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Comprehensive Athletic Trainer
Assessment of the FHL and Ankle
Impingement for the Performing
Artist and Traditional Athlete.

Learning Objectives

- Analyze and interpret anatomic variations as they relate to FHL and impingement syndromes
- Implement an increased awareness of dynamic foot ankle ROM and basic lower extremity anatomy when assessing foot and ankle injuries.
- Apply new perspectives for appropriate rehabilitation and treatment plan for a specific style of dance or traditional athlete.

Overview

- Are injuries to the foot and ankle in a dancer or performing artist really that different than the traditional athlete?
- Looking at the demands placed on the foot and ankle in these two arenas they are more alike than we may think.
- As our knowledge in dance/performing arts medicine grows and the inclusion of these individuals as athletes becomes more widely accepted, we can bridge the gap between the stage/apparatus, court, deck and field.
- We will examine some of the common signs and symptom complaints of both of these athletic groups.
- We will discuss assessment of these injuries and development of appropriate rehab programs.

Ankle Pain

- Soft-tissue foot pain is widespread, especially in active populations.
- Plantar fasciitis, Achilles tendinitis, or tarsal tunnel syndrome are commonly reported causes of chronic pain and disability.
- Disorders of the flexor hallucis longus (FHL) are routinely overlooked and may frequently be misdiagnosed as some of these other foot problems mentioned above.
- Ankle impingement, especially posterior impingement in the adolescent population is another misdiagnosed injury.

FHL

- The flexor hallucis longus (FHL) has been referred to as the 'Achilles of the foot' because of its unique role controlling midfoot pronation and supination.
- Its physiological and mechanical properties allow it to act as a powerful convertor of force from the rearfoot all the way through to the big toe.

A wolf in sheep's clothing?

- As a result of the anatomical arrangement and unique actions associated with it, the FHL is muscle-tendon unit that can often become injured in athletic populations and present as something else.
- However it may also affect any sport that requires repetitive push-off and extreme plantar flexion such as:
 - swimmers
 - sprinters
 - Football
 - Soccer
 - Gymnasts
- The FHL may also suffer damage following injury to the ankle and/ or syndesmosis due to its close proximity to the talus and the ankle joint.

Common causes of ankle impingement and injury to the FHL

- Overuse (FHL, Ankle impingement)
- Extreme or repetitive plantar flexion (FHL, PAIS)
- Stress to tarsal tunnel (FHL, PAIS)
- The most common problems with the FHL are:
 - Tenosynovitis
 - muscle strains
 - tendinosis
- This is often called the 'dancers tendonitis' as it is so prevalent in classical ballet dancer's.
- These conditions often occur together due to constant friction or irritation of the muscle.

