

Original Article

Management of Club Foot

Outcome of Early Management of Club Foot by Ponseti Technique

1. Muhammad Khan Pahore 2. Muhammad Ayub Laghari 3. Asim Niaz 4. Sikandar Ali Bhand 5. Muhammad Saeed

1. Asstt.Prof.of Orthopedic Surgery and Traumatology, Liaquat University Hospital, Jamshoro 2. Prof.of Orthopedic Surgery and Traumatology, Liaquat University Hospital, Jamshoro 3. Dept. of orthopedic surgery, Isra university Hospital Hydrad 4. Asstt. Prof. of Paediatric, Liaquat University Hospital, Hyderabad 5. Liaquat University Hospital Hyderabad

ABSTRACT

Objective: The Objective of this study is to assess the anatomical correction, cosmetic and functional outcome of the Ponseti method in idiopathic congenital Talipes Equino Varus (CTEV).

Study Design: Experimental and case series study

Place and Duration of Study: The study was carried out in the Department of Orthopaedic Surgery and Traumatology (DOST) Liaquat University of Medical & Health Sciences Jamshoro for a period of two years from 21-01-2009 to 20-01-2011.

Materials and Methods: This study was contains 50 cases of congenital talipes equino varus "CTEV". In this study all the case were selected with age of one year from the birth with congenital "talipes Equino Varus". All the cases with Acquired "Talipes Equino Varus", atypical foot, "talipes Equino Varus" with Arthrogryposis Multiplex Congenital, "talipes Equino Varus" previously treated by method other than ponseti technique were excluded from the study.

Results: Total 50 cases of congenital Telipase Equino Varus (CTEV) having 77 feet were analyzed in this study with (male female ratio 1:7). Out of 50 cases, 27 (54.0%, n = 50) had bilateral (54 feet) deformities and 23 (46.0%, n = 50) cases were unilateral deformities. Severity was assessed according to Pirani Scoring system. 48 (62.0%) had severe foot deformity while 29(37.60%, n = 77) patients had moderate foot deformity. Out of 77 feet, rocker bottom foot deformity developed in 03 (3.8%) feet, increased stiffness of ligaments and joints occurred in 1(1.2%, n =77) foot while vascular complications like skin ulceration and necrosis was observed in 1(1.2%, n =77) feet. At the end of 2 to 3 years follow-up period, in 72 (94.0%, n = 77) patients congenital clubfoot deformities were corrected successfully by using Ponseti method while 05 (6.0%, n = 77) patients were not fully corrected due to other complications.

Conclusion: The Ponseti method is a fast, safe and effective treatment for congenital idiopathic clubfoot and radically decreases the need for extensive corrective surgery.

Key Words: Ponseti method, idiopathic congenital Club feet, 12 months age.

INTRODUCTION

Idiopathic congenital talipes equinovarus (CTEV) is a relatively common complex three dimensional deformity of the foot affecting approximately 1–2/1,000 newborns¹ and about 1.2 per 10000 births among Caucasians, with approximately 50% of cases are bilateral.² Clubfoot deformity in children is difficult to treat because of the complex pathological anatomy of the growing foot.³ The clubfoot is not a single bone deformity but it is varying combination of four basic deformities including hind-foot equines, varus, forefoot adduction and medial subluxation of navicular bone.⁴ CTEV may occur as an isolated birth defect i.e. idiopathic or may be associated with other congenital deformities e.g. Edward syndrome, Spina bifida, Arthrogryphosis, Meningomyelocoele and Cerebral palsy.⁵ The deformity consist of four components including equinus, hind foot varus, fore

