Forget the Plantar Plate??
A Brief Introduction to New Techniques

American Podiatric Medical Association
The National 2019

N. Jake Summers, DPM
Dartmouth-Hitchcock Foot & Ankle
100 Hitchcock Way
Manchester, NH 03104
N.Jake.Summers@hitchcock.org
Disclosures

- Arthrex
- Stryker
Diagnosing Plantar Plate Injuries

- Patient symptoms
- Toe position
- Kelikian Push-up Test
- Lachman’s Test
- Ultrasound
- MRI
Staging Plantar Plate Tears
Dry Hair Shampoo

1. Heat some extra virgin olive oil until it is slightly warm.
2. Massage it onto your scalp.
3. Wrap your hair in a warm towel & leave it on for at least 45 min.
4. Finally, shampoo & condition your hair.

Use 
OLIVE OIL 
to treat
DANDRUFF
Egg Shampoo
Baking Soda Shampoo

**Homemade Oily Hair Remedy**

- Aloe Vera plant
- 2 Tbs Baking Soda
- Juice Half a Lemon

**How to Make Baking Soda Shampoo**

To get soft, strong, shiny, healthy hair.
Dry Shampoo

- Cornstarch
- Baking Soda
- Cocoa Powder
- Lavender Oil

DIY dry shampoo:
- 6-10 drops essential oil, lavender or lemon
- 2 Tbsp. corn starch
- 2 Tbsp. rice flour
- 2 Tbsp. arrowroot powder

Doctor Sweet Tooth

DIY Dry Shampoo

Brown Sugar

3oz bottle

Dartmouth-Hitchcock
Intentions ≠ Outcomes
Hammer toe deformity most common

2nd toe frequently affected

Imbalance of intrinsics and long flexor/extensor

“Floating Toe” and “Crossover Toe” involve attenuation of plantar plate and/or collateral ligaments

“Best laid schemes of mice and men go often askew, and leave us nothing but grief and pain…”

-Robert Burns ‘To a Mouse’
“It’s just a toe”
“It’s just a toe”
“It’s just a toe….. Until it’s not”
“It’s just a toe..... Until it’s not”
“Realistic Expectations”

Goals of Surgery

- Eliminate/Reduce pain
- Realign digits
- Produce stable digits
- Avoid complications
- Return to reasonable shoegear
Digital Deviation
“To Osteotomy or Not??”
Lesser Metatarsal Osteotomies

- Distal
  - Weil Osteotomy
  - Weil with a Wafer
  - Sagittal “V” Osteotomy

- Proximal
  - Base Wedge
  - Crescentic
  - Lepird
Lesser Metatarsal Osteotomies

- Distal Indications
  - Plantar Keratotic Lesions
  - Plantar Ulcerations
  - Chronic Bursitis/Capsulitis
  - MTPJ Instability
  - Short 1\textsuperscript{st} met
  - Long 2\textsuperscript{nd} met
  - Plantar Plate Tear
  - Hammertoe with MTPJ Contracture
Repair Options and Outcomes

One-Year Outcome Study of Anatomic Reconstruction of Lesser Metatarsophalangeal Joints.
Cook JJ¹, Cook EA¹, Hansen DD², Matthews M³, Karthas T², Collier B², McKenna G², Manning E².

Plantar Plate Repair for Lesser Metatarsophalangeal Joint Instability.
Flint WW¹, Macias DM², Jastifer JR³, Doty JF⁴, Hirose CE⁵, Coughlin MJ⁵.

Lesser Metatarsophalangeal Joint Instability: Advancements in Plantar Plate Reconstruction.
Hsu RY¹, Barg A², Nickisch F².

A Systematic Review of Plantar Plate Repair in the Management of Lesser Metatarsophalangeal Joint Instability.
Elmaee M¹, Shen Z², A'Court J³, Pillal A⁴.

Plantar Plate Injury and Angular Toe Deformity.
Akoh CC¹, Phisitkul P².
**Repair Techniques**

- **Plantar plate tears: a review of the modified flexor tendon transfer repair for stabilization.**
  - Baravarian B¹, Thompson J, Nazarian D.

- **Technique using interference fixation repair for plantar plate ligament disruption of lesser metatarsophalangeal joints.**
  - Sung W¹.

- **Multiplanar Correction of the Lesser Digital Deviation and Indirect Plantar Plate Rupture Repair Using a Braided Polyethylene Nylon Suture: A Technique Guide.**
  - Blazek CD¹, Brandão RA¹,², Marway JM¹,², Burns PR¹,².

- **Anatomic Repair of Plantar Plate With Flexor Tendon Sheath Reinforcement: Case Series.**
  - Donegan RU¹, Caminear D².
FDL Transfers

Tendon repositioned with sutures

FDL Transfers

FDL Transfers
Interference Screw Fixation

- Kuwada & Dockery (1980)
  - Drill tunnel

- Sung (2015)
  - Interference Screw
Anatomic Reconstruction Technique for a Plantar Calcaneonavicular (Spring) Ligament Tear.

Palmanovich E, Shabat S, Brin YS, Feldman V, Kish R, Nyska M.
Suture Tape with Interference Screw

Technique using interference fixation repair for plantar plate ligament disruption of lesser metatarsophalangeal joints.

Sung W

Innovation and Adaptation
Plantar plate tears are a common problem, and often missed or misdiagnosed.

Repairs options include:
- Hammertoe repair
- Direct Plantar plate repairs
- Ligament balancing
- Metatarsal osteotomies
- Flexor tendon transfers

Flexor Tendon Transfers:
- Drill tunnel can prevent capsulotomy and collateral ligament destabilization
- Drill tunnel can be adjusted/angled to corrected transverse deviation
- Suture tape or graft augmentation can be used to reconstruct poor soft tissue structures or aid in transverse plane correction
- Tendon can be split to aid in transverse plane correction