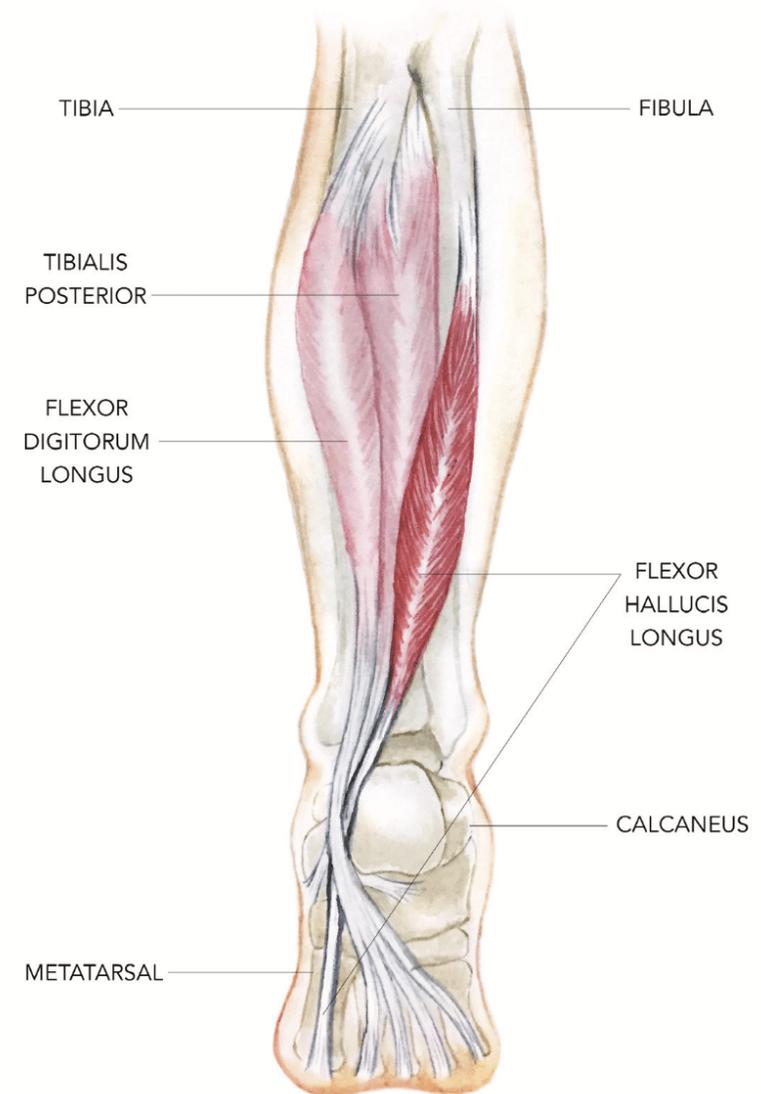
Ankle Impingement and FHL Injury

- To have a better understanding of how involved the FHL is, a closer look at the anatomy of the lower leg is necessary.

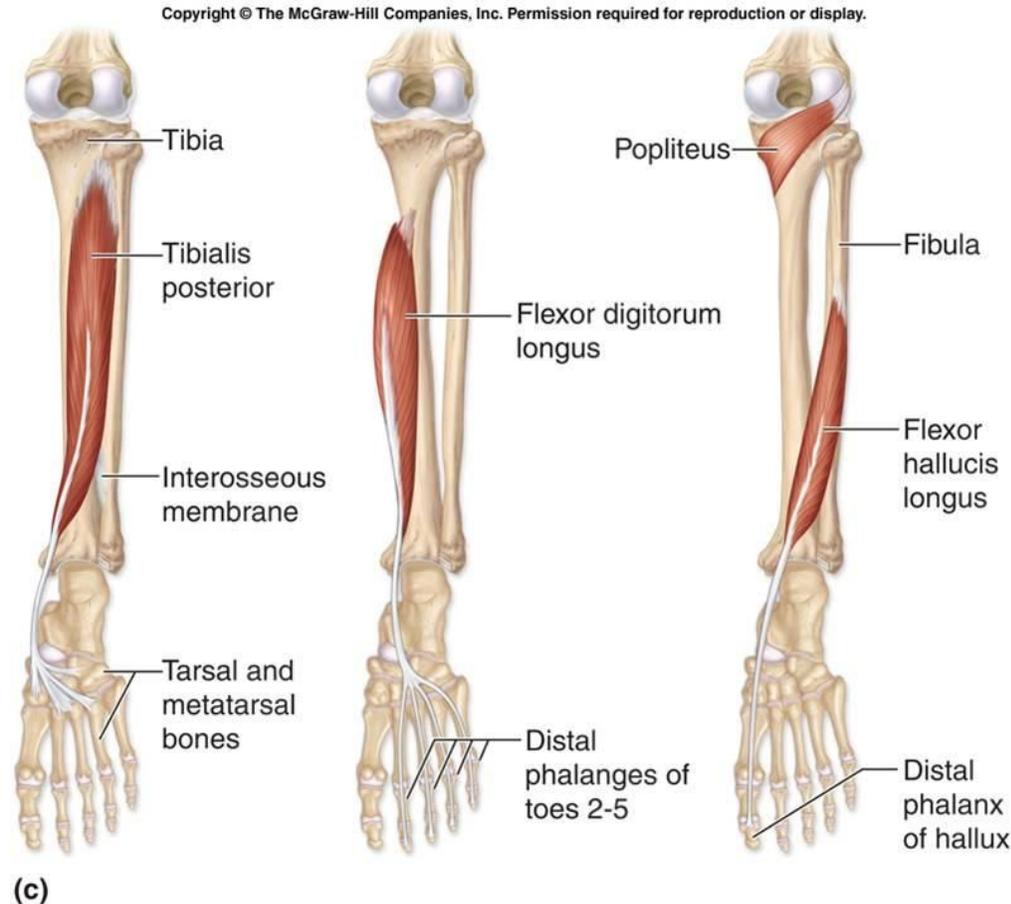
Anatomy

- The proximal attachment of the FHL is on the distal 2/3 of the posterior fibula and the interosseous membrane.

