

Early Experience with Ponseti Club Foot Management in Lagos, Nigeria

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Background: The first Ponseti clubfoot management workshop in Nigeria was held in Ile-Ife in December 2009, facilitated by a team from the University of Iowa. Prior to this, very few Nigerian orthopaedic surgeons had been trained to use this technique. The objective of this study was to evaluate the initial experience and outcome of treatment of idiopathic clubfoot using the Ponseti method in our teaching hospital club foot clinic.

Methods: A prospective study of congenital club feet managed in our clubfoot clinic from January 2010 to December 2011 using the Ponseti method. Biographic data, severity using Pirani score, duration of treatment and outcome were evaluated. Cases with less than one year follow-up and syndromic clubfeet were excluded.

Results: A total of 106 patients (158 feet, 54 unilateral and 52 bilateral) were treated. Age ranged from 7 days to 4 years, and there were 40 females and 66 males. Pirani score at presentation was 4 and less in fifty feet (31.6%) and above 4 in 108 (68.4%). Percutaneous achilles tenotomy was performed on 42 feet (26.6%). Initial correction was achieved in 152 feet (96.2%). Mean number of casts to correction was 4.6. Relapse was observed in 8 feet (5.16%) within one year. The foot abduction brace was used as prescribed in 60 patients (56.8%)

Conclusion: Initial observations indicate the outcome of clubfoot management using the Ponseti method is encouraging. Few casts are required, treatment duration is short and complications are minimal. Brace compliance was a challenge.

Introduction

Congenital club foot is not uncommon in Nigeria, and has been reported as the commonest musculoskeletal congenital anomaly in the country^(1,2). The deformities include forefoot adduction, heel varus, equinus and cavus⁽³⁾ and it may be idiopathic or secondary, frequently associated with spina bifida and tibial hemimelia⁽⁴⁻⁶⁾. Transient muscular and collagen dysfunction in the posterior and medial aspects of the foot⁽⁷⁾, as well as the presence of vimentin and myofibroblast-like cells in the medial and posterior tarsal ligaments have been reported to play an important role in the aetiology of club foot⁽⁸⁾.

The principle of 'stretch and hold' (manipulation and casting or strapping) for the treatment of congenital club foot has long been applied and has achieved varying results^(9,10). Extensive club foot surgery becomes inevitable when the feet become resistant to correction by manipulation and casting and this has frequently resulted in a painful stiff foot on long-term follow-up⁽¹¹⁾. Some authors have described the use of Ilizarov frames for relapsed club feet and arthrolysis^(12,13).

The Ponseti method has been proven to reduce the need for extensive surgery and clinical outcome studies have yielded excellent results on long-term follow-up⁽¹⁴⁾. This method requires training and non-medically qualified personnel can be taught to use this method in resource-challenged communities⁽¹⁵⁾. The first Ponseti clubfoot management workshop in Nigeria was held in Ile-Ife in December 2009, facilitated by a team from the University of Iowa. Prior to this, very few Nigerian orthopaedic surgeons had been trained to use this technique. The prevalent method for management was based on the work of Hiram Kite⁽¹⁶⁾ which involved

manipulation of the foot at the calcaneo-cuboid joint and progressive dorsiflexion of the foot. Casting protocols differed; some focussing on one deformity at a time (forefoot adduction, varus, then equinus), whilst others corrected all deformities at once. Most surgeons opted for an above knee cast until satisfactory correction of the equinus was achieved and thereafter replaced it with a below-knee (retention) cast. Furthermore, the timing of cast changes differed, from two to three, or even up to 6-week intervals. Reports on the outcome of these various methods in Nigeria are not known, but casual observations in our unit prior to adoption of the Ponseti protocol, showed that the mean duration to correction was 3 months, but 49% had recurred by one year.

We started using the Ponseti protocol in January 2010 and this is a report of our initial experience.

