

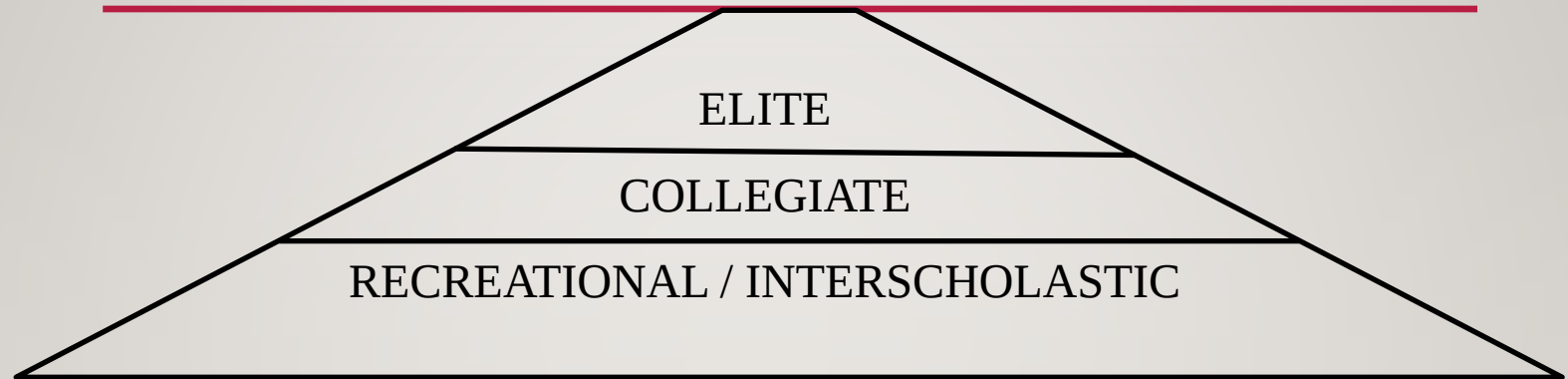
SPORT-SPECIFIC PEDORTHICS



TEAMWORK

No place is the concept of a
Comprehensive Foot Care Team
more evident than in the treatment of
an elite athlete.

ATHLETIC CARE PYRAMID PARADOX



Group with fewest number of members has most
comprehensive care team / receives most extensive care

MEDICAL STAFFS

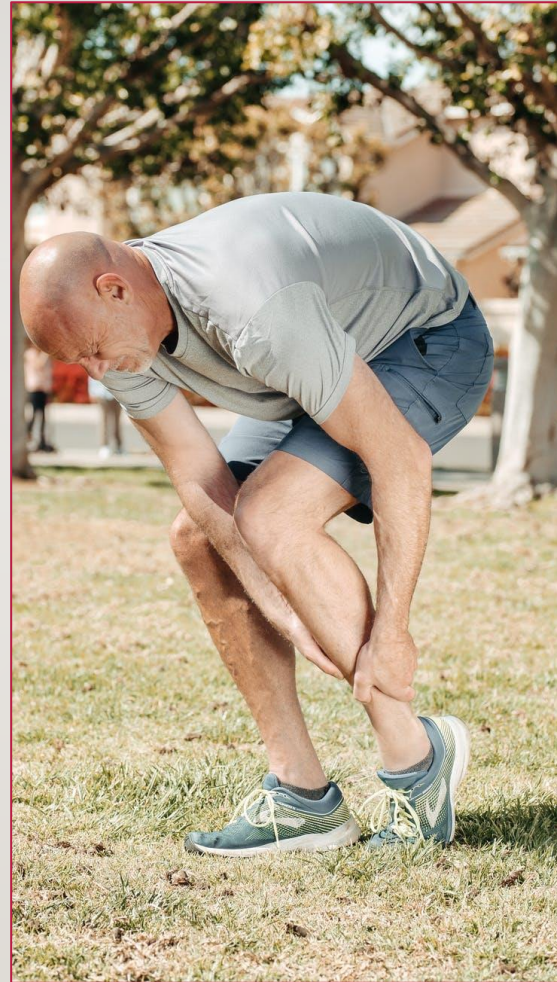
2023 Tennessee Titans Training and Medical Staff (For 53 players)

