

Long Term Follow-up of the Ponseti Method

The definitive long term study:

Cooper, D. M., & Dietz, F. R. (1995). Treatment of idiopathic clubfoot. A thirty-year follow-up note. *The Journal of Bone and Joint Surgery. American volume*, 77(10), 1477-89.

This study was instrumental in validating Ponseti's technique and launching the Ponseti clubfoot revolution.

45 patients, average age 34 years, treated by Ponseti technique compared with age matched controls. Clinical, functional, radiographic, pedobarographic and electrogoniometric analysis. 78% excellent or good outcomes, comparable to controls. Minor changes in all parameters of evaluation were noted but did not affect function. There was no deterioration in function over time.

Subsequent follow-up over 50 years confirms no deterioration in pain or function. Calcific changes in the Achilles tendon have been noted (J. Morcuende, personal communication).

This study constitutes the "gold standard" against which other long-term studies of clubfoot treatment must be compared.

Comparison with long term surgical results:

Dobbs, M. B., Nunley, R., & Schoenecker, P. L. (2006). Long-term follow-up of patients with clubfeet treated with extensive soft-tissue release. *The Journal of Bone and Joint Surgery. American volume*, 88(5), 986-96.

45 patients with extensive soft tissue release followed over 30 years. Clinical, radiographic and Quality of Life (QOL) evaluation. 27% good results on same scale as Cooper & Dietz.

Radiographic osteoarthritis in 56%. QOL impairment similar to serious medical diseases such as Parkinsons and patients on haemodialysis. The results of surgical treatment deteriorate over time and subsequent reconstructive bony surgery is common.

Most other studies of follow-up of surgical results are short-term.

Extensive surgical release, therefore, shows significantly worse results over the long term than does the Ponseti method.

Radiologic follow-up:

Farsetti, P., De Maio, F., Russolillo, L., & Ippolito, E. (2009). CT study on the effect of different treatment protocols for clubfoot pathology. *Clinical Orthopaedics and Related Research*, (2009) 467(5), 1243-9.

This is an excellent study of 72 patients with minimum 17 year follow-up. Normal feet were compared with those treated by a previous manipulative therapy, some of whom also needed postero-medial release, and an equal number treated with a modified Ponseti method (limited posterior release was performed instead of percutaneous tenotomy). All patients had 3D CT

examinations. Radiographic abnormalities were almost universal in all the tarsal bones but are relatively minor. Ponseti treated patients had better radiographic parameters than those treated by the previous non-Ponseti method.

This study confirms that minor radiographic changes do not adversely affect a good long-term clinical outcome.

Gait analysis follow-up:

Cooper & Dietz did perform pedobarography and electrogoniometry showing diminished active and passive dorsiflexion and plantarflexion, but near normal dorsi & plantarflexion during walking. There was lesser peak pressure on the heel and more on the midfoot.

Other long term gait analysis studies are lacking.

Karol, L. a, Jeans, K., & ElHawary, R. (2009). Gait analysis after initial nonoperative treatment for clubfeet: intermediate term followup at age 5. *Clinical Orthopaedics and Related Research*, 467(5), 1206-13.

This is a short term study of 90 patients at 5 years of age. Ponseti method, French method and operative cases compared to normal controls. Better gait parameters were seen in the Ponseti group compared to the French technique group; worst results in the operated group. Residual in-toeing was seen in 1/3. The presence or absence of Achilles tenotomy did not affect ankle power.

Gait characteristics of feet that did not have surgery and maintained correction were superior to those of operated feet.

Sinclair, M. F., Bosch, K., Rosenbaum, D., & Böhm, S. (2009). Pedobarographic analysis following Ponseti treatment for congenital clubfoot. *Clinical Orthopaedics and Related Research*, 467(5), 1223-30.

20 patients at 33 months after last cast. Mild differences in maximum force, impulse, contact area, and peak pressure were documented, with increased weightbearing pressure over the lateral midfoot. Value of pedobarography in predicting successful outcome doubted due to lack of correlation with clinical outcomes.

Tenotomy follow-up:

The best long-term follow-up of tenotomy is included in the results of Cooper & Dietz (above). Minor dysfunction in range of motion and strength is noted but the question is whether this is related to the clubfoot deformity itself or to the tenotomy.

Tibialis Anterior transfer follow-up:

Lampasi, M., Bettuzzi, C., Palmonari, M., & Donzelli, O. (2010). Transfer of the tendon of tibialis anterior in relapsed congenital clubfoot: long-term results in 38 feet. *The Journal of Bone and Joint Surgery. British volume*, 92(2), 277-83.

38 clubfeet having had TAT reviewed at 24.8 years. None were Ponseti cases or isolated procedure – all were done in association with soft tissue releases or osteotomies, so outcomes are not truly valid. One tendon failure. Excellent or good results in 53%. The authors conclude: “The addition of transfer of the tendon of tibialis anterior can restore balance and may provide some improvement of forefoot adduction. However, it has a considerable complication rate, including failure of transfer, over-correction, and weakening of dorsiflexion.”

Coopr & Dietz: 38 of their long term follow-up patients had Tibialis Anterior Transfers but these were not evaluated separately.

Important points:

- **Long-term follow-up results of the Ponseti technique are excellent and are superior to operative intervention or other techniques.**
- **Function and quality-of-life parameters are near-normal and do not deteriorate over the long run.**
- **There are subtle differences between Ponseti treated clubfeet and normals in all parameters but it would appear that these differences are within the tolerance of the foot, not causing functional impairment or disability.**
- **Suppleness is more important than perfect x-rays or alignment.**
- **Violating the joint capsules produces stiffness with deteriorating function over time.**
- **The results of Ponseti’s treatment as reported in the article by Cooper and Dietz form the “gold standard” for outcomes of clubfoot treatment. Any alternative clubfoot treatment must demonstrate equal or improved outcomes over the long run term...a tall order!**

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