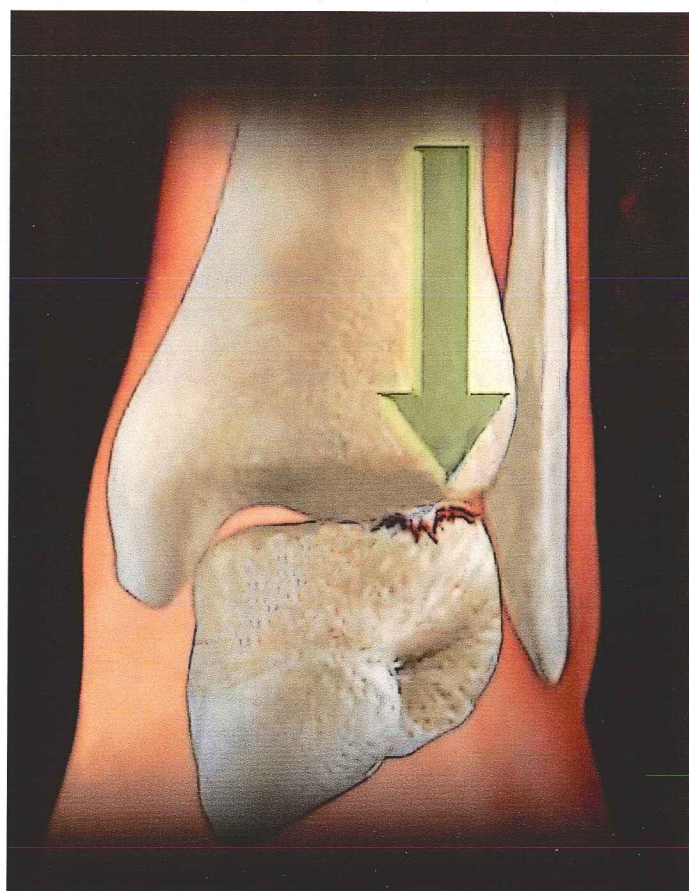
ORTHOPAEDIC MONTHLY

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SPECIAL EDITION: ANKLE BY NABIL A EBRAHEIM MD

Ankle Pain- Complete Overview

There are many structures present at the anterior aspect of the ankle. These structures are often susceptible to injury. There are many common injuries and conditions around the ankle. Anterolateral impingement is a painful limitation of full range of motion of the ankle due to soft tissue or osseous (bony) pathology. Soft tissue thickening is commonly seen in athletes with prior trauma that extends into the ankle joint. Tibial bone spur impinging on the talus can become a source of chronic ankle pain and limitation of ankle motion in athletes. Osseous (bony) is a spur on the anterior lip of the tibia contacting the talus during dorsiflexion. Arthritis of the ankle joint is commonly the result of a prior injury or inflammation to the ankle joint. It can usually be diagnosed with an examination and x-ray. Osteochondritis Dissecans of the Talus is a chip-type fracture that usually occurs with severe ankle sprains. It causes pain, swelling, and stiffness of the ankle joint. X-rays, CT scan, or MRI are commonly used for the diagnosis. Tibialis Anterior Tendonitis is an overuse condition common in runners. It is a common injury that usually accompanies anterior shin splints. If this tendon is strained, pain and tenderness will be felt upon active dorsi-flexion or when the tendon is touched. There are many structures present at the medial aspect of the ankle. These structures are often susceptible to injury. There are many common injuries and conditions around the medial ankle. Posterior tibial tendonitis or rupture can occur from overuse activities, degeneration, or trauma. The posterior tibial tendon is one of the major supporting structures of the foot. The tendon helps to keep the arch of the foot in its normal position. When there is insufficiency or rupture of the tendon, the arch begins to sag, and a flatfoot deformity can occur with associated tight Achilles tendon. The posterior tibial tendon rupture occurs in a hypovascular zone. This occurs distal to the medial malleolus. It will present as painful swelling on the posteromedial aspect of the ankle. The patient will be unable to perform a single leg toe raise, the too many toes sign will be present, the patient will be flatfoot, and there will be a fixed deformity of the hind foot. There are four stages of posterior tibial tendon rupture. Rupture of the posterior tibial tendon could be missed. Tarsal tunnel syndrome is compression of the tibial nerve in the tarsal tunnel. The flexor retinaculum covers the nerve. Tarsal tunnel syndrome is similar to compression of the median nerve in the carpal tunnel. It can be caused by ganglia, accessory muscles, or



soft tissue mass. Tarsal tunnel syndrome can be differentially diagnosed as a herniated disc, a stress fracture of the calcaneus, or plantar fasciitis. Tarsal tunnel syndrome will present as pain on the medial side of the foot. The patient will have pain worse with dorsiflexion due to tension on the nerve. There will be paresthesia and numbness of the foot and a positive tinell's sign behind the medial malleolus. Flexor hallucis tendonitis is pain, swelling, and weakness posterior to the medial malleolus. Dorsiflexion of the big toe may be reduced when the ankle is placed in dorsiflexion. Triggering and pain along the tendon sheath may also occur with toe flexion.