Todd Toriscelli	Vice President, Sports Medicine
Matt Gregg	Associate Head Athletic Trainer
Salvador Lopez	Director, Sports Rehabilitation
Jon Takahashi	Assistant Athletic Trainer
Cam Baker	Assistant Athletic Trainer
Clay Taylor	Assistant Athletic Trainer
Mike Micca	Director, Physical Therapy/Assistant Athletic Trainer
Lauren Silvio	Nutrition Coordinator
Dr. Thomas Byrd	Team Physician
Dr. Daniel Lamar	Team Physician
Dr. Damon Petty	Team Physician
Dr. John Williams	Team Physician
Dr. John Zvijac	Team Physician

In St. Louis, the larger high school football programs' games are covered by a rotation of resident physicians. So...at best, there is one resident physician on-site to care for as many as 200 players. Private school may have one part-time athletic trainer.

TYPES OF INJURIES

- Acute Injury
- Overuse Disorders
- Anatomy/Sports Incompatibility



PEDORTHIC PROCESS

- Pedorthic Objectives
 - Reduce forces to tolerable levels
 - Control motions that exist in excess
 - Determine Mechanism of Injury
- Evaluate Contributing Factors
 - Anatomical Limitations
 - Osseous
 - Soft Tissue
 - Orthosis/Footwear Compatibility with activity
 - Is orthosis/footwear working in unison?
 - Is orthosis/footwear appropriate and/or designed to control sports specific condition?
 - Orthosis/Footwear Compatibility with activity
 - Determination of orthosis/footwear ability to effect stressors.



CONSIDERATIONS

- Mechanical Aspects Involved
- Motion Necessitated
- Motion Intensity
- Force
 - Increase in Ground Reaction Forces
 - Angle of force to body
- Shear Forces

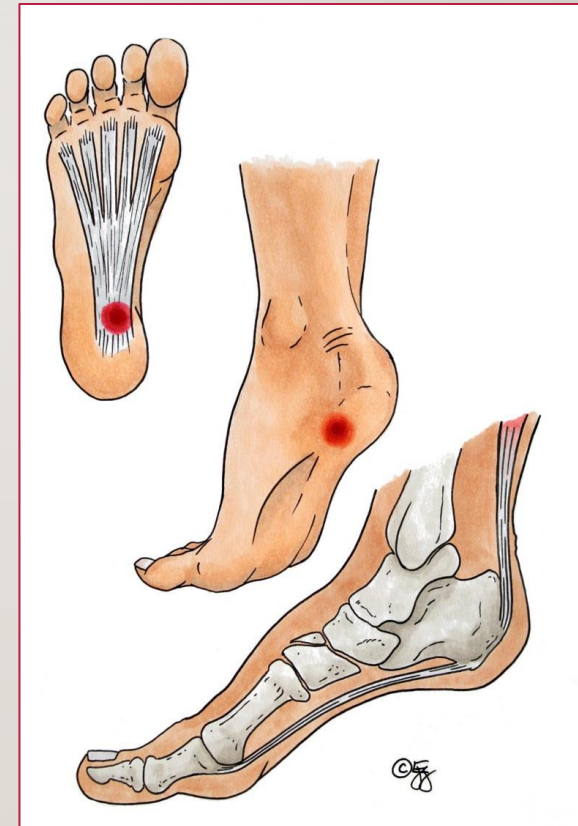
PEDORTHIC TREATMENT MODEL

- Evaluation
- Formulate Objectives
- Establish Modalities to Obtain Objectives
- Impression of Foot in Most Functional Position
- Manufacture of Devices
- Fitting of Footwear/Orthosis
- Patient Acclimation
- Evaluate Objectives meet and Effect
- Not Effective ➡ Re-establish New Objectives



PLANTAR FASCIITIS

- May occur in every sport
- Affects 10%-20% of injured athletes
- Tenderness along taut plantar aponeurosis that may increase when additional pressure is applied along the plantar aspect of the midfoot.
- Self-limiting?