Figure 1: FHL muscle (posterior view)

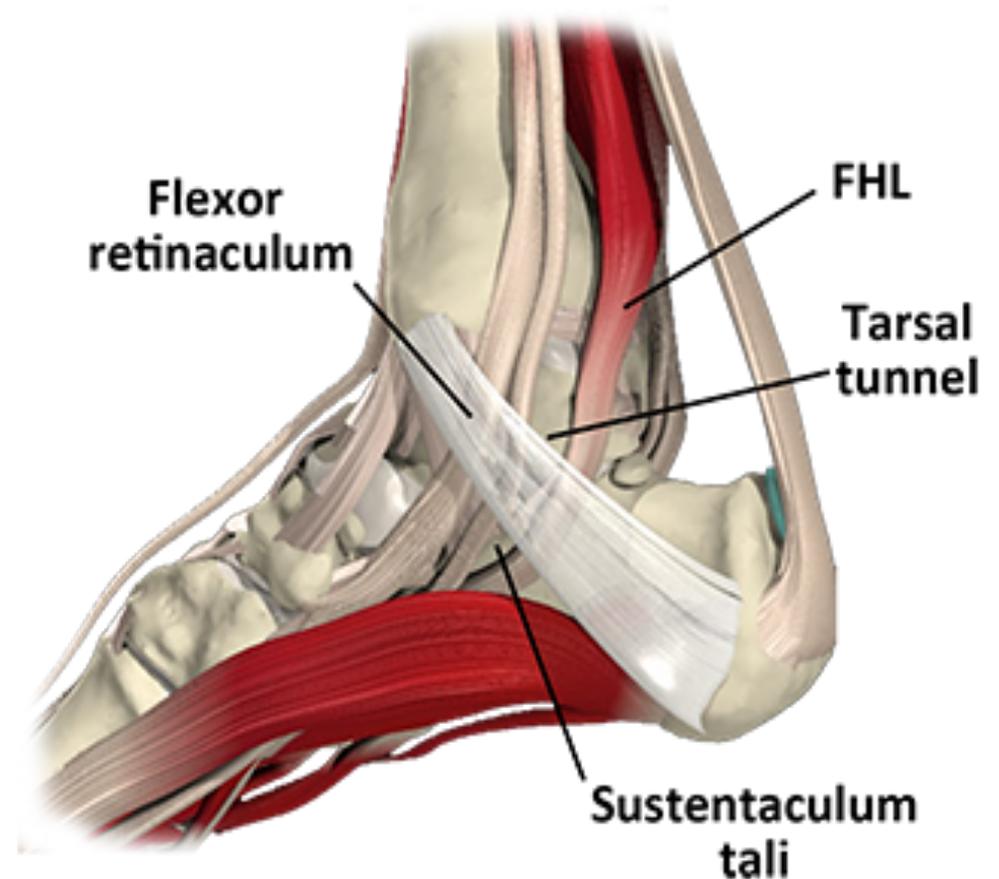


Anatomy



- The proximal attachment of the FHL is on the distal 2/3 of the posterior fibula and the interosseous membrane.
- It is one of three muscles in the deep posterior compartment of the leg, and shares that compartment with the
 - tibialis posterior
 - flexor digitorum longus (FDL)

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- It is one of three muscles in the deep posterior compartment of the leg, and shares that compartment with the
 - tibialis posterior
 - flexor digitorum longus (FDL)
- These muscles course together through the tarsal tunnel on the medial side of the ankle.
- The FHL's distal attachment is on the plantar surface of the hallux (great toe).





Clawing

- Scar tissue from tendon irritation or plantar fasciitis may cause the tendons of the FHL and flexor digitorum longus (FDL) to adhere to each other.
- Adhesion between these structures is evident if there is a significant *clawing* of the other toes when the FHL is activated during attempted flexion of just the great toe.



FHL Strength test



Ankle Impingement

- Impingement syndromes are increasingly recognized as a cause of chronic ankle pain
- Often is a clinical diagnosis, with use of MR / arthrography to aid in delineating extent of soft tissue abnormalities. This is particularly true in posterior and posteromedial syndromes
- Knowing the main syndromes and their manifestations can help you as the clinician.
 - Good history

Anterior Impingement

- Relatively common, well recognized cause of anterior ankle pain
- “Spurs” on anterior tibial plafond and talus; intracapsular
- Theories:
 - Repetitive dorsiflexion microtrauma (ballet, soccer)
 - supination causing anterior/medial cartilage damage and proliferative fibrosis
 - repetitive direct trauma
 - capsular avulsion from forced plantar flexion

Test for anterior ankle impingement



Posterior Impingement

- A compression of posterior talus and soft tissues between posterior calcaneal process and posterior tibia in plantar flexion.
- Repetitive / forced plantar flexion.
- Involved capsular soft tissues include PTaF, PTiF, posterior intermalleolar ligament, FHL

Test for Posterior Ankle Impingement



Glute strength

- Glute strength is important when developing a foot/ankle rehab program.

