Course Objectives

- Define hallux valgus (bunion) deformity, and discuss treatment options
- Discuss the anatomy as it pertains to hallux valgus, emphasizing muscles that, theoretically, could be strengthened to slow deformity
- Instruct and practice (lab) the foot muscle strengthening exercise
- Provide home program handout (prepared for distribution to patients)
- Discuss disorders, in addition to hallux valgus, that could be treated with this strengthening exercise routine

Part 1. Background

- Hallux valgus presents as an offset in 1-MTP joint alignment, accompanied by a swollen growth (bunion) on the first metatarsal head
- It occurs 35% of women over age 65, and is commonly associated with gait impairments, and reduced health and social function. Nix, 2012
- To date, surgery is the only treatment that corrects deformity, but at what cost to the individual and society at large?
Surgery is a booming industry; this surgery is performed on more than 200,000 cases each year in the United States

Roddy, 2008

Surgery yields good outcomes, though the rate of recurrence can approach 15%

Okuda, 2011

Etiology & Prevalence

• Though the etiology is not understood, prevalence is highest in females and overpronation accelerates the deformity processes

• Eversion of hindfoot, and collapse of the arch are known risk factors that may be modified with conservative treatment

Inman, 1974; Glasoe, 2010

• PT treatments include muscle strengthening exercise

McKeon, 2014

Today’s course instructs a strengthening approach for treatment

Three exercises are described

• Short-Foot Exercise
• Toe-Spread-Out (shown)
• Heel-Raise Exercise

Fig. by Kim et al. 2013

Disclaimer: there is not enough evidence to claim exercise can correct deformity, but pragmatic recommendation supports the need for early intervention instead of withholding care until impairments become severe and surgery is required

Tanaka, 2001
Foot Deformities
(described in relation to position of the body)

Adduction vs. Abduction
(towards midline) (away from midline)

Bunion presents as:
• Adduction of first ray
• Abduction of hallux

Time-lapse video showing deformity progression

Time-lapse images illustrate the change in foot structure
1) Adduction of first ray; 2) Abduction of hallux; 3) Rolling of calcaneus

Early-to-late stage changes of bunion

Note how the muscle shown is ideally positioned to keep the first ray from adducting
Five muscles have shared potential to counter deformity

- Flexor Hallucis Brevis
- Adductor Hallucis
- Abductor Hallucis
- Transverse Head
- Oblique Head

Blow-up of 1-MTP joint

The extrinsics insert on midfoot and along the arch.
The intrinsics insert on sesamoids & surround the first metatarsal head.

Muscle Actions

Extrinsics
- Fibularis Longus
- Tibialis Posterior

Intrinsics
- Abductor Hallucis
- Flexor Hallucis Brevis
- Adductor Hallucis
- Transverse Head
- Oblique Head

Actions support 1-MTP joint in carrying weight.

Work in synergy to stabilize the midfoot and arch, and limit pronation.
Part 1 Summary

➢ Collapse of hindfoot/arch is a risk factor of deformity
➢ Five muscles were identified with potential to lift and support the arch, and counter the onset and progression of deformity
➢ Although not yet tested on patients, this presentation will next instruct a strengthening approach for treatment

➢ Part 2 describes a series of muscle strengthening exercises
➢ The routine can be performed as self-care intervention, or delivered as part of directed physical therapy management

Part 2. Exercise Instruction

Short-Foot

Toe-Spread-Out

Heel-Raise

Prescription / Guidelines

• Perform at least 1 time per day
• Repeat each exercise 10 times, or until feeling fatigued
• Hold each contraction for 5 seconds with maximum effort
• Learn the exercise in sitting; transition to standing on one foot

Short-Foot Exercise

(recruits the inrinsics)

Preferentially recruits the flexor hallucis brevis and oblique head of the adductor hallucis Kim, 2013
EMG activity records highest when standing Jung, 2011
Toe-Spread-Out Exercise
(targets recruitment of the intrinsics)

Generates higher EMG activity in abductor hallucis compared to short-foot exercise, though both exercises effectively recruit the intrinsic muscles  
Kim 2013

Heel-Raise Exercise
(recruits intrinsics, but not in isolation)

Hold hindfoot turned-in, to best recruit the tibialis posterior  
Kulig 2004

Place coin under the first metatarsal head as a target for loading, to facilitate recruitment of the fibularis longus  
McKeon 2015

# JOSPT Perspectives for Patients

**Bunion**

**Strengthening Foot Muscles to Reduce Pain and Improve Mobility**

**NEW TREATMENTS**

With your physical therapist, identify if your feet and toes are bothering you.

1. Wear proper shoes that fit well.
2. Strengthen the muscles around your feet and toes.
3. Wear proper shoes that fit well.

**DID YOU KNOW?**

Foot pain can be relieved by strengthening your foot and toe muscles. This can be done by using pain management techniques and exercises.

**EXERCISES TO STRENGTHEN FOOT MUSCLES**

- 1. Bend your toes and hold for 10 seconds.
- 2. Repeat 10 times.
- 3. Stretch your toes and hold for 10 seconds.
- 4. Repeat 10 times.

**CONSULT WITH PHYSICAL THERAPIST**

If you experience pain or discomfort in your foot or toes, consult with your physical therapist.

**NEW TREATMENTS**

- 1. Wear proper shoes that fit well.
- 2. Strengthen the muscles around your feet and toes.
- 3. Wear proper shoes that fit well.
Lab Activity

Now after viewing the exercise videos, and home program handout

1. Perform the exercise on your own, while watching the video
2. After you perform the exercise, instruct it to a lab partner

Discuss intrinsic muscle strengthening exercise

"Is the Juice Worth the Squeeze"

Effects of a 4-Week Intrinsic Foot Muscle Exercise Program on Motor Function: A Randomized Control Trial
Fraser and Hertel, J Sport Rehabilitation, 2018

Participants in intervention group performed exercise at home daily for 4 weeks

Results indicate that a home program exercise routine similar to this one:
- Effectively recruited the intrinsic muscles in a targeted manner
- Improved motor performance; decrease perceived difficulty during exercise
- But did not change muscle activation (or cross-section area) as measured during exercise with diagnostic ultrasound

Name other disorders you might treat with this exercise routine

Summary

➢ Hallux valgus deformity is common, and often seen in PT
➢ The pull of muscles may counter the deformity processes
➢ An exercise routine was instructed to strengthen muscles
➢ The exercise treatment is premised on a pragmatic approach
➢ Research is needed to investigate the benefits of exercise in the treatment of hallux valgus, and other foot disorders

Questions / Discussion
References:


Fraser JJ, et al. Effects of a 4-Wk Foot Exercise Program on Motor Function: A RCT. *J Sport Rehab*. 2018