NOTABLE PROFESSIONAL ATHLETES WITH PLANTAR FASCIITIS

- LaMarcus Aldridge - Basketball
- Tim Duncan - Basketball
- Phil Jackson - Basketball
- Tyreke Evans – Basketball
- Eli Manning - Football
- Peyton Manning - Football
- Jason Kidd – Basketball
- Joaquim Noah – Basketball
- Antonio Gates – Football
- Shaquille O’Neal - Basketball
- Evan Longoria - Baseball
- Stephanie Catley - Soccer
- Jana Pittman - World champion runner
- Scott Podsednik - Baseball
- Albert Pujols, - Baseball
- Rajon Rondo - Basketball
- Carlos Quentin, - Baseball
- Kevin Youkilis, - Baseball
- Pau Gasol – Basketball
- Jordan Henderson - Soccer



PLANTAR FASCIITIS

- Important Considerations
 - Duration of Disease
 - 6 months +
 - Previous Treatment
 - Medical
 - Drug Store
 - Disease Causing Disability
 - Short Duration Upon Rising
 - Ambulatory Assist Devices Required
 - Activity
 - Recent Changes
 - Non-Appropriate Activity



PLANTAR FASCIITIS

- Objective

- Limit/Decelerate Pronation Motion
- Control Hyperextension at the MTP's
Reducing “Windless Effect”
- Insure Correct Positioning During
Stretching Program
- Transfer force from sensitive
calcaneal tubercle (??)
- Reduce Tension & Shock Along
Plantar Aponeurosis & Triceps Surae
- Evaluate Activity and Foot Shape for
Proper Fitting & Appropriate Type of
Footwear for Activity
- Limit or Delay End Range Motion



PLANTAR FASCIITIS

- Modalities
 - Effectiveness of Foot Orthoses to Treat Plantar Fasciitis
 - Landorf et al., Arch Intern Med 2006;166:1305
 - Plantar fascia-specific stretching exercise improves outcomes in patients with chronic plantar fasciitis. A prospective clinical trial with two-year follow-up
 - Digiovanni B, et al., JBS 2006 **88** (8): 1775–81
 - Low-Dye Taping Versus Medial Arch Support in Managing Pain and Pain-Related Disability in Patients With Plantar Fasciitis
 - Abd El Salam MS, Abd Elhafz YN., Foot Ankle Spec. 2010 Dec 1.
 - Night splint treatment for plantar fasciitis. A prospective randomized study
 - Probe RA, et al., Clin Orthop Relat Res. 1999 Nov;(368):190-5.

PLANTAR FASCIITIS

- Initial In Shoe Treatment
 - Hard Heel Cup
 - Soft Tissue Confinement
 - Waffle Heel Cup
 - Pneumatic Resistance
 - Gel Heel Cup
 - Elevation/Attenuation
 - Off-The-Shelf Insert
 - Replace Worn / Inappropriate Footwear



PLANTAR FASCIITIS

- Foot Orthoses
 - 3/4 to Full length
 - Isolate and control areas allowing hyperpronation
 - Utilize shock attenuating materials
 - Provide longitudinal arch support
 - Temporary heel elevation to decrease obligated dorsiflexion



PLANTAR FASCIITIS

- Modalities
 - Orthoses
 - Utilize a heel cup to control plantar fat pad
 - Carbon Fiber/Plastic Foot Plate to limit MTPJ motion
 - Off load (evacuate) area of point tenderness (??)



PLANTAR FASCIITIS

- Modalities
 - Shoe
 - Insure Adequate Width
 - Insure Adequate Length
 - Insure Proper Location of Break of Shoe
 - Firm shock absorbing sole