Gait training

- Analyze gait through both the swing and stance phase.
- Arm swing?
- Heel whip?
- Foot position
- Pelvic position

Assessing glute activation



3-way hip: toes forward, up, and down



2-way hip: clamshell and reverse clamshell



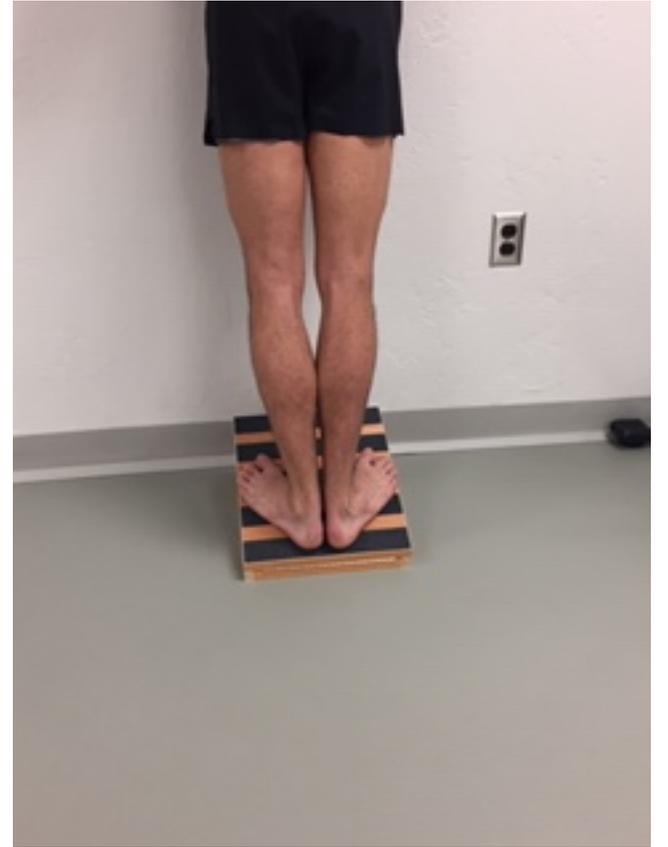
Glute bridging



Foot doming, alternating toe flexion/extension, toe splay



Slant board stretch, toes forward, toes in and toes out



Ankle plantarflexion and toe extension stretch

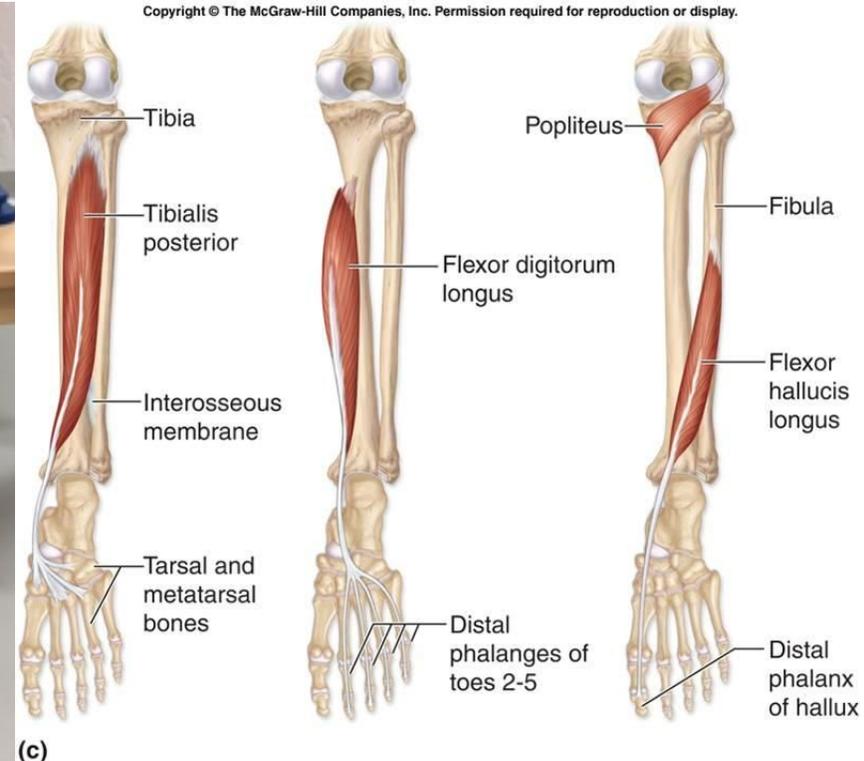


Releve/ heel raise with ball, double and single leg



A closer look

- When squeezing the ball between ankles
- Activation of the deep planter flexors and rear foot stabilizer's are activated prior to initiating the releve or heel raise.



