

Clubfoot Treatment by Ponseti Method

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ABSTRACT

OBJECTIVE: To document the outcome of Ponseti method in the treatment of clubfoot.

STUDY DESIGN: Observational-descriptive study.

Place and Duration: Department of Orthopedic Surgery and Traumatology, Liaquat University of Medical and Health Sciences (LUMHS) Jamshoro, Sindh – Pakistan, from January 2007 to December 2010 (4-years).

METHODOLOGY: Clubfeet were treated by Ponseti technique. Pirani score was recorded for all subjects at the time of presentation and a foot was considered fully corrected when scored 0-0.5. Immediately after the removal of last cast, foot abduction braces were used. Follow-up pattern was at two weeks, at three months, then at four month interval up to 3-years age, then at six month interval up to 4-years age, and then once a year. Any relapses were treated accordingly. Tenotomy was repeated in equines, whereas castings were repeated in adduction of forefoot, intoeing and cavus.

RESULTS: During the study period 49 children presented 71 clubfeet with 27 (55.1%) unilateral and 22 (44.9%) bilateral cases. The mean Pirani score at the time of presentation was 5.44. Majority (63.38%) feet required casting up to 5-weeks and in 69.01% feet complete correction was acquired by five casts (mean 5.6 casts). Achilles tenotomy was performed in 65 (91.55%) feet. Pirani score of 0-0.5 was achieved in 69 (97.18%) cases within 1-year follow-up. Thirteen (18.31%) cases of relapse were reported. Among these, 2 (2.82%) cases of equinus underwent repeat tenotomy; whereas 7 (9.86%) cases of adduction, 3 (4.23%) cases of cavus and 1 (1.41%) case of intoeing were treated by repeat casting.

CONCLUSION: Ponseti method can be used in our setup with excellent correction of clubfoot deformity, and surgical complications can be minimize by this technique.

KEYWORDS: Clubfoot; Congenital talipes equinovarus; Ponseti; Pirani; Relapse; Achilles tenotomy; Adduction; Cavus; Intoeing.

INTRODUCTION

Congenital talipes equinovarus (CTEV) or clubfoot is one of the commonest and complex three dimensional foot deformity affecting more than 100,000 newborns every year, 80% of which occur in developing countries like Pakistan.[1] The choice for technique among surgical, non-surgical or both has been historically controversial.[2] The treatment of clubfoot is a success when a functional, pain-free, plantigrade foot with good mobility and tolerance of normal footwear is achieved.[3] However, during the last decade conservative methods are gaining popularity over surgical methods. Among conservative methods the technique pioneered by Ignacio Ponseti is reported effective in treatment of clubfoot in children.[4] This technique involves a serial corrective manipulation and casting for reduction of deformity. A foot abduction splinting is done subsequently and also often requires a percutaneous Achilles tenotomy.[5] Ponseti technique is generally regarded as simple and efficient for the treatment of clubfoot but reports from Pakistan are few. Therefore we conducted this study to determine the

efficiency of this technique in our set up.

METHODOLOGY

This observational-descriptive study was carried out at Department of Orthopedic Surgery and Traumatology, Liaquat University of Medical and Health Sciences (LUMHS) Jamshoro, Sindh – Pakistan, from January 2007 to December 2010 (4-years). All cases of clubfeet were included in this study except clubfeet secondary to any other cause and cases with history of posterior or posteromedial release. In all subjects manipulation and casting was performed according to Ponseti technique. Casting was performed once a week by authors with assistance of paramedical staff by using Plaster of Paris. Sedation was used for casting where and when required. Percutaneous tenotomy was performed by authors under general anesthesia after achieving the full correction of cavus, adductus and varus but dorsiflexion of ankle remained $\leq 10^\circ$ above neutral and abduction was adequate. The casts were then used for 3-4 weeks. Pirani score was recorded for all subjects at the time of presentation and

a foot was considered fully corrected when scored 0-0.5. Immediately after the removal of last cast foot abduction braces were used. The external rotation of brace was set at 70° on clubfoot side and at 45° on normal side in unilateral cases, whereas it was set at 70° on both sides in bilateral cases. For the first 3-months subjects were braces for 23-hours a day and then for 16-hours a day up to the age of 4-years, after which subjects used ankle foot orthosis. Follow-up pattern was at two weeks, at three months, then at four month interval up to 3-years age, then at six month interval up to 4-years age, and then once a year. Any relapses were treated accordingly. Tenotomy was repeated in equines, whereas castings were repeated in adduction of forefoot, intoeing and cavus. All data were recorded by the authors and SPSS version 16 was used for data analysis.

RESULTS

During the study period 49 children presented 71 clubfeet with 27 (55.1%) unilateral and 22 (44.9%) bilateral cases. Among them 38 (77.6%) males presented 55 (77.5%) clubfeet and 11 (22.4%) females presented 16 (22.5%) clubfeet. Age wise distribution is detailed in **Table I**. The mean Pirani score at the time of presentation was 5.44.