foot adduction and cavus or medial subluxation of navicular bones.^{5,6}

In Ponseti's technique, the first two casts are applied with the forefoot supinated so as to bring it into alignment with the hind foot.⁷ The third cast is applied with the forefoot abducted and simultaneous counter pressure over the head of talus. In the fourth cast, the forefoot is further abducted. Prior to the fifth cast, the degree of dorsiflexion is assessed and if dorsiflexion is not possible beyond neutral, then a percutaneous Achilles tenotomy is required. Congenital Talipes Equino Varus is a matter of concern for the parents as well as to treating doctors because clubfoot needs early treatment and strict follow-up⁸ to achieve satisfactory end results at adolescent. The goal of treatment is to reduce or eliminate these four deformities so that the patient has a functional, pain free, plantigrade foot, with good mobility and without calluses, and does not need to wear modified shoes.⁸ The Ponseti technique is based on a thorough understanding of the anatomy and

pathology of Congenital Idiopathic Clubfoot it involves a fairly small number of manipulations (between five and seven) and usually requires performing an Achilles tendon tenotomy under local anaesthesia⁹, later on Denis Brown shoes were advise. Looking at the local and international literature which shows Ponseti's method is safe and effective mode of treatment and radically decrease the need for extensive corrective surgery.¹⁰ Study conducted by Sharma has showed effectiveness of Ponseti method in congenital club foot to be 95%.⁴ A local study by Iqbal J has evaluated effectiveness of Ponseti method in congenital club feet children under one month.⁷ We designed this study to save the time by reducing the number of casts as advised by Ponseti and money of this resource deprived country and prevent the long term sufferings and complications of the morbidity and other methods. In comparing the conservative and operative methods of treatment, literature reveals that the conservative method i.e. Manipulation and serial casting produces lower or no complication, less pain and better function.^{11,12} The conservative method is found to have impressive short and long term results to the tune of 90%.¹³ This study aims to assess the anatomical correction with cosmetic and functional outcome of the Ponseti method in Congenital "Talipes Equino Varus" under 12 months of the age.

MATERIALS AND METHODS

This experimental study was contains 50 cases of congenital talipes equino varus "CTEV" and was carried out in the department of Orthopaedic and Traumatology of Liaquat University of Medical and Health Sciences Jamshoro/Hyderabad, with the duration of two years from 21-01-2009 to 20-01-2011. In this study all the case were selected with age of one year from the birth with congenital "talipes Equino Varus". All the cases with Acquired "Talipes Equino Varus", atypical foot, "talipes Equino Varus" with Arthrogryposis Multiplex Congenital, "talipes Equino Varus" previously treated by method other than ponseti technique were excluded from the study. The Data was entered and analyzed in statistical program SPSS version 16.0. Simple frequencies and percentages of categorical variables such as gender, estimated growth, placental localization, medical disorders, any addiction, hospitals, place of delivery, mode of delivery, deformities, severity of clubfoot, procedures, complications, final outcome, were calculated. No statistical test was applied for any comparison.

RESULTS

Total 50 cases of congenital Telipase Equino Varus (CTEV) having 77 feet were analyzed in this study based on inclusion criteria. Out of 50 cases, 32(64.0%) were males and 18(36.0%) were females (male female ratio 1:7). Out of 50 cases, 27 (54.0%, n = 50) had

bilateral (54 feet) deformities and 23 (46.0%, n = 50) cases were unilateral deformities. Of these, 13 were on left side and 10 on right side. The parents of the patients with unilateral deformity were informed about possible foot length differences and atrophy in leg muscles. Table No.1

Severity was assessed according to Pirani Scoring system. In the present study, out of total 77 feet, 48 (62.0%) had severe foot deformity while 29(37.60%, n = 77) patients had moderate foot deformity. Chart No. 1.

All the cases were initially treated by POP casting. Percutaneous Achilles tenotomy was performed in 53(68.8%, n = 77) patients. Chart No.2.

Out of 77 feet, rocker bottom foot deformity developed in 03 (3.8%) feet, increased stiffness of ligaments and joints occurred in 1(1.2%, n =77) foot while vascular complications like skin ulceration and necrosis was observed in 1(1.2%, n =77) feet. At the end of 2 to 3 years follow-up period, in 72 (94.0%, n = 77) patients congenital clubfoot deformities were corrected successfully by using Ponseti method while 05 (6.0%, n = 77) patients were not fully corrected due to other complications. Table No. 2.

Table No. 1 **base line charecteristics of the patients (n = 50)**

	Number	Percentage
Gender Distribution		
Male	32	64.0%
Female	18	36.0%
Frequency of Deformities		
Bilateral	27	54.0%
Unilateral:	23	46.0%
- Left	13	43.5%, (n = 23)
- Right	10	56.5%, (n = 23)

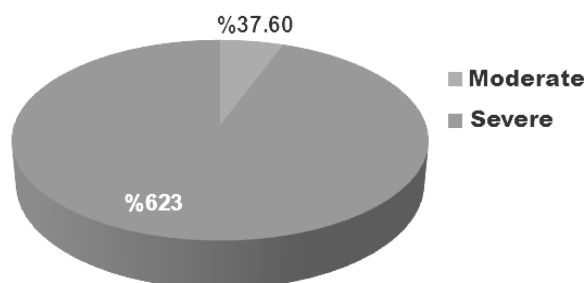
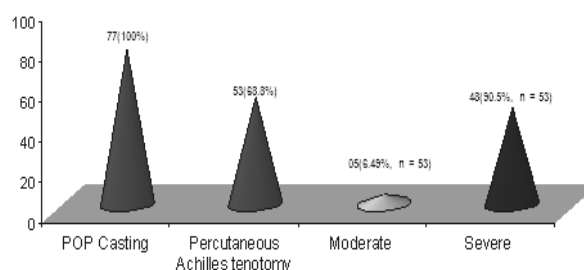


Chart No. 1: **Severity of clubfoot (n = 77)**



Procedure**Case No.2: Details of Procedure Performed (n = 77)****Table No. 2: Complications and Outcome of Treatment (n = 77)**

	Number	Percentage
Complications		
Rocker bottom feet	03	3.8%
Increased stiffness of ligaments and joints	01	1.2%
Vascular complications	01	1.2%
OUTCOME		
Corrected	72	94.0%
Failure	05	6.0%

DISCUSSION

Clubfoot or congenital talipes equinovarus is a complex deformity of foot that requires meticulous and dedicated efforts on the part of the treating physician and parents for the correction of the deformity. Idiopathic clubfoot has been documented as a hard and frustrating deformity to treat.¹⁴ Ponseti treatment for clubfoot has been gaining popularity due to the good results demonstrated by Ponseti and other institutions.¹⁵ In this series, 64.0% were male and 36% were female. The male to female ratio is high (male: female, 1:7) in comparison to the series of Gupta A et al.¹⁶ who showed the slightly higher frequency of gender in his study i.e. 81% male and 19% female while Khan NU et al.¹⁷ reported the 60.3% male and 39.7% female which is similar to this study. In a local study conducted by Arif M. et al.¹⁸ described 53.3% male and 46.7% female out of 30 cases of congenital talipes equinovarus (clubfoot), this difference is because of small sample size. Palmer¹⁹ explained this by suggesting that females require a greater number of predisposing factors than males to produce a clubfoot deformity. Social bias and increased attention towards males in our region can account for the higher incidence in males in our study. The order of birth also seemed to have an influence on the occurrence of clubfoot, with 65% of cases in the first-born child, which is in accordance with various other studies.^{20,21}

In the present study, out of 50 children, 54.0% had bilateral clubfoot and 46.0% had unilateral clubfoot (13 on left side and 10 on right side). Khan NU et al.¹⁷ involved 48.9% children having bilateral clubfoot and 51.0% had unilateral clubfoot out of 141 patients, this less difference is due to large sample size of the study. Gupta et al.¹⁶ showed similar results i.e. 60% children had Bilateral clubfoot while 40% had unilateral clubfoot in his study on 96 patients.

The Ponseti method of conservative clubfoot treatment is an excellent method of club foot treatment, of which

there have been successful results in western countries.^{21, 22, 23, 24}

In this study reporting early results of the Ponseti treatment, 92% of the deformities were corrected without need for extensive surgery. This recovery rate is consistent with the results, reported by Herzenberg et al.²¹, whose study included similar population and follow-up. Another study by Goksan SB et al.²⁷ recovery rate was 95% which is similar to this study.

The duration of casts in this study for more than 70% of feet was five weeks or (3 to 8). The duration decreased over time as we mastered the technique and started getting faster correction. Ponseti et al.²⁵ reported five–12 weeks' duration of casts (average, 9.5 weeks). In another study by Laaveg et al.²⁰, the average duration was 8.6 weeks whereas Gupta A et al.¹⁵² also observed that the duration of casts for more than 85% of feet was five weeks or less which correlate to this study. The duration decreased over time as we mastered the technique and started getting faster correction. These findings correlate well to the study of Gupta A et al.¹⁶ Ponseti et al.²⁵ reported five–12 weeks' duration of casts (average, 9.5 weeks). In another study by Laaveg et al.²⁰, the average duration was 8.6 weeks. Morcuende et al.²³ reported an average time from the first cast to tenotomy as 16 days for one group and 24 days for another group in the same study.

The Ponseti method²⁶ of correction of clubfoot deformity requires serial corrective casts with long-term brace maintenance of the correction. In this study reporting early results of the Ponseti treatment, 92% of the deformities were corrected without need for extensive surgery. This recovery rate is consistent with the results, reported by Herzenberg et al.²¹, whose study included similar population and follow-up. An other study by Goksan SB et al.²⁷ recovery rate was 95% which is similar to this study.

CONCLUSION

In conclusion, the Ponseti method is a very safe, efficient treatment for the correction of clubfoot that radically decreases the need for extensive corrective surgery. Furthermore, it can be used successfully in children especially when no previous surgical treatment has been attempted. The decline in extensive clubfoot surgery should encourage national efforts to make this method the gold standard in the treatment of congenital idiopathic clubfoot. Educational programs should be targeted to primary care physicians, pediatricians, gynaecologists and lady health workers to increase awareness of the Ponseti method and its excellent results, so that they can advise families accordingly. It is advised that the treatment of club foot should be started within few days of birth to achieve best results. Orthopedicians who adopt the Ponseti method will feel rewarded by the satisfaction of successfully correcting

what traditionally has been a very frustrating deformity to treat.

REFERENCES

- Anand A, Sala DA. Clubfoot: Etiology and treatment. *Ind J Orthop* 2008;42:22-8.
- Beaty JH. Congenital Anomalies of the lower extremity. In: Canale ST, Beaty JH, editors. *Campbell's operative orthopaedics*. 11th ed. Philadelphia: Mosby; 2008.p.1063-1179.
- Sanghvi AV, Mittal VK. Conservative management of idiopathic clubfoot: Kite versus Ponseti method. *J Orthopaedic Surg* 2009;17: 67-71.
- Cahuzac JP, Baunin C, Luu S. Assessment of Hind foot Deformity by Three Dimensional MRI in Infant Clubfoot. *J Bone Joint Surg* 1999;81B: 97 – 101.
- Gerlach DJ, Gurnet CA, Limpaphayom N, Alae F, Zhang Z, Porter K, et al. Early results of the ponseti method for the treatment of clubfoot associated with Myelomeningocele. *J Bone Joint Surg Am* 2009;91:1350-9.
- Shahab-ud-din, Shah SA, Hayat S. conservative management of congenital talipes equino varus (club foot). *JPMI* 2004;18(3):368-72.
- Ponseti IV, Campos J. Observations on pathogenesis and treatment of clubfoot. *Clin Orthop* 1972;84:50–60.
- Shahabuddin, Shah SA, Hayat S. Conservative treatment of Congenital Talipes Equino Varus (clubfoot). *J Postgrad Med Inst* 2004;18:368–72.
- Palmer RM. The genetics of talipes equinovarus. *J Bone Joint Surg [Am]* 1964;46:542-56.
- Stewart SF. Club foot: its incidence, cause and treatment. *J Bone Joint Surg [Am]* 1951;33:577-88.
- Lehman WB, Mohaideen A, Madan S, et al. A method for the early evaluation of the Ponseti (Iowa) technique for the treatment of idiopathic clubfoot. *J pediatr Orthop* 2003;12(12):133-40.
- Dobbs MB, Gordon JE, Walton T, et al. Bleeding complications following percutaneous tendoachilles tenotomy in the treatment of clubfoot deformity. *J Pediatr Orthop* 2004;24(4):253-7.
- Dobbs MB, Rudzki JR, Purcell DB, et al. Factors predictive of outcome after use of the Ponseti method for the treatment of idiopathic clubfoot. *J Bone Joint Surg (Am)* 2004;86:22-27.
- Elshenawy EM, Hassanen EY, Ramadam AI, Ibrahim MM. The Mansoura experience in the treatment of idiopathic clubfoot deformity using the ponseti technique. *Acta orthop Belg* 2008;74:658-66.
- Lehman WB, Mohaideen A, Madan S, Scher DM, Van Bosse HJP, Iannaccone M, et al. A method for the early evaluation of the Ponseti (Iowa) technique for the treatment of idiopathic clubfoot. *J Pediatr Orthop B* 2003; 12: 133–40.
- Gupta A, Singh S, Patel P, Patel J, Varshney MK. Evaluation of the utility of the Ponseti method of correction of clubfoot deformity in a developing nation. *Int Orthop* 2008;32(1):75-9.
- Khan NU, Askar Z, Hakeem A, Durrani Z, Ahmed I, Khan MA, et al. Idiopathic congenital clubfoot: our experience with the Ponseti method of treatment. *Pak J Surg* 2010;26(1):70-4.
- Arif M, Inam M, Sattar A, Shabir M. Usefulness of ponseti technique in management of congenital talipes equino-varus. *J Pak Orthop Assoc* 2011; 23(2):60-4.
- Palmer RM. Genetics of talipes equinus varus. *J Bone Joint Surg Am* 1964;46:542–556
- Laaveg SJ, Ponseti IV. Long-term results of treatment of congenital clubfoot. *J Bone Joint Surg Am* 1980;62(1):23–31.
- Herzenberg JE, Radler C, Bor N. Ponseti versus traditional methods of casting for idiopathic clubfoot. *J Pediatr Orthop* 2002;22(4):517-21.
- Morcuende JA, Abbasi D, Dolan LA, Ponseti IV. Results of an accelerated Ponseti protocol for clubfoot. *J Pediatr Orthop* 2005;25(5):623–626.
- Morcuende JA, Dolan LA, Dietz FR, Ponseti IV. Radical reduction in the rate of extensive corrective surgery for clubfoot using the Ponseti method. *Pediatrics* 2004;113(2):376–380.
- Colburn M, Williams M. Evaluation of the treatment of idiopathic clubfoot by using the Ponseti method. *J Foot Ankle Surg* 2003; 42(5):259–267.
- Ponseti IV, Smoley EN. Congenital clubfoot: the results of treatment. *J Bone Joint Surg Am* 1963;45(2):2261–2275.
- Ponseti IV. Clubfoot management. *J Pediatr Orthop* 2000;20(6):699–700.
- Goksan SB. Treatment of congenital clubfoot with the Ponseti method. *Acta Orthop Traumatol Turc* 2002;36:281-7.

Address for Corresponding Author:

Dr. Muhammad Khan Pahore
National Medical Center Khursheed Town Hala Naka
Hyderabad.
Cell: 0306 3314761.
Email: m.khanpahore@hotmail.com