Resisted great toe flexion, extension, foot winging



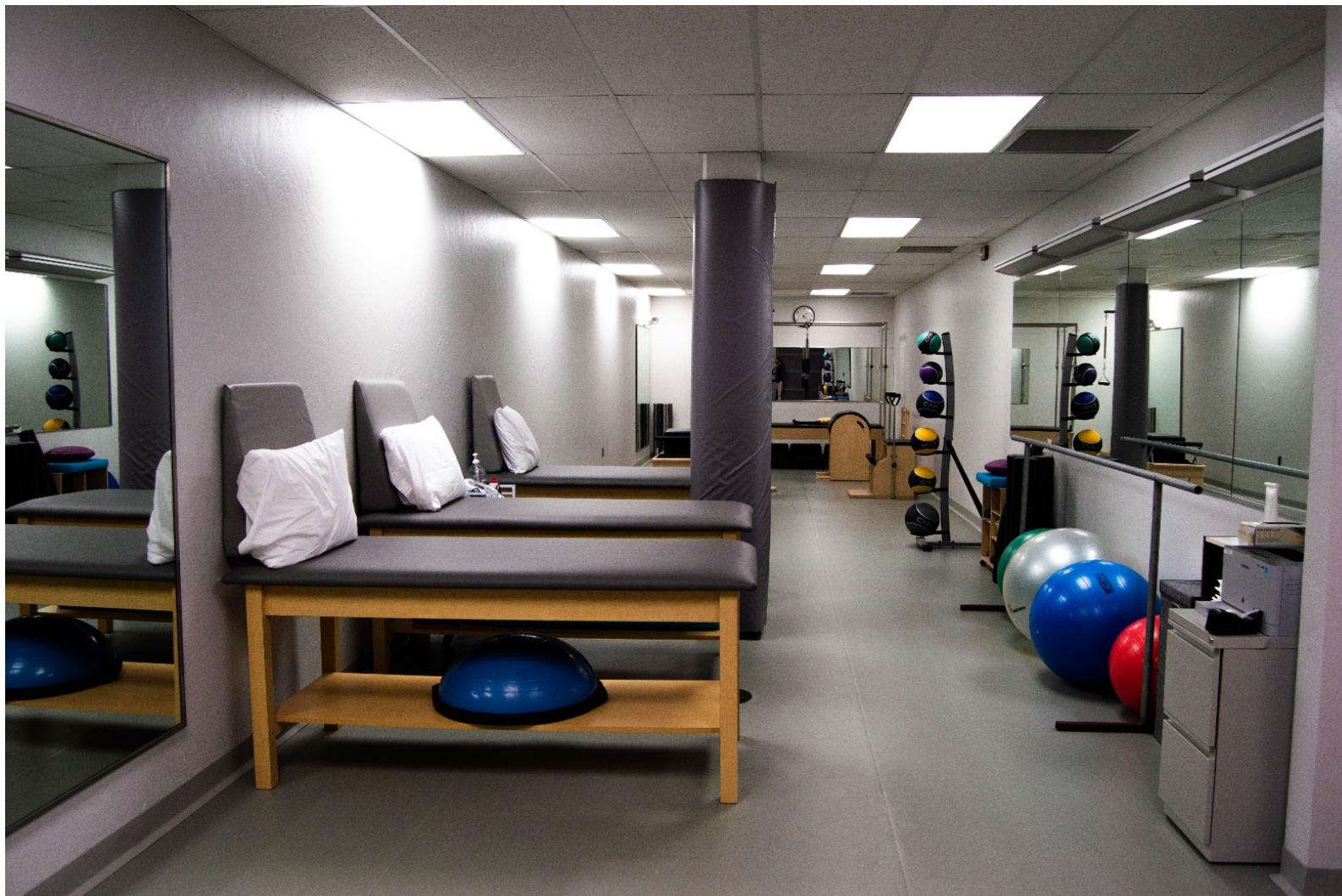
Resisted foot articulation



Take home

- Remember the FHL in treating an ankle sprain.
- Early intervention is key to successful outcomes.
- Gearing a rehab program that is tailored to your dancer or athletes demands is also key for successful outcome. You need buy in.
- Knowing when to refer to outside health care provider, MD,PT.
- Remember to look at the whole chain not just the site of pain.
- Glutes are important, DON'T leave them out of the program.
- Gait training, our athletes spend most of their time walking.

Thank you



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