A large majority, consisting upon 45 (63.38%) feet, required casting up to 5-weeks (**Table II**). In majority (69.01%) of the feet complete correction was acquired by five casts (mean 5.6 casts). Achilles tenotomy was performed in 65 (91.55%) feet. Pirani score of 0-0.5 was achieved in 69 (97.18%) cases within 1-year follow-up. Subjects were followed for the period of 6-36 months (mean 18-months). During follow-up period 13 (18.31%) cases of relapse were reported. Among these, 2 (2.82%) cases of equinus underwent repeat tenotomy; whereas 7 (9.86%) cases of adduction, 3 (4.23%) cases of cavus and 1 (1.41%) case of intoeing were treated by repeat casting.

TABLE I: AGE DISTRIBUTION OF CLUBFOOT CASES (n=49)

Age	Total Cases	Total Feet	Unilateral Cases	Bilateral Cases
<6 months	18	25	11	7
6-12 months	16	23	9	7
12-36 months	10	16	4	6
>36 months	5	7	3	2
Total	49	71	27	22

TABLE II: DURATION OF CAST APPLICATION (n=71)

Duration	No. of Feet	Percentage
3-weeks	2	2.82
4-weeks	8	11.27
5-weeks	45	63.38
6-weeks	11	15.49
7-weeks	4	5.63
8-weeks	1	1.41

DISCUSSION

CTEV or clubfoot is a complex foot deformity, treatment of which needs extensive efforts by physician as well as by parents of the affected child. Treatment of clubfoot deformity by Ponseti method requires serial of casts followed by long-term maintenance of the brace. [6] Various case selection guidelines and management protocols have been recommended, however, early start and strict supervision is generally required for better treatment.[6-9] In this study the excellent results manifested the effective use of this conservative method.

In the present study male gender predominated female gender by the ratio of 3.5:1, which is in accordance with other reports.[10,11] It is suggested that in males CTEV can be developed by fewer predisposing factors than in females.[11] Higher ratio of male presentation may also be due to the fact that we dwell in a male oriented society where most of the time male child gains more attention than female child.

In this study mean number of casts was 5.6 (range 3-10). It is reported that 5-10 casts per foot were required with mean of 7-7.6.[12,5] Some studies reported that the deformity was corrected within 5 casts in 90% feet.[13,14] Clinicians with experience over time are achieving quick results by changing casts at less duration.[13] In the present study feet presenting with higher Pirani score needed more casts. In more than 75% feet the deformity was corrected within 5-weeks. The mean duration of casts is reported 8.6 weeks and 9.5 weeks in other studies.[12,5]

Tenotomy was performed in about 92% feet in the presented study; almost all of them had Pirani score of >5. Tenotomy is advised when forefoot abduction is achieved and equines correction is doubtful.[15] Various studies have reported that 78-91% deformed feet required tenotomy; during the process 4 patients bleed severely in one study.[5,12,13] No such problem was observed in the present study.

In our study only those cases were included who followed for at least 6-months. Among the relapses, forefoot abduction was most frequent (7 feet); the probable reason for which was failure of brace compliance and/or inappropriate application of brace by parents after removal at home. Majority of the parents did not understand the importance of appropriate brace reapplication due to the fact that majority of patients presenting at our tertiary care hospital belongs to low socioeconomic class with very low literacy rate. In another study the relapse rate was 6% in compliant cases whereas in non-compliant cases it was 80%. [13] Underlying muscle imbalance of foot and stiffness of ligament were responsible for relapse in compliant cases. In this study only 2 (2.82%) equines relapse were presented, which were because the patients removed the brace. Tenotomy was repeated and corrective casts were applied for 3-weeks in these cases. Because of non-compliance of brace the relapses of cavus and adduction of forefoot were observed in initial period, which became less frequent later on by regular follow-up and better compliance of the brace. Thirty-six (11.65%) feet relapsed in a study in which accelerated Ponseti method was used to treat 319 clubfeet of 230 patients.[14] A high proportion (56%) of relapse is reported by Ponseti et al in their earlier studies.[12] Thacker et al applied Steenbeek foot abduction braces in their study on 44 clubfeet after casting. They reported that better correction was obtained in feet which were compliant with braces compared to those feet which were non-compliant to braces. The same braces were used in this study, and almost all clubfeet achieved Pirani score of 0-0.5 after treatment period of 6-months. As per recommendations of Pirani, plotting at graphs were carried out for each patient.

Excellent correction of clubfoot deformity is achieved by Ponseti method. This conservative method of clubfoot treatment has shown successful results in developed societies.[6-16] Patients treated for clubfoot deformity are followed-up for more than 40-years in some studies and they reported that these patients are living a normal life. Surgical complications can be avoided by Ponseti method and this technique provides an opportunity of pain free, fully functional, normal looking, and fairly mobile feet without requiring any special footwear. In a developing country like ours, where proper operative facilities in rural areas are scarce, Ponseti method can be used safely and effectively for correction of clubfoot deformity, which is a result oriented and cost effective technique as well.

By proper and effective counseling and awareness, parents of such child can be motivated for long term brace application, and realize its effectiveness and prevention of relapses.

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