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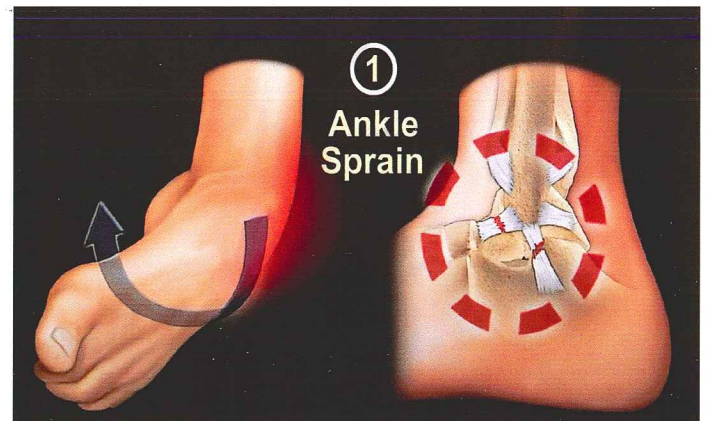
Flexor hallucis tendonitis often occurs in activities such as ballet dancing, in which plantar flexion is necessary. The deltoid ligament is the primary stabilizer of the ankle joint. The deltoid ligament provides support to prevent the ankle from everything. An isolated eversion sprain with a tear of the deltoid ligament is a rare injury.

There are many structures present at the posterior aspect of the ankle. These structures are often susceptible to injury. There are many common injuries and conditions around the posterior ankle. Posterior ankle impingement (os trigonum) is a posterior talar impingement of the os trigonum or large process of the talus (stieda syndrome). This is a non-united piece of accessory bone seen posterior to the talus. It is common in athletes such as ballet dancers. There will be tenderness in the posterolateral aspect of the ankle posterior to the peroneal tendon especially with passive plantar flexion. It may be seen in association with flexor hallucis longus tenosynovitis. Flexor hallucis longus tenosynovitis is a condition associated with ballet dancing, in which extreme plantar flexion is necessary. It is characterized by swelling and pain posterior to the medial malleolus. It is triggered by toe flexion. Dorsiflexion of the

big toe is less when the ankle is dorsiflexed. Achilles tendonitis is irritation and inflammation that occurs due to overuse. It is characterized by pain, swelling, and tears within the tendon. It is usually treated with therapy and injection. Do not inject inside the tendon. It is rarely treated with surgery. Achilles tendon can become prone to rupture with age, lack of use, or by aggressive exercises. Rupture is diagnosed by the Thompson test and MRI. It is treated by conservative treatments without surgery by using a cast or a boot. However, rupture rate may be high if the patient is treated conservatively. Surgery is done by approximation of the torn tendons. The risk of surgery is infection or skin and wound complications. There are many structures present on the lateral side of the ankle. These structures are often susceptible to injury. Diagnosis of these injuries can be confusing and many of these injuries can be missed. Diagnosis of a sprained ankle may be the wrong diagnosis. A high ankle sprain is a syndesmotic injury that may require surgery. Other injuries to the lateral side of the ankle include peroneal tendon subluxation, rupture of the peroneus longus tendon, peroneal tendonitis, anterior process of the calcaneus fracture, lateral process of the talus fracture, and Achilles tendonitis.

Ankle Sprains

Ankle sprains are among the most common injuries in orthopaedics. In fact, estimates suggest that approximately 25,000 people experience ankle sprains each day. An ankle sprain occurs when a ligament in the ankle is forced to stretch beyond its normal range of motion. The ankle joint is composed of three bones: the tibia, the fibula and the talus. Ligaments hold these bones together in position. Ligaments stretch during movement and provide stability to the joint. There are sets of three ligaments responsible for holding the ankle together: the lateral ligament complex, the syndesmosis and the deltoid ligament on the medial side. The lateral ligament complex is the most common injured ligament, accounting for roughly 85-90 percent of all ankle sprains. Injuries to the syndesmosis, also referred to as high ankle sprains, account for 10 percent of ankle sprains, while medial ankle sprains account for less than 1 percent. Ankle sprains are typically caused by one of the following: twisting, rolling or turning beyond normal ankle motions, excessive force transmitted upon landing, planting the foot unevenly on a surface. Patients with an ankle sprain will likely present with symptoms including: swelling, pain, redness and warmth in the foot. Physicians will perform a thorough history and physical examination. Here, physicians will look for tenderness and swelling and check a patient's range of motion. X-rays may be ordered to rule out fractures. Moreover, an MRI may be ordered if the physician is concerned about severe injury to the ligaments. It's important to accurately diagnose an ankle sprain, as they may mimic other complicated injuries including: ankle fractures, syndesmotic injuries or high ankle sprains diagnosed with stress views or a CT scan, stress fractures diagnosed with a bone scan or an MRI, osteochondral fractures or osteochondritis of the talar dome or tibial plafond, subluxation or dislocation of the peroneal tendons diagnosed through clinical examination supplemented by MRI, sprains of the subtalar joint or midfoot injuries, such as dorsal calcaneocuboid