Patients and Methods

From January 2010, all the patients referred to our club foot clinic with congenital club foot were managed using the Ponseti protocol. As soon as they were referred, the nurses in the unit counseled the mothers, disabusing their minds of various unproven beliefs for its causation such as witchcraft and explaining what the treatment involved as well as the prognosis. The biographic data, family history, home addresses and telephone contacts were recorded at the first visit. Next, they were seen by the principal authors who assessed the severity using Pirani score ⁽¹⁷⁾, and examined for any other congenital anomalies. Foot manipulation and casting was carried out by the authors using the Ponseti method ⁽⁷⁾. This involved initial supination of the forefoot to align it with the hind foot and subsequent progressive foot abduction until the head of the talus was properly articulated with the navicular. Thereafter, any residual equinus deformity was corrected by percutaneous Achilles tenotomy. The limbs were all immobilized in above-knee casts which were changed weekly until correction was achieved. A final three-week cast was applied after correction with or without heel cord tenotomy, which was carried out under local anaesthesia when indicated, with a size 15 surgical blade. After deformity correction, the patients were fitted with locally fabricated Steenbeck Foot Abduction Braces (SFAB) (Figure 1), and seen two weeks later to see if they had been wearing the braces properly. Thereafter, they were seen at 3-monthly intervals to assess for relapse and to ascertain brace compliance. Patients who missed clinic appointments were contacted by telephone and encouraged to visit the next clinic.

Statistical package for social sciences (SPSS) software was used for the purpose of analyzing data which included biographic data, severity (pirani score) at presentation, number of casts, duration of treatment, surgical intervention (tenotomy, tibialis anterior transfers, tendo-achilles elongation and posteromedial releases) if performed. Treatment outcome was determined by initial foot correction, relapse and complications of treatment. All patients followed up for less than one year and those with syndromic clubfeet were excluded from the study.

Results

On the whole, there were 106 patients, 54 had unilateral club foot and 52 had bilateral clubfoot with a total of 158 feet. Age at presentation ranged from 7 days to 4 years, seventy five (70.8%) presented in the first 6 months of life (Figure 2). There were 40 females and 66 males (male/female ratio 1:1.6) (Figure 3). Pirani score at presentation was 4 and less in fifty feet (31.6%). One hundred and eight feet (68.4%) had a Pirani score above 4 (Figure 4). Percutaneous tenotomy was performed on 42 feet (26.6%) with only one case of bleeding which subsided after local pressure was applied. Initial correction was achieved in 152 feet (96.2%) by serial manipulation, casting and percutaneous tenotomy when required. The total number of casts ranged from 3-9, the mean number of casts to correction being 4.6.

Six feet required open elongation of the tendo-achilles, three of which also had posterior capsulotomy. Relapse was observed in 8 feet (5.16%) within one year, and all these patients did not use the foot abduction brace as prescribed. Cast complications (blisters, ulcers and skin rashes) were found in 9 feet, two of which had to be left out of cast for one week each. The foot abduction brace was used as prescribed in only 60 patients (56.8%). Reasons given for not wearing the brace as prescribed included mother's embarrassment, lack of funds, babies' discomfort and removal of braces by the older children

Figure 1.

Steenbeck foot abduction brace



Figure 2.

Grouped age

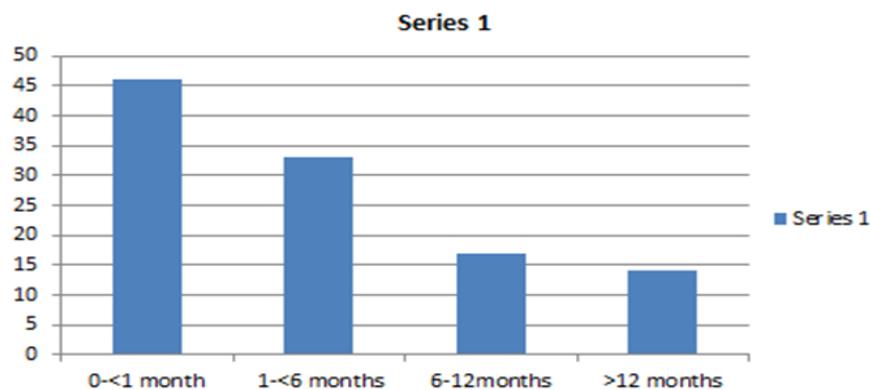
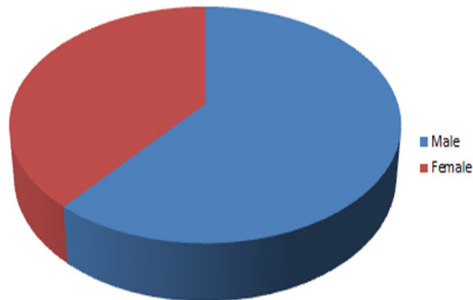
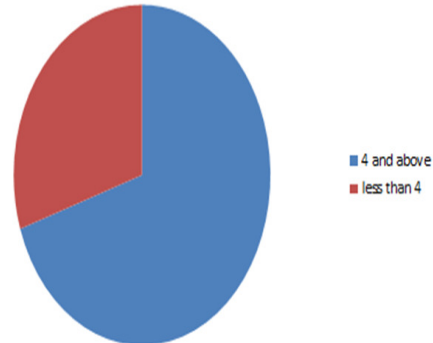


