Etiology and Biomechanics of the Cacus Foot

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I. Definition AND CHARACTERISTICS of cavus foot

- A. Deformity typically with increased arch height and plantarflexed first metatarsal, and often hindfoot varus, hindfoot dorsiflexion, internal rotation of forefoot; remains deformed with weightbearing
- B. Highly variable, can have different foot shapes and still be called cavus
- C. Secondary contracture of plantar aponeurosis could accentuate elevated arch, plantarflexed metatarsals, inverted calcaneus, relative external rotation of tibia
- D. Flexible, rigid
- E. Both soft tissue and bony deformity
- F. Often with claw toes

II. ETIOLOGY OF CAVUS FOOT

- A. Not always clear
- B. Neuromuscular disorders diagnosed in about 2/3 (Brewerton 1963), some static, some progressive
- C. Positive family history in many (about ½)
- D. Presentation variable, depending upon underlying cause

III. Specific causes

- A. Neuromuscular: Charcot-Marie-Tooth disease, spinal dysraphism, poliomyelitis, diastematomyelia, Friedrich's ataxia, syringomyelia, cerebral palsy,
- B Congenital: residual clubfoot, isolated congenital cavus
- C Idiopathic cavus foot (ICF)
- D Traumatic: muscle injury (compartment syndrome, crush), burn, fracture malunion
- E. Miscellaneous

IV. PATHOGENESIS

- A. Theories
- B. Stages
- C. Malalignment in three planes, not just sagittal plane
- D. Plantar aponeurosis contracture, clawtoes, migration of fat pad, abnormal plantar foot pressure distribution and area, abnormal motion, abnormal shock absorbing characteristics

V. EVALUATION

A. Onset, family history
B. Pain in lateral foot
C. Callosities lateral to 5th metatarsal base, metatarsal heads
D. Change in foot shape--high arch, sense of instability
E. Uneven wear of shoes
F. Repeated ankle sprains
G. Clumsiness

VI. PHYSICAL EXAMINATION

A. Deformity maintained with weight bearing
B. Tenderness along lateral border of foot
C. Callus lateral foot
D. May be flexible, rigid, or partially correctable
E. Flexible deformity—with Coleman block test the flexible hindfoot varus will correct into valgus suggesting the surgery mainly in the forefoot
F. Rigid deformity—with Coleman block test the rigid hindfoot varus does not correct, indicating the need for surgery in forefoot and hindfoot
G. Range of motion: ankle, hindfoot, midfoot, metatarsophalangeal
H. Abnormal neurologic exam
I Other: scoliosis, lateral ankle ligament instability, peroneal tendinopathy

VII. TYPICAL FINDINGS FOR COMMON DIAGNOSES

A. Charcot-Marie Tooth Disease
B. Poliomyelitis
C. Idiopathic cavus foot

VIII. DIAGNOSTIC STUDIES

A. Plain film radiographs
    1. Standing AP foot
    2. Standing lateral foot
    3. Standing AP ankle
B. CT: simulated weightbearing
C. Electrodiagnostic studies, spine X-rays, MRI, myelogram
D. Neurology consultation, geneticist

IX. CLINICALLY-RELEVANT RESEARCH

A. Foot shape and function: common beliefs
B. Effect of foot shape on three-dimensional position of foot bones
C. Cavus feet compared to normal feet
D. Effect on cavus on foot pain and plantar pressure
E. Foot shape and occurrence of injuries
F. Influence of foot malalignment upon plantar pressure pattern during running

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