ligament sprains, anterior process of the calcaneus, lateral process fractures of the talus. The severity of an ankle sprain is determined by the amount of force on the ligament and is identified through three grades. Grade I sprains are characterized by slight stretching and damage to some fibers of the ligament. There is usually minimal tenderness and swelling, and it can be treated with rest. Grade II sprains are characterized by a partial tear of the ligament. Patients with a Grade II sprain will present with moderate tenderness and swelling, decreased range of motion and possible instability. In addition to immobilization with a splint, physical therapy is necessary to increase range of motion and strength. Grade III ankle sprains are characterized by a complete tear of the ligament. Patients will present with significant swelling, tenderness and instability. Immobilization will again be needed along with a longer stint of physical therapy for range of motion and strengthening. Although rare, surgical intervention may be needed for grade III ankle sprains that don't respond to conservative treatment. In these cases, physicians may either perform ankle arthroscopy or reconstruction.

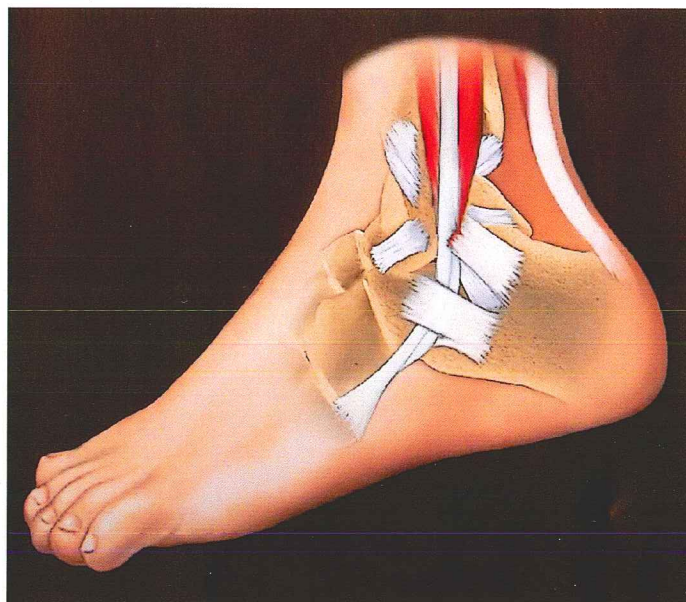
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Following an ankle sprain injury, there is a gradual process toward recovery. First, it's imperative to rest and protect the ankle to reduce swelling. Second, range of motion, strengthening and flexibility should be addressed. Third, there should be a gradual return to

activity. To lessen the risk of developing an ankle sprain, it's important to properly warm up and stretch. In addition, it is helpful to wear properly fitting shoes and be mindful of talking, running or working surfaces.

Peroneal Tendon Subluxation

Two peroneal tendons run on the outside of the ankle just behind the fibula in a groove. The two peroneal tendons are the peroneus brevis tendon (closer to the fibula) and the peroneus longus tendon (posteriorly). The superior and inferior retinacula keep these two tendons in their positions. Retromalleolar swelling with pain and giving way of the ankle and the feeling of "clicks" as the patient moves the ankle, should alert the clinician to the possibility of peroneal tendon subluxation. Testing for peroneal tendon subluxation is usually done with dorsiflexion/eversion of the foot against resistance. The ankle may feel as if it is unstable and sometimes the patient will be able to demonstrate the subluxation of the tendons. Peroneal tendon subluxation usually occurs more in younger individuals. It is usually a sports related injury. The condition can be acute, chronic, or recurrent. It may be associated with a shallow fibular groove, a ruptured or a weak superior peroneal retinaculum, or a peeled off retinaculum. X-ray may show an avulsion fracture of the fibula. The "fleck sign" is an indication for peroneal tendon subluxation. MRI or ultrasound is very helpful in visualizing the condition of the peroneal tendons. The condition may be associated with a longitudinal tear of the peroneus brevis tendon. The tendon is near the fibula and as it goes outside of the groove; it may hit the fibula as it subluxes, causing a tear. For acute treatment, cast or immobilization results are average. Surgical repair of the retinaculum can be done in addition to the possibility of deepening the fibular groove especially if the condition is chronic,



recurrent and painful. You may want to do deepening of a shallow groove in addition to repair of the longitudinal tear of the peroneus brevis tendon (if it is present), by suturing the tendon side to side. Suturing of the peroneus brevis longitudinal tear. Reconstruction of the superior peroneal retinaculum.