Figure 3. Sex Distribution

Figure 4. Pirani score at presentation


Discussion

Although Ponseti first described his method of treatment of club foot in 1963, it took over 30 years for the method to catch on with the orthopaedic community worldwide. This was influenced by the encouraging long term results published by him and early converts ^(9,10). Ponseti's detailed explanation of the relationship between the tarsal bones in club foot confirmed with MRI and ultrasound are in support of his method ^(18,19).

In this study, the patients presented at an earlier age than in our previous study carried out before we set up a formal club foot clinic ⁽¹⁾. This may have been as a result of greater awareness amongst the populace that the condition can be treated. The interaction amongst mothers with children at different stages of treatment may have improved their understanding of the condition and treatment outcome and bolstered their confidence in the treatment. Using the Pirani score to assess severity, the vast majority (69.8%) of club feet were severe with a score of 4 and above. Non-idiopathic (syndromic) clubfeet were excluded from this study. These have been observed in other studies to take longer to correct and are more prone to relapse ⁽²⁰⁾.

Percutaneous Achilles tenotomy was performed in only 26.6% of the feet, far below most other studies ⁽²¹⁻²³⁾. In spite of the evidence of complete regeneration of the Achilles tendon after 6 weeks, demonstrated clinically and ultrasonographically in a study ⁽²⁴⁾, the authors' were reluctant to perform this procedure routinely, preferring to use a few more casts. This may have been because all the tenotomies were performed under local anaesthesia and the reported complications are well known ⁽²⁵⁾.

The total number of casts applied until initial correction was achieved ranged between 3 and 9, with a mean of 4.6 which is well within the average reported by other authors ^(21,23). After one year's follow-up, only 5.2% had relapsed, and they were all cases that did not use the foot abduction brace as prescribed. Non-compliance with the use of the brace has been found to be the factor most related to the risk of recurrence⁽²⁶⁾. Cast complications (ulcers, blisters and rashes) were minimal, which suggests that this method of treatment is associated with minimal complications when properly carried out.

The main limitation of this study is the one-year follow-up period, but we are eager to reveal that we have tried this method which has yielded very satisfactory results so far. However, we

need to review the relapse rate again over the following years, because of the large number of patients who did not use the brace as prescribed.

Conclusion

Early observations suggest that the results of Ponseti method of club foot management are consistent and reproducible in West Africa.

