FIRST MTPJ: ACHIEVING BETTER OUTCOMES
AMERICAN ASSOCIATION FOR WOMEN PODIATRISTS SPEAKER’S TRACK

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EXCELLENCE IN TREATMENT OF THE FIRST MTPJ: INTRODUCTION AND PEARLS

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EXCELLENCE IN FIRST MTPJ – AN OVERVIEW

- Importance
- Gender
- Length
- Pediatric

- Aging
- Forensics
- Hypermobility
- Sesamoids
WHY IS THE FIRST MTPJ COMPLEX SO IMPORTANT?

• 1/3 body weight
• 3 x hindfoot load
• Vital to Windlass
• Different than any other species (more doming – habitual DF)
Peroneus longus major stabilizing force

Evolutionary migration of PL across foot to increase stabilization
→ loss of opposable great toe
GENDER DIFFERENCES IN FIRST MTPJ PATHOLOGY

Females exhibit:

- Prevalence HAV
- Ligamentous Laxity
- First Ray Hypermobility
- Articular surface rounder, smaller → instability?

(Ferrari, J, et al. 2004)
Hallux Valgus in Males

- Onset earlier, pain earlier
- 68% family hx vs females with 35%
- Less correlation with footwear
- Main intrinsic contributing factor was DMAA

(Nery, et al 2013)
Females → shorter metatarsals and phalanges

Hypothesis → Males: lever arm needs to be shortened, occurs by transverse deviation.

Shortening during osteotomy helpful?

(Munuera, et al, 2008)
FIRST RAY LENGTH IMPACT ON FIRST MTPJ

- Too long – need to shorten lever
- Too short – tripod is violated and weight shifts
- Sesamoids too posterior – can functionally shorten
PEDiatric and gender differences in first ray

- F-Scan 61 children 5-16 years old
- Females >> peak pressure under hallux
- COP more medial
- Faster heel strike to first met head load time
- No correlation to hypermobility or hallux valgus angle
- Reasons unclear?

(Ferrari, J, Watkinson, D. 2005)
AGING AND THE FIRST RAY

- Distal metatarsal articular angle increases 1-3 degrees per 10 years of age
- Average change 20-60 years old = 4.5 degrees

(El Said, et al. 2006)

Photo: Chopra, et al.
FORENSIC IMPACT OF FIRST RAY

- Stature can be estimated from CT of 1\textsuperscript{st} and 2\textsuperscript{nd} metatarsal
- Gender can be determined from length and width of 1\textsuperscript{st} metatarsal
- Felt to be better method than on the bone measurement

Morton in 1928 – Still controversy

Met-cuneiform hypermobility = >4 degrees saggital, > 8 degrees transverse

Radiographic and clinical measurements and signs

Not as straightforward as it seems?
DEVICES MEASURING HYPERMOBILITY

- Klaue – manual force
- Glasoe - quantifiable – screw mechanism
- EMC - L shaped device on first and second met

Are we too focused on met-cuneiform?

Saffo, et al: 90% first ray motion occurs from cuneiform-navicular; 10% from met-cuneiform.
HYPERMOBILITY - PITFALLS

- Sesamoid position – we assume medial/lateral deviation
- Still in groove?
- Rotation in frontal plane – part of hypermobility
- True triplanar correction = less ancillary procedures
- DON’T FORGET THE FRONTAL PLANE
SESAMOID INJURIES/PATHOLOGY

- Acute vs chronic
- Variations in treatment of fracture – NWB, WB, offloading
- When do you perform sesamoidectomy?
- Involvement of MTPJ itself cannot be ignored
- ORIF?
ORIF SESAMOID?

Images by courtesy of Dean W. Richardson
EQUINE ORIF SESAMOID

www.aofoundation.org
ORIF SESAMOID
WHAT CAN WE LEARN?

- Implant, orthotic, shoe R and D (gender/age specific?)
- Not just 2D measurements but shape/morphology differences
- Forensic value of the first MTPJ
- Lack of EBM – especially in hypermobility
- Look at entire biomechanical picture
REFERENCES

- Ferrari, J, and Watkinson, D. “Foot Pressure Measurement Differences Between Boys and Girls With Reference to Hallux Valgus Deformity and Hypermobility.” *Foot and Ankle Int.*, 2005 Sep; 26(9); 739-747.
- Ferrari J, et al. “Size and Shape Difference Between Male and Female Foot Bones.” *JAPMA*, 2004 Sep; 94(5); 434-452.
HELPFUL WEBSITES

- http://www.aofas.org/PRC/conditions/Pages/Conditions/First-Metatarsal-Fractures.aspx
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2532263/
THANK YOU!