PLANTAR FASCIITIS

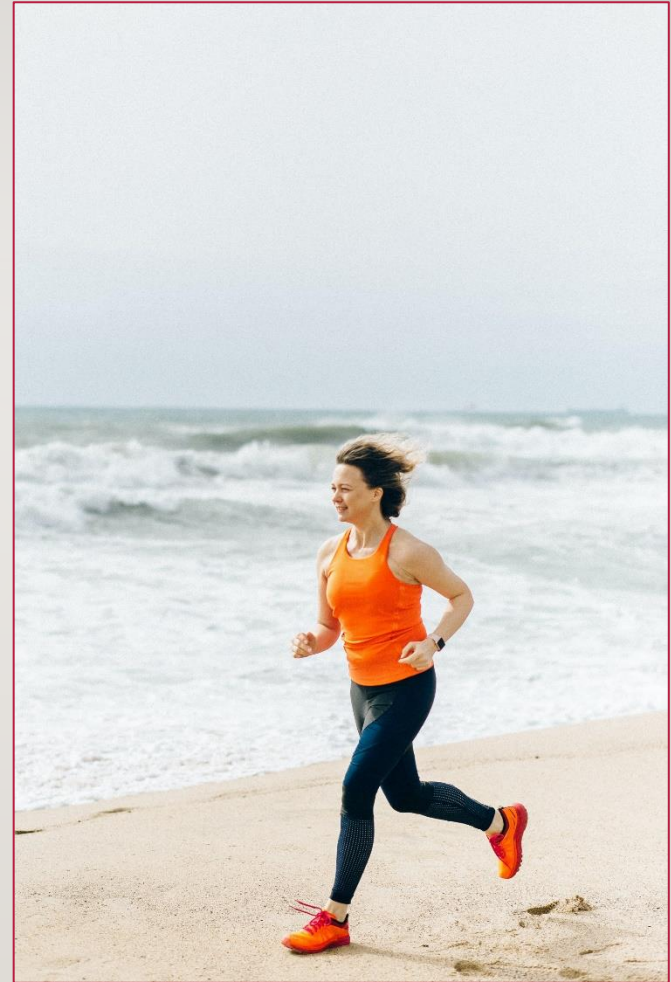
- Landorf et al. *Effectiveness of different types of foot orthoses for the treatment of plantar fasciitis*. JAPMA 2004 Nov-Dec;94(6):542-9
 - FOs do have a role in the treatment of PF
 - Premades and custom work equally as well
 - Cannot be inferred that custom FOs are more effective
- Landorf et al. *Effectiveness of foot orthoses to treat plantar fasciitis: a randomized trial*. Arch Intern Med 2006 Jun 26;166(12):1305-10.
 - Foot orthoses produce small short-term benefits...and may also produce small reductions in pain for people with plantar fasciitis, but they do not have long-term beneficial effects compared with a sham device.
 - The customized and prefabricated orthoses... have similar effectiveness in the treatment of plantar fasciitis.

PLANTAR FASCIITIS

- Scherer PR, *Do prefab foot orthoses have a place in treating plantar fasciitis?* Podiatry Today 2007 Nov;20(11).
 - Semi-rigid PFOs work better than accommodative
 - Semi-rigid prefab FOs work just as well as custom
- Is plantar fasciitis simply a self-limiting condition?

SPORT SPECIFIC PEDORTHICS

- Running (Jogging vs Sprinting)
 - Jogging
 - Forward Motion
 - Single Leg Support
 - Increased GRF
 - “Runner’s toe”
 - Shin splints
 - Sport-specific shoes
 - LE Biomechanics
 - Pedorthic treatment
 - Education & Prevention



RUNNING SHOES

- Be sure shoe is appropriate for foot type
 - Most expensive shoe is NOT necessarily the best shoe for every foot

“Anti-pronation” “Anti-supination”

Lat



Med

Lat



Med

RUNNER'S TOE

- Bleeding under the toenail gives the “Black Toe” appearance
- Repeated trauma caused by the toe hitting the front or top of the shoe
 - Shoe too small
 - Nails too long
- Once nail bed is damaged there can be additional pressure from under the nail



Source: Lichtman MA, Shafer MS, Felgar RE, Wang N:
Lichtman's Atlas of Hematology: <http://www.accessmedicine.com>
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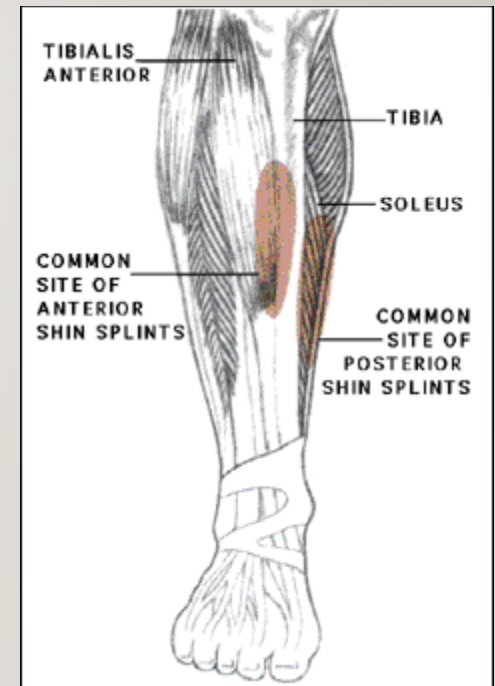
SPORT SPECIFIC PEDORTHICS