References

1. Adewole OA, Giwa SO, Kayode MO, Shoga MO Balogun, RA. Congenital Club Foot in a Teaching Hospital in Lagos, Nigeria. African Journal of Medicine and Medical Sciences. (2009)38: 203-206
2. Omololu B, Ogunlade SO, Alonge TO. Pattern of orthopaedic malformations in an African teaching hospital. West Afr J Med. 2005; 24 (2): 92-95
3. Irani MN, Sherman MS. Pathological anatomy of club foot. J. Bone Joint Surg (Am). 1963; 45-A: 45-52
4. Frischhut B, Stockl B, Landauer F et al. Foot deformities in adolescents and young adults with spina bifida. J Paediatr Orthop B.2000; 9 (3): 161-9
5. Kyzer SP, Stark SL (1995) Congenital idiopathic club foot deformities. Aorn J. 1995; 61 (3): 492-506.
6. Tayton KJ, Weisl H. The spina bifida club foot. Z Kinderchir Grenzgeb. 1979; 28 (4): 401-8
7. Ponseti I. Congenital clubfoot-Fundamentals of treatment. Oxford/New York; Oxford University Press, 1996.
8. Sano H, Uhiboff H, Jarvis J et al. Pathogenesis of soft tissue contracture in club foot. J Bone Joint Surg Br 1998;80 641-4.
9. Llaaveg SJ, Ponseti IV. Long term results of treatment of congenital club foot. J. Bone Joint Surg. Am 1960; 62: 23-31.
10. Ippolito E, Farsetti P, Caterini R, Tudisco C. Long term comparative results in patients with congenital club foot treated with two different protocols. J. Bone Joint Surg. Am. 2003; 85: 1286-1294.
11. Aronson J, Puskarich CL. Deformity and disability from treated club foot. J. Pediatr orthop. 1990; 10: 109-119
12. Bradish CF, Noor S. Ilizarov method in the management of relapsed club feet. J. Bone Joint Surg. Br 2000. 82-B; 3: 387-391.
13. Choi IH, Yang MS, Chung CY, Cho CJ, Sohn YJ. The treatment of recurrent arthrogryptic club foot in children by Ilizarov method: A preliminary report. J. Bone Joint Surg. Br 2001. 83-B; 5: 731-737
14. Cooper DM, Dietz FR. Treatment of idiopathic clubfoot. A thirty year follow up note. J Bone Joint Surg Am. 1995; 17: 1477-1489
15. Tindall, A J, Steinlechner, CWB, Lavy, C B, Mannion, S, Mkandawire, N. Results of Manipulation of Idiopathic Clubfoot Deformity in Malawi by Orthopaedic Clinical Officers Using the Ponseti Method: A Realistic Alternative for the Developing World? J. Paediatr orthop 2005. 25 (5): 627-629.
16. Kite J H. Principles Involved in the Treatment of Congenital Club-Foot. J Bone Joint Surg Am, 2003; 85(9):1847-1847
17. Pirani S, Outerbridge HK, Sawatzky B, Stothers K. A reliable method of clinically evaluating a virgin clubfoot evaluation. 21st SICOT Congress 1999.
18. Pirani s, Zeznik L, Hodges D. magnetic Resonance imaging study of the congenital clubfoot treated with Ponseti method. J. Paediatr Orthop. 2001 21: 719-726
19. Desai S, Aroojis A, Mehta R. Ultrasound evaluation of clubfoot correction during Ponseti treatment. J. Paediatr orthop 2008; 28: 53-59.

20. Kowalczyk B, Lejman T. Short-term experience with Ponseti casting and the Achilles tenotomy method for clubfeet treatment in arthrogryposis multiplex congenital. J. Childrens orthopaedics. 2008, (2) 5: 365-371
21. Abdelgawad AA, Lehman WB, van Bosse HJP, Scher DM, Sala DA. Treatment of idiopathic clubfoot using the Ponseti method: minimum 2-year follow-up. J Pediatr orthop B 2007; 16: 98-105
22. Eberhardt O, Schelling K, Parsh K, Wirth T. Treatment of congenital clubfoot with the Ponseti method. Z orthop Ihre Grenzgeb 2006. 144: 497-501.
23. Ducker C, Lewthwaite S, Kelly NT. Ponseti treatment in the management of clubfoot deformity- a continuing role for paediatric orthopaedic services in secondary care centres. Am R Coll Surg Engl. 2007; 89: 510-512
24. Barker SL, Lavy CBD. Correlation of clinical and ultrasonographic findings after Achilles tenotomy in idiopathic club foot. J. Bone Joint Surg. Br. 2006 88-B: 377-379
25. Dobbs MB, Gordon JE, Walton T, Schoenecker PL. Bleeding complications following percutaneous tendo-achilles tenotomy in the treatment of clubfoot deformity. J. Pediatr Orthop. 2004; 24: 353-357.
26. Dobbs MB, Rudzki JR, Purcell DB et al. Factors predictive of outcome after use of Ponseti method for the treatment of idiopathic club feet. J.Bone Joint Surg. Am. 2004. 86:22-27