

Severity of Clubfoot: Considerations for Evaluation and Outcomes

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Clubfoot is the most commonly treated congenital disorder at HRDC (Hospital and Rehabilitation Center for Disabled Children). Whereas, the majority of these cases are amenable to successful treatment by the Ponseti method, the severe deformities pose challenges in management. HRDC treats over 600 feet annually and the numbers show an increasing trend. Recognizing the complex foot and addressing specific alternative additional treatment measures result in better outcomes.

Keywords: clubfoot, HRDC, surgery.

An experienced physician can judge the severity of the deformity after the first or second manipulation and plaster cast application. The degree of lateral displacement of the navicular with abduction the foot is the examiner's main clue. Scores obtained by the Pirani or Demigloo systems provide basis for documenting severity and assessing response to treatment.

Clues to severity include-

1. Decreased calf size and the degree of

retraction of calf muscles

2. Severe Equinus and Varus deformity of Heel
3. Rigidity of adduction of forefoot
4. Depth of medial and posterior skin creases.

Goldner and Fitch¹ offer a classification to judge the severity, noting the reduction in the normal distance between the navicular and medial malleolus.

Normal foot	12-24 mm
Mild deformity	13-18 mm

Mod Deformity	7-12 mm
Severe Deformity	0-6 mm

The Complex Clubfoot:

The foot exhibits severe carus and equinus and the dorsum of the foot is swollen. A detailed examination reveals rigid equinus, severe plantar flexion of all metatarsals, a deep crease above the heel, a transverse crease in the sole of the foot, short hyperextended toes and an exceptionally tight and fibrotic Achilles tendon extending to the mid-calf region. The etiologies are probably multifactorial, including neuromuscular causes, chromosomal anomalies, syndromic and other rare extrinsic causes, including possible iatrogenesis.

A small number of complex clubfeet are very difficult to treat with poor results even following extensive surgical releases. They respond altogether differently to both operative and non-operative treatment and early surgery results in a grotesquely deformed foot.²

Queried Causes: iatrogenic

1. Equinus deformity can be accentuated when there is inadequate knee flexion in the cast, causing the foot to slide proximally accentuating ankle equinus and plantar flexion of the forefoot.
2. A similar situation can occur when the foot is not securely fitting into the orthotic shoe.
3. Improper manipulation techniques:
 - a. Using the calcaneus as fulcrum
 - b. Forcefully pronating the foot

Special points in cast application in the

complex clubfoot.

1. Avoid excess padding
2. Use splint across the knee – anteriorly. This reduces the quantify of plaster and makes positioning knee easier.
3. All the metatarsals must be dorsiflexed to connect the cavus deformity
4. Cavus correction may need more than one cast application
5. Try to achieve Hyper abduction

Abduction of the forefoot automatically corrects the heel varus and medial displacement of cuboid may persist when counter-pressure is over the calcaneocuboid joint instead of the lateral head of the talus.

Additional clues to severity may include-

1. Position of malleoli in relation to the tibial crest, tuberosity, head of talus and calcaneal tuberosity.
2. Calf circumference
3. Extent to which talar head is subcutaneous in front of the lateral malleolus.

Arthrogryposis is a common condition presenting with severe clubfoot deformity. In an earlier review of patient undergoing talectomy at our institution (unpublished), 86% of the total case (57 feet) were arthrogryposis and congenital idiopathic clubfeet. These were late presenters and our experience revealed failure with lesser procedures. As experience with talectomy improved, this procedure was undertaken as the primary operation for these severe deformities. Our follow up records revealed

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that the patients treated by primary talectomy did better than those cases where talectomy was a secondary procedure for all age groups. Result of the talectomy in arthrogryphotic clubfeet have been similarly reported by numerous authors.^{3,4}

Radiographs – What value?

Radiographs are difficult to reproduce, evaluate and measure in these age groups. The joints are stiff and deformed and difficult to position. The ossific nucleus does not represent the true state of the largely cartilaginous foot.

When radiographs are undertaken, the foot must be held in the weight bearing mode in the best corrected position.

The KITE Angle (Talocalcaneal Angle)

AP/Lat X-ray beam focused.

- a. 30° from vertical for AP
- b. Transmalleolar with fibula overlapping tibia for lateral

In the older child the X-ray beam is focused at the mid-foot to allow assessment of dorsolateral subluxation and narrowing of the talonavicular joint. Lateral dorsiflexion and plantar flexion x-ray allow for evaluation of ankle and mid foot mobility.

X-rays have a limited role in the management of clubfeet and good clinical results often may not match the “spurious” radiographic findings. They may be useful in older patients, in relapses and in the patient with a history of previous treatment.

Relapses

These are uncommon after the age of five years. Early severe relapses are common in

Arthrogryposis. Relapses are most frequent in the 1-3 year age group but can occur till age five or six. The incidence of relapse is lower in feet where hyper-abduction was achieved. Tibialis anterior transfer is indicated when dynamic supination is observed and this procedure can be continuously used more frequently. Non-compliance with brace has been identified as an important factor for relapse. Some relapses are associated with growth spurt, when the strong inversion action by the soleus muscle accentuates deformity.

Discussion

The complex clubfoot exhibits some unique findings and a thorough examination is the single most important first step. Correct manipulative and casting methods can result in correction even though this treatment may be of a longer duration than for the conventional clubfoot.⁵ Iatrogenic cause for failure of cast treatment needs to be carefully considered. The patients with Arthrogryposis pose unique challenges – rigid deformity, poor response to manipulative cast treatment and high relapse rates. Primarily talectomy is a valid treatment option in this group of patients. More extensive soft tissue release must be selectively undertaken in certain cases where manipulative treatment fails. Selective mid foot fusion (calcaneocuboid joint) may sometimes be combined with talectomy to help maintain correction. Extensive bony resection procedures and the use of External Fixators have little or no role

in infants and children where the foot is yet a large mass of cartilage.

References:

1. Goldner J.L., Fitch RD et al. Classification and Evaluation of Congenital Talipes Equinovarus. *The Clubfoot* 1994;120-39.
2. Turco VJ. Resistant congenital club foot: one-stage posteromedial release with internal fixation. A follow-up report of a fifteen-year experience. *J Bone Joint Surg Am.* 1979;61:805-14.
3. Legaspi J, Li YH, Chow W, Leong JC. Talectomy in patients with recurrent deformity in clubfoot. A long term study. *The journal of Bone and Joint surgery.* 2001;83:384-7.
4. D'Souza H, Aroojis A, Chawara GS. Talectomy in arthrogryposis: analysis of results. *J Pediatr Orthop* 1998;18:760-4
5. Ponseti IV, Zhivkov M, Davis N, Sinclair M, Dobbs MB, Morcuende JA. Treatment of the complex idiopathic clubfoot. *Clinical Orthopaedics and related research* 2006;451:171-6.