Ankle Fractures

There are two common classifications used for ankle fractures; the Weber Classification and the Lauge Hansen Classification. The Weber classification categorizes fractures of the ankle according to the level of the fibular fracture.

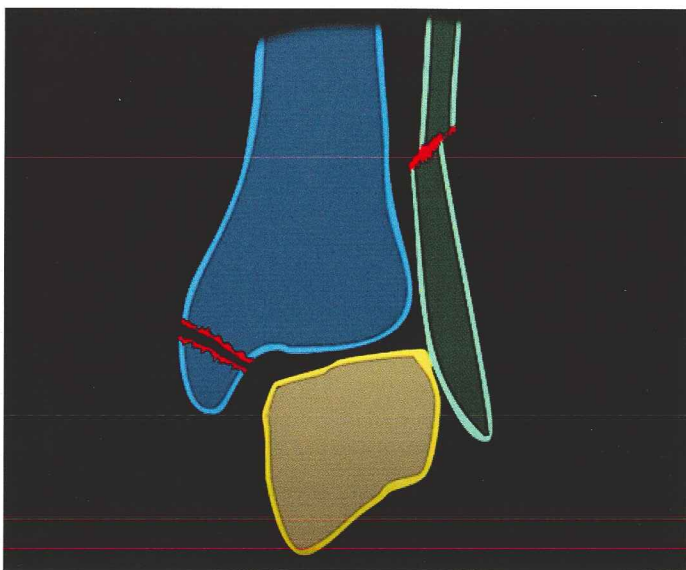
Type A: The fracture occurs below the level of the syndesmosis. It is rarely unstable and is rarely associated with a syndesmotic injury.

Type B: Common injury and the fracture occurs at the level of the syndesmosis. The fracture could be unstable.

Type C: The fracture occurs above the level of the syndesmosis. This type is usually unstable. A Type C fracture with a deltoid ligament injury will most likely require syndesmotic screws because the syndesmosis will be unstable.

The Lauge Hansen Classification categorizes depending on the mechanism of injury.

Supination – Adduction Injury: Vertical medial malleolus fracture associated with injury to the talus and tibial plafond.



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Movement of the talus medially. Possible anteromedial tibial plafond impaction. It is a transverse fracture of the distal fibula. Treatment includes screws parallel to the ankle joint or an anti-gliding plate. Check for loose bodies in the joint due to possible tibial plafond impaction. May also need to elevate and restore the joint surface. Fixation for this injury type may need to be started medially rather than laterally (routinely done laterally first).

Supination – External Rotation: Most common injury. Check the fibula on the lateral x-ray. Always look for this injury type on AP view and lateral view radiographs. On the lateral x-ray, if you find a fibular fracture that starts from anterior/inferior going posterior/superior, then this is a supination – external rotation injury. This is the injury type that can give you trouble if the fibula appears to be the only bone that is fractured because you want to prove that this is a supination – external rotation injury Type 2 not a Type 4 injury. Make sure that you are not missing a Type 4 fracture of the medial malleolus or injury to the deltoid ligament. This injury has four stages: 1. Anterior Tibiofibular Ligament. 2. Fibula Fracture. 3. Posterior Tibiofibular Ligament. 4. Medial Malleolus or Deltoid Ligament. Deltoid ligament injury may not show up clearly on x-rays. You will need to get stress view x-rays! Injury with a stage 2 injury alone is treated with a boot and weight bearing as tolerated. Injury with stage 4 will need surgery.

Pronation – External Rotation: On lateral x-ray, the fractures goes anterior/superior to posterior/inferior. The fracture of the fibula is usually above the joint level (Weber Type C). This fracture has 4 stages starting medially. The fracture pattern moves in a circle.

Pronation – Abduction: The fracture of the fibula is usually transverse or comminuted. The fractured ankle may have injury only to the syndesmosis with nothing else appearing on the x-ray. Fracture starts medially and may cause injury to the deltoid ligament. Injury to the syndesmosis and fracture of the fibula will occur last.

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