- Sprinting (up to 400m)
 - Forward Motion
 - Single Leg Support
 - Continuous Propulsive Phase
 - Increased GRF
 - Control Forefoot
- Sport-specific shoes
- Pedorthic treatment
 - Training Vs. Competing



SHIN SPLINTS

- Tibial periostitis (inflammation of the periostium of the tibia)
- Overuse injury
- Pedorthic Treatment:
 - Proper shoe selection
 - Footwear maintenance
 - Shock attenuation is key
 - FO w/ viscoelastic polymer in heel



SPORT SPECIFIC PEDORTHICS

- Tennis
 - Explosive Start/Stop
 - Forward/Backward Motion
 - Medial/Lateral Motion
 - Shearing
 - Jamming of Foot
 - Slapping of Forefoot
 - “Tennis toe”
- Pedorthic treatment
 - Cushion and control



SPORT SPECIFIC PEDORTHICS

- Soccer
 - Improper shoe fit is common
 - Lateral stability
 - Start / Stop
 - Turf Toe type injuries
 - Ankle injuries
 - Foul play
- Pedorthic treatment



TURF TOE

- Prior to introduction of artificial turf in late 60's, sprains to the hallux MTP were relatively uncommon
- 1976 Bowers and Martin coined the term “turf toe” to describe a plantar capsuloligamentous sprain of the 1st MTP related to hard artificial surfaces and soft-soled shoes

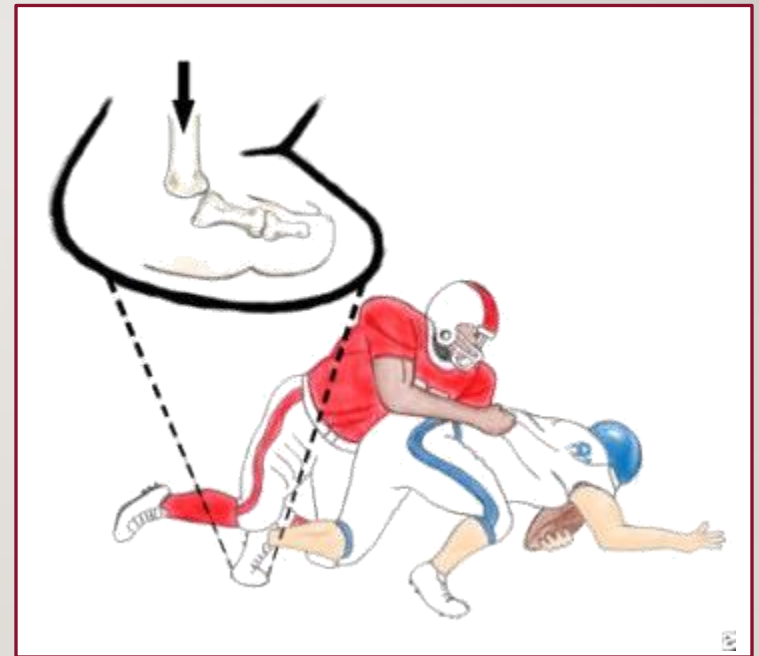


Illustration © eMedicine

TURF TOE

- I – Stretch injury or minor tearing of capsuloligamentous complex of 1st MTP
- II – Partial tear of capsuloligamentous complex of 1st MTP without involvement of the articular joint surface
- III – Complete tear of the capsuloligamentous complex; tearing the plantar plate from its on the metatarsal head/neck with dorsal impaction of the proximal phalanx into the metatarsal head
- Complications
 - Sesamoid Fx
 - Separation of bipartite sesamoid
 - Proximal migrations of sesamoids
 - Instability w/pain or synovitis
 - Hallux rigidus
 - Loose body in joint

