Cavus Foot: Subtle and Not-So-Subtle

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Disclosure

- Nothing to disclose
What is a Cavus Foot?

Image: Foot and Ankle International, April 2002;23:344-347
What is a Cavus Foot?
Cavus vs. Planus
Valgus vs. Varus
Cavovarus
Physical Exam

- High arches
- “Peek-a-boo” heels from the front
- Varus heels from behind
- Coleman block test
Coleman Block Test

- Varus Heel
- Stand on block with 1\textsuperscript{st} ray dropping over the edge
- Does this correct the hindfoot varus?
- If it does, then it is:

  Forefoot Driven Hindfoot Varus
Coleman Block
Forefoot-Driven Varus

- Plantarflexed 1st Ray
- Supple hindfoot
- If you correct the first ray, then you correct the hindfoot varus, which improves foot mechanics
- With varus, there is no eversion to allow for shock absorption at heel strike which transfers stresses above.
Plantarflexed 1st Metatarsal

- One leg of the tripod is too high
- High sesamoid pressures
- Foot tipping
- Instability
Problems

- Peroneal tendon tendonitis/subluxation/tears
- 5th Metatarsal fractures – Stress, Jones, Nonunions
- Sesamoiditis
- 1st/5th Metatarsalgia/Calluses
- Recurrent ankle sprains
- Ankle arthritis
Severe Cavovarus from Polio
Cavovarus Radiographs

- High arch, plantarflexed 1\textsuperscript{st} ray
- Hindfoot supinated – Open sinus tarsi
- Fibula is posterior
- Double talar dome
- High calcaneal pitch
Severe Cavovarus
Severe Cavovarus

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Varus Ankle Arthritis
Moderate Cavus
5th Metatarsal Stress Fracture
Subtle Cavus
Subtle Cavus
“Sports” Coleman Block
Etiology

- CNS – Cerebral Palsy, Friedrich’s Ataxia
- Spine – Myelodysplasia, Syringomyelia, Polio, Tumors, Intrathecal Lipoma, Tethered Cord *(May have unilateral or progressive cavovarus)*
- Peripheral Nerves – Hereditary Sensorimotor Neuropathy
- Muscular- Deep posterior compartment syndrome
- Idiopathic
Charcot-Marie-Tooth

- Most common hereditary motor-sensory neuropathy
- Results from abnormal myelination affecting peripheral nerves from distal to proximal
- 94% of patients have a foot deformity
- Pathology: Onion Bulb formation from segmental demyelination and remyelination
- PMP-22 (peripheral myelin protein) gene defect in 80% of most common CMT-1 (demyelinating) type which is autosomal dominant
CMT Pathophysiology

- Weakness and atrophy of foot intrinsics, tibialis anterior, and peroneus brevis; while the posterior muscles and peroneus longus retain their strength.
- As the muscle imbalances become longer standing, the more rigid the deformities become.
Deformities

- Equinus – Tib Ant overpowered by Gastroc/Soleus
- Cavus – Peroneus Longus overpowers Tib Ant
- Hindfoot Varus – Posterior Tibial overpowers Brevis
- Claw Toes – Loss of intrinsic function. Extensors recruited to help dorsiflexion, while flexors overpull
Extensor Recruitment
Achilles Contracture
Soft Tissue Procedures for Charcot-Marie-Tooth

- Plantar Fascia release
- Achilles tendon lengthening for Equinus
- Extensor tendon lengthening for Hammering Toes
- EHL to 1\textsuperscript{st} Metatarsal Neck for Clawed Hallux
- Peroneus Longus to Brevis for Weak or Torn Brevis
- Posterior Tibial Tendon Transfer to Dorsum for Foot Drop
- Girdlestones for Flexible Hammertoes
Bony Procedures for CMT

- IP Fusions for Rigid Hammertoes
- Dorsiflexion MT Osteotomies for Plantarflexed Mets
- Dorsiflexing Tarsometatarsal Fusions for PF Mets
- Lateral closing wedge Calcaneal Osteotomies for Varus
- Triple Arthrodesis for Rigid/Arthritic Deformities
Cavus Foot

- Ask yourself, why does this patient have a cavus foot?
- Early recognition is important to prevent or treat lateral sided or ankle pathology
- Subtle cavus can be treated with orthotics
- Early stages can be treated with tendon transfers
- Later, more rigid cases require the addition of bony procedures
Summary

- A cavus foot can lead to lateral foot and ankle overload and injury.
- When evaluating a patient with ankle instability, ankle arthritis, 5th metatarsal fracture/nonunion, sesamoiditis, and/or peroneal tendon dysfunction, assess the hindfoot/forefoot alignment.
- Define the origin of the hindfoot varus using the Coleman Block.
- Correct underlying deformity, not just the tip of the iceberg.
Image Sources