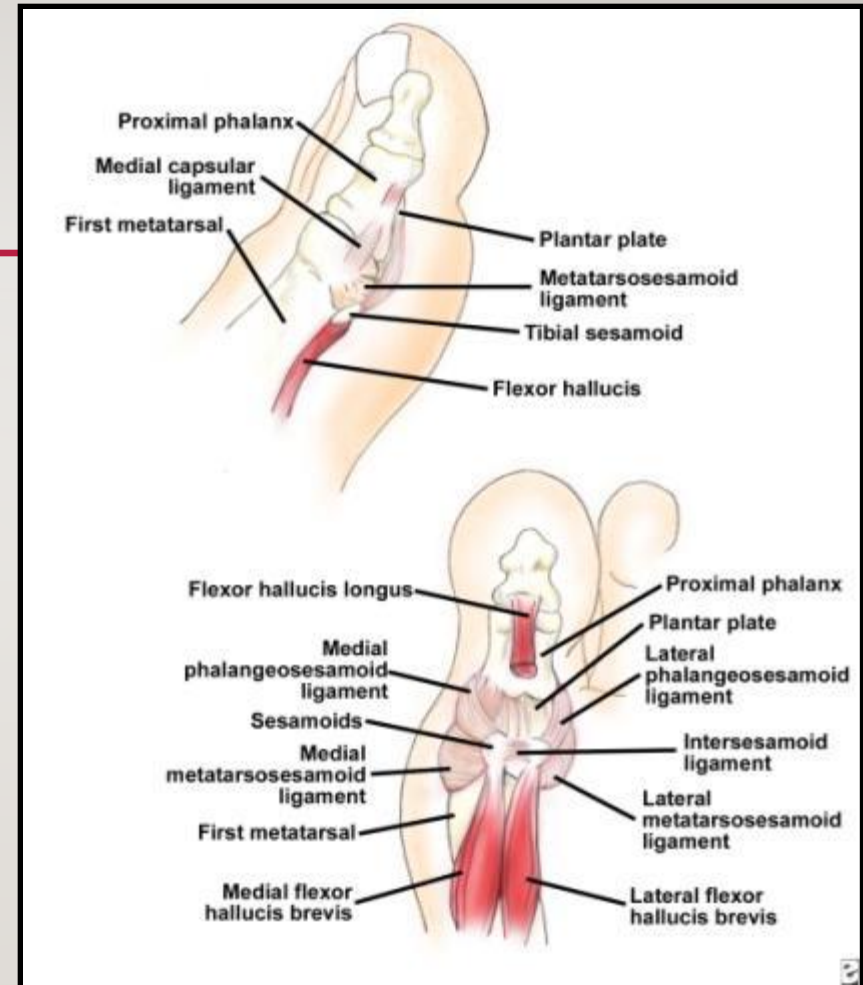


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TURF TOE

- Stiffen forefoot
 - Full-plate vs. half-plate
- Immobilize 1st MTP
- Offload sesamoids
- Spike placement



SPORT SPECIFIC PEDORTHICS

- Hockey / Rollerblading
 - Fixed foot sport
 - Torques and Forces realized proximally
- Pedorthic treatment
 - Limited space
 - Excellent splint



SPORT SPECIFIC PEDORTHICS

- Basketball
 - Jumping
 - Jogging/Sprinting
 - Forward/Medial/Lateral Motion
 - Shearing
 - Lateral Rolling / Sprains
 - Ballistic components
- Pedorthic treatment
 - Cushion, stabilize & control
 - Proper shoe flexion point



SPORT SPECIFIC PEDORTHICS

- Baseball
 - Start / Stop
 - Lateral stability
 - Spike placement vs Molded Cleats
 - 5-spike → 9-spike design
 - Shoe fit
- Pedorthic treatment



SPORT SPECIFIC PEDORTHICS

- Golf
 - Walking
 - Foot must have lateral stability
 - +/- Wedging
- Pedorthic treatment



SPORT SPECIFIC PEDORTHICS

- Dancing
 - ???



SPORT SPECIFIC PEDORTHICS

- Cycling
 - All Force on Forefoot
 - Control Rotation of Tibia
- Pedorthic treatment
 - Very limited space
 - Shoe selection
 - Pedal clip placement



SPORT SPECIFIC PEDORTHICS

- Martial Arts
 - Toe & Foot trauma
 - Pedorthic treatment???



SPORT SPECIFIC PEDORTHICS

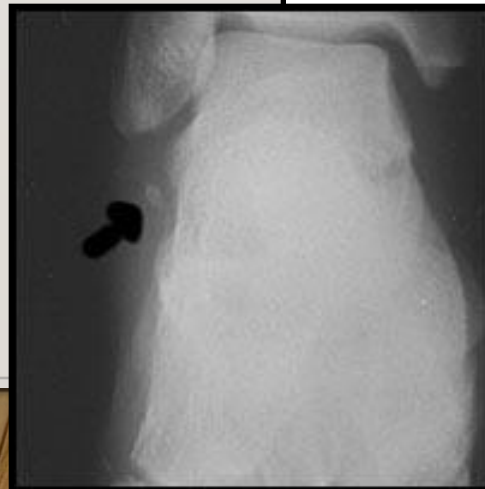
- Skiing / Snowboarding
 - Foot stability to Edge Change
 - Down Hill Leg Supports Weight
 - Fixed Foot Sport
- Pedorthic treatment
 - Custom inlay, liner, boot



SPORT SPECIFIC PEDORTHICS

- Snowboarder's Fx

- 1/4 of all snowboarding injuries happen during first experience
- Fracture of lateral process of talus
- Often misdiagnosed as a severe ankle sprain



Type I

SPORT SPECIFIC PEDORTHICS

- Football

- Violent sport = any number or type of injuries
- Needs and considerations necessarily vary by position



SPORT SPECIFIC PEDORTHICS

- Football
 - Consider Newton's Laws of Motion
 - Body in motion will stay in motion until acted upon by outside force
 - $F = MA$
 - For every action there is an equal and opposite reaction
 - Pedorthic treatment



CASE STUDY

- 34 yr. old professional football player
- 6'0", 188lbs.
- 9/25/05: Diagnosed as acute turf toe injury. Pt was tackled low from behind and foot got caught resulting in hyperextension on L great toe.
- Pain with VVB and with DF of great toe



CASE STUDY

- 9/26/05: Saw pt with team physician the day after the injury.
- Took foam impression and fabricated TCI:
1/8" EVA / 1/16" PPT Bilam/Quickform(QF) to sulcus and posted with 1/4" cork. Into L TCI I incorporated a Dynaflex carbon fiber plate 27.5cm Flex, cut into a morton's extension
- Delivered on 9/27/05
- 9/28/05: I received a call from the trainer...TCI is too stiff. Can I re-do it so that only forefoot is stiff? Pt wants arch to flex, he feels stiffness of arch slows him down.

CASE STUDY

- 9/29/05: Made new LTCl with “S” shaped Carbon fiber plate, so that still I had adequate lever arm for Morton’s ext to function properly without stiffening arch. Delivered same day.
- 9/30/05 – Trainer called...still too stiff.



CASE STUDY

- 9/30/05: Made new LTCl - 1/8" EVA/1/16" PPT Bilam/ full length QF and posted with 1/4" cork. Added additional layer of QF under 1st ray.
- 10/3/05 – Trainer called TCI not working. Wants to try “toepiece” like we did earlier for an offensive lineman.
- 10/04/05 – disp'd new TCI and molded for “toepiece”. I will fabricate one from 2 layers of QF and one from 1/16" copoly.



CASE STUDY

- 10/07/05 – Toepieces are both too thick. He wears his shoes very tight. He'll try new TCI instead.
- 10/28/05 – pt still not playing. Pain with VWB is actually more of a problem than the DF. Saw pt with a different physician and trainer. Discovered that the sesamoids have slipped proximally as the plantar plate was torn. We will try a new TCI with a “cutout” under 1st. Challenge will be to offload sesamoids, limit DF and keep thin enough for cleats.

CASE STUDY

- 10/28/05 – I added 3/16” EVA buildup to cast over 1st MTP and 1/4” proximally. Then fab’d 1/8”EVA/1/16”PPT Bilam/Grey Foam to fill in and level out area around “cutout”/ full length QF/ posted with 1/4” black Soleflex heel-to-ball (batch of cork I had was too soft). Delivered to Rams Park later that day.
- 11/11/05 – Got call from trainer – I.B. likes the TCI! He wants a matching R one, complete with stiffener and cutout. OK???
- 11/13/06 – Returns to play

CASE STUDY



CASE STUDY

- Ahhh...success at last!
- 1/10/06 – Trainer called I.B. wants another pair.
- 3/2/06 – Trainer called I.B. wants 3 more pairs.
- 7/11/06 – Trainer called I.B. wants 5 more pairs.
- 12/1/06 – Trainer called I.B. wants 2 more pairs.
- 5/4/07 - Trainer called I.B. wants 6 more pairs.
- 10/13/07 - Trainer called I.B. wants 8 more pairs.

CONCLUSION

The team approach is essential in caring for the athlete, no matter what level of skill and competition. Coordination and communication among the team members – DPM, MD, C. Ped., PT, ATC, CO and team physician – is crucial to providing the best possible results.



THANK YOU

ERICK.JANISSE@